CARE FROM A DISTANCE

- A PRACTICE STUDY OF TELEMEDICINE'S INFLUENCE

ON THE ROLE OF THE NURSE

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MASTER THESIS IN INFORMATION STUDIES

TITLE PAGE

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ABSTRACT

Keywords: Telemedicine, Qualitative practice study, Activity theory, COPD, Nursing discipline.

Problem field: As telemedicine initiatives are emerging both globally and in Denmark this thesis aims to understand how nursing as professional discipline thrives in this technological context, by studying the practice of nurses working in the TeleCare North COPD initiative in the region of northern Denmark in three different municipalities.

Research objectives: The focus of the study is to provide insight in how the nurses practice is manifested one and a half year after initiative rollout, targeting the framework of their practice from understanding the local set-ups, defining a general practice and identifying how telemedicine influences nursing as discipline in the auspices of the studied initiative.

Research design: As the study is situated in an activity theoretical paradigm, the methods used for data collection and analysis consist of interviews, contextual inquiry, thematic networks and activity systems are the theoretical framework.

Discussion: Studying the local set-ups and defining a general practice for the participating nurses has been difficult as the activities has proven to be bound by the nurses individual approaches, which is not completely outlined in the activity analysis, but is shown in the themes in the thematic networks. However, a general practice understanding is defined.

Conclusion: We have found that the nurses practice does not only concern medical consultation but also important elements of guidance/supervision and psychological support.

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DANISH SUMMARY

I det flere og flere telemedicinske initiativer fremkommer, både globalt og i Danmark, vil vi med dette speciale sigte efter at forstå hvordan sygeplejerske professionen trives, i denne teknologiske kontekst. Dette gøres med udgangspunkt i driften af TeleCare Nord KOL, hvor den kommunale sygeplejerskes arbejdspraksis undersøges. For at forstå hvordan sygeplejerskens arbejdspraksis er i driften af TeleCare Nord samarbejdes der med de ansvarshavende koordinatorer og sygeplejersker i tre nordjyske kommuner, Hjørring, Frederikshavn og Aalborg. I det TeleCare Nord KOL har været i drift i halvandet år, findes det interessant at forstå de individuelle kommuners organisatoriske set up, definere en general praksis og forstå hvordan det telemedicinske arbejde påvirker sygeplejerske professionen.

For at opnå denne viden og forståelse er det valgt at tilgå problemfeltet ud fra kvalitativt paradigme og med en teoretisk fundering i *Aktivitets Teori*. Dataindsamlings metoderne omfatter *semi-struktureret interviews* med både koordinatorerne og sygeplejerskerne i hver af de tre kommuner. I Aalborg kommune er det dog valgt at udføre et *Fokus Gruppe Interview* med sygeplejerskerne. For at opnå en forståelse for arbejdspraksissen og de aktiviteter og handlinger der finder sted er det valgt at bruge *Contextual-Inquiry*. Til at behandle dataene anvendes tematiske netværk og aktivitets systemer.

Ud fra denne tilgang opnås en forståelse for sygeplejerskens praksis og de lokale set-ups. Gennem brug af OpenTele systemet er det muligt for de kommunale telemedicinske sygeplejersker at aflæse borgernes

indsendte sundhedsdata og tager derefter telefonisk kontakt til borgerne hvis det faglige skøn ser problemer i forhold til borgernes helbred. Disse aktiviteter ses som den generelle praksis der foregår i de tre kommuner. Ud fra de tematiske netværk og aktivitets systemerne ses det at de telemedicinske sygeplejerskers praksis er mere forskellig end som så, da deres individuelle tilgang til deres arbejde skaber forskellige aktiviteter i hver kommune. Dette er også påvirket af de lokale set-ups der enten er funderet i hjemmeplejen eller ved sundhedscentret. Funderingen i hjemmeplejen giver den telemedicinske sygeplejerske fordele i forhold til at forstå borgerens på en anden måde end når praksissen er funderet i sundhedscenteret, som derimod giver sygeplejersken adgang til andre ressourcer der kan hjælpe til en forbedring i borgerens liv. Fælles for de tre kommuner er at de telemedicinske sygeplejersker ser formålet med deres praksis værende at hjælpe borgerne til at hjælpe sig selv og hjælpe borgerne til at have et meningsfyldt liv med deres kroniske sygdom KOL.

ACKNOWLEDGEMENTS

ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS:

TCN: TeleCare North

COPD: Chronic Obstructive Pulmonary Disease

GOLD: The Global Initiative for Chronic Obstructive Lung Disease

GP: General Practitioner

DEFINITIONS:

Municipal Nurse: Refers to the nurses working with telemedicine in the TeleCare North COPD operations.

Primary nurse: Is a nurse working with telemedicine in the TeleCare North COPD operations.

Coordinating nurse: Is a nurse who oversees the management of the TeleCare North COPD operations in a municipal setup.

Coordinator: refers to the individual overseeing and coordinating the municipal nurses in the TeleCare North COPD operations.

Citizen: Individuals who are included into the TeleCare North COPD operations. In the municipalities, the nurses do not use the term patient, but instead sees the individual as a citizen.

TeleKit: It is a container that is given to the citizens that are included into the TeleCare North COPD operations. In the container, an android tablet with the OpenTele system installed, a weight that can be wireless connected to the tablet, a blood pressure monitor and a pulse oximetry, are available.

Indhold

1.0 INTRODUCTION

1.1 EMPOWERING PATIENTS

Patient autonomy, patient advocacy, expert patients and patient 2.0 - the concept of patient empowerment and its' sub concepts are global phenomenons, rising with the digital development in healthcare, influencing not only patient's abilities, but also the abilities of healthcare professionals. The shift in the healthcare paradigm to a patient centered focus calls for some considerations regarding the meaning and purpose of patient empowerment, to understand how it manifests in healthcare practices.

Digitization has spread within public healthcare as well as individual health awareness through systems, applications and in general knowledge about managing own health, distributed from digital platforms. Big international organizations and political commissions such as WHO (World Health Organization) and The European Commission are promoting digital solutions as a mean in personalizing healthcare and engage individuals in managing their own illnesses and lifestyle choices (Hopia et al,

2015, Prigge et al, 2015). The western world is constantly in development regarding digital healthcare solutions. Looking into the future interventions in healthcare strategies proposed by WHO and The European Commission, their agendas for securing streamlining and quality in healthcare highly revolve around empowering the individual patient through mobile technology (WHO, 2011, The European Commission, 2017). Patient empowerment can be explained as patients increasing their awareness of their own medical situations and thereby becoming self-managing regarding their illnesses. The empowerment aspect is embedded within the possibilities of and competences in monitoring own health and the conditions influencing it (Gray, 2002, Kitson et al, 2012, Hopia et al, 2015, Funnell, 2016).

Sub-concepts that are often targeted in relation to patient empowerment are patient autonomy and patient advocacy. Both concepts address patient's abilities to handle own health, and being co-determining in making medical decisions, if it is

deemed ethically reasonable. The meaning of the concepts signalizes a certain independence from the absolute supervision of healthcare professionals, as patients are encouraged to participate as active partakers in their own treatment/rehabilitation (Hyland, 2002).

The coexistence of the two above concepts might not even be a possibility as a professional healthcare set-up always will question one of the two and the idea of the self-managing patient is deemed to merely an illusion. What indicates that there can be established a common ground for both patient autonomy and patient advocacy is positive evidence from securing solid balanced processes of information-sharing between patients and healthcare professional, but also internally between healthcare professionals. Good communication is crucial if patients are to be enabled to practice autonomy (Aveyard, 2000, Hyland, 2002, Ueckert et al, 2003).

To practice empowerment and enable patient autonomy and advocacy relies on coorporation between patients and healthcare professionals. Concepts like patient participation, involvement, engagement, activation and enablement address the different processes concerning how patients may be encouraged to get involved with their own illness and general health, and what stages patients must undergo to become active partakers. Modern healthcare policies embrace these stages and healthcare professionals have an ethical responsibility to comply with them to the best of their ability (Fumagalli et al., 2014). The incitement for empowering patients lies in the stage of involvement and implies that healthcare professionals invite patients to take part in their treatment and considerations on future care, but also in patient's determination to develop an understanding of his/her medical situation (Fumagalli et al, 2014). Activation is the stage that is manifested in elements that trigger the patient's need to be involved and is where medical professionals can make a crucial effort in helping patients become self-managing. The activation concept is closely connected to what illness or rehabilitation program patients are encouraged in (Fumagalli et al., 2014). The engagement stage is

anchored in patient's motivation to learn about own their condition and plans for progress or stabilization. Once motivation is present, patients are easier adapting to the idea of co-mastering their illness together with affiliated healthcare professionals (Fumagalli et al, 2014, Higgins et al, 2016). For a patient's abilities to develop and their health oriented awareness increasing, the stage of enablement has a significant meaning. Patients must feel that they achieve new skills/techniques for managing fluctuations related to their symptoms. This requires well established supervising abilities in healthcare professionals (Fumagalli et al, 2014). Finally, the stage of participation is possible on the terms of the fulfillment of the previously mentioned stages. When all stages are at interplay, patients can become active partners in managing their own illness and thereby participate in and understand medical supervision (Fumagalli et al., 2014). Figure 1 shows a model by Fumagalli et al (2014), that outlines the interconnectivity of the abovementioned stages:
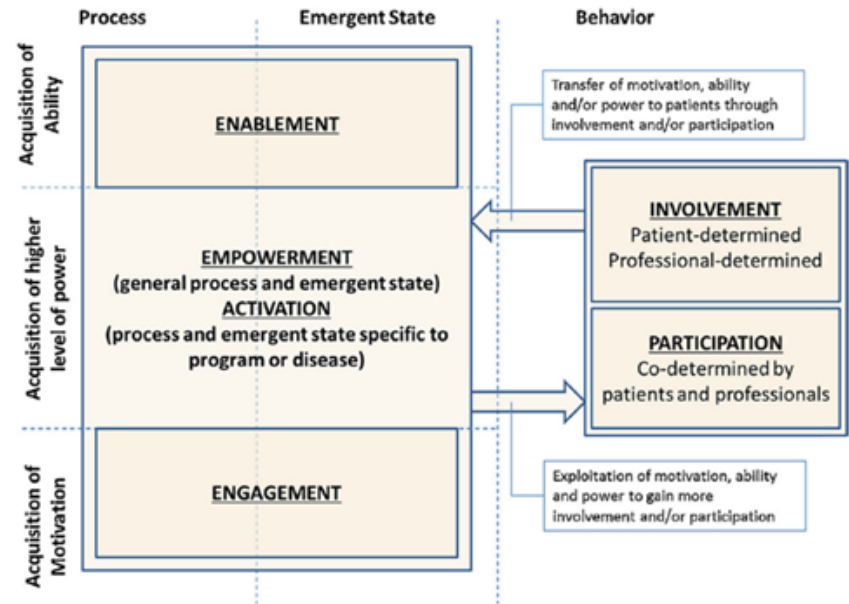
Figure 1: Representation of a tentative concept mapping (Fumagalli et al., 2014)

Expert patients is another concept of self-managing patients. The concept addresses the education of patients to become, as the term indicates, experts in their own illness and health, and is often directed towards patients with chronic illnesses, as these call for constant awareness in relation to detecting symptoms of aggravation and the ability to act upon these (Greenhalgh, 2009). If patients are to be referred to as experts, it calls for some considerations on their level of expertise and the actual possibilities of "educating" patients.

The discussion on the meaning of the concept reveals that there are some challenges in the relation between patient and professional, in regard to recognizing the value of the concept (Shaw & Baker, 2004). If patients are to question the advice or decisions made by medical professionals it might jeopardize their ability to act together, as the power relations between the two always will be somewhat unequal. Allowing the concept of expert patients its place in modern healthcare demands that patients respect the medical training and thereby knowledge of doctors and nurses, and vice versa are healthcare professionals to acknowledge the value of patients concerns and considerations (Shaw & Baker, 2004). Empowerment is a key topic in many aspects of healthcare research, not only focusing on patients, but also the empowerment of nurses, physicians, health organizations and in political agendas/movements.

A wider study of research concerning empowerment in healthcare proposed by Bridges et al. (2008) shows that though empowerment is addressed in both professional, organizational and political aspects of healthcare, the strongest representation of the term is within the patient-category. The diagram in figure 2 shows the distribution in percentage per category, as presented in a literature study on empowerment in healthcare research by Bridges et al. (2008), see next page →
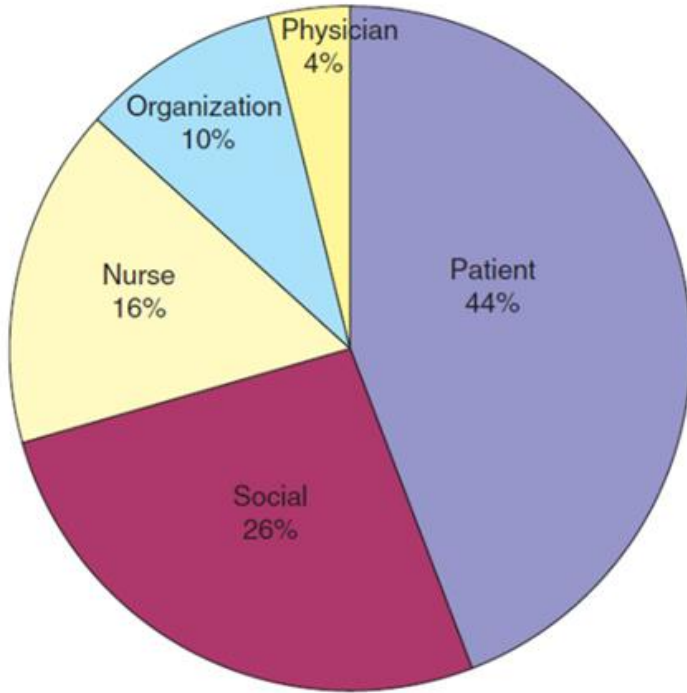
Figure 2: Proportion of empowerment articles published between 1980 and 2005 focusing on specific populations or entities (Bridges et al., 2008)

When patient empowerment seems to be a dominant category with empowerment in healthcare, it might be because the term itself signalizes a revolution within healthcare systems, by creating new standards for patient care which also influence how empowerment can be established in respectively healthcare professions, organizational set-ups and the political debate (Bridges et al., 2008). Whether patients are able to cope with the concept of empowerment and what it withholds is one of the main concerns raised by healthcare professionals. Salmon and Hall (2004) and Cole et al. (2014) argue from a medical professional point of view, that scientific findings suggest that patients might not be able to cope with the full scope of what is required of them in relation to their own empowerment. The argumentation is focused on the relation between patient empowerment in clinical care and medicine a discipline. It is not in the belief of Salmon and Hall, that those two elements are compatible in practice, as the concept of patient empowerment always will be undermined by the unchanged discourse within medicine; that the healthcare professional knows best. It is

suggested that more research should be conducted in order to develop an understanding of the possibilities for patient empowerment to comply with the requirements of a patient-healthcare professional relation, and avoid patients feelings trumped by the discourse of medicine. Funnell and Anderson (2004) address the problematization of implementing patient empowerment as a result of the need for a paradigm change within the practice understanding of healthcare professionals, as the concept is influencing the power relations in the healthcare hierarchy.

1.1.1 TECHNOLOGY IN EMPOWERMENT

Technology in healthcare has undergone rapid development since the beginning of the 2000s. E-health has become an umbrella concept, that covers many other sub-concepts and terms, including telemedicine (Pagliari et al.,2005). Whether technology can play a key role in empowerment in any aspect is a widely discussed research topic. In relation to the concept of patient empowerment in healthcare, technology is also considered one of the main means to its facilitation. Several types of ICTs (Information and Communication Technology) are considered beneficial in patient empowerment (Calvillo et al., 2013). What technologies that are and will be successful in facilitating patient empowerment not only depends on the interface possibilities and access, but also on the attitude towards the technology of the involved actors. Calvillo et al. also address the problems in patient's technological abilities and that some groups might be superior to others, when it comes to IT competences. This can create a divide in whom gets the most out of their treatment and that some might be furthered instead of others. The digitization of the relation between healthcare professionals and patients also imply a certain digitization of the persons involved; e.g. nurses, doctors and the patients themselves. The relation being merely reduced to data input (from the patient) and evaluation of data output (from the healthcare professionals) might propose a concern for the ethics of telemedicine; if it is ethically responsible to "reduce" patients

to datasets and leave healthcare professionals to deliver care to patients they might never meet (Mort et al., 2009). Korhonen et al. (2014) suggest that science have not yet reached a time in which the ethical dimensions of a concept such as telemedicine can be outlined, and more perspectives from both healthcare professionals and patients need to be submitted before doing so.

1.1.2 THE EFFICIENCY ASPECT

Another aspect of the paring of the concepts patient empowerment and telemedicine, that needs to be taken into consideration in relation to why these concepts even co-exist and why it is sought to be implemented in especially public healthcare sectors, is the efficiency aspect. The primary argumentation for the implementation of telemedicine initiatives is that they provide care from a distance, which implies that healthcare professionals and patients involved in telemedicine initiatives do not necessarily meet, or only meet a few times during the treatment period. Telemedicine is meant to improve healthcare systems by increasing efficiency in aspects like economy, allocation of resources and infrastructure, often focused on patients with chronic illnesses or patients undergoing rehabilitation, as these are frequent visitors at the GPs, ambulatories and are often prone to rapid hospitalization, due to suspected deterioration (Scalvini et al., 2004, Bossen & Ballegaard, 2014).

Even though telemedicine initiatives sound promising in relation to optimizing healthcare systems, there is a lack in evidence of their impact on efficiency in public healthcare, and knowledge on which premises this efficiency can and should be measured on. Efficiency of telemedicine in economy and resource allocation is evaluated from different parameters and calls for more streamlined methods of evaluation if any comparisons are to be made between findings (Bergmo, 2009).

Indications of telemedicine having an impact on efficiency in healthcare has however been proven in studies on geriatric care

and home care - when there is a long or permanent treatment period, as in management of chronic illness (Whitten et al., 2002, Hailey et al., 2004, Hjelm, 2005). The technologies in telemedicine has developed fast through the 2000s and lack of studies of efficiency in initiatives with new technologies might be the cause as to why telemedicine is being questioned as benefitting the efficiency of public healthcare (Kidholm et al., 2014).

1.1.3 IMPACT ON HEALTHCARE PRACTICE

Because of the rising focus on patient empowerment and technology in healthcare, and especially the parings of those concepts, its impact on healthcare professionals is being questioned regarding education, work ethics and organization. Early studies in the implementation of telemedicine and its effect on healthcare professionals work practice show that telemedicine initiatives should be approached with a special emphasis on educational and organizational considerations.

Telemedicine can demand the adoption of new techniques in relation to healthcare professionals communicative and pedagogical abilities. Furthermore, an organizational perspective such as the relation between healthcare professionals and patients, and from professional to professional can be prone to profound change, due to a stronger focus on social abilities rather than clinical knowledge (Currell et al., 2000, Gherardi, 2009). It is questioned whether telemedicine is more of a social intervention instead of clinical, in relation to the supervision and pedagogical nature of the contact between professionals and patients (Gherardi, 2009). Telemedicine might be the beginning of the establishment of a new healthcare sector, focusing on working together with patients rather than on them (Jensen, 2010). Regarding the changes telemedicine can cause in healthcare professionals practice, the concept provides some perspectives on the future education of nurses, as they are the group of healthcare professionals that most often are in contact with patients in telemedicine initiatives (Hopia et al., 2015). In relation to organizational changes that might be a

reality in telemedicine initiatives, the power distribution between healthcare professionals is also prone to change, as nurses are furthered in the advisory role in comparison to traditional clinical setups (Dyb & Andreassen, 2014).

1.2 AN INTERNATIONAL PERSPECTIVE ON TELEMEDICINE

As mentioned in section 1.1 telemedicine is highlighted as a natural development of healthcare initiatives regarding patient empowerment by international health organizations, political and governmental institutions (WHO, 2011, The European Commission, 2017). The reasoning for the implementation of telemedicine differs from the circumstances underlying the need for implementation. In some cases, telemedicine is introduced as a solution to problems in the accessibility of medical consultation, e.g. if the distance between patients and clinics/hospitals is significant, if patients live isolated or because of demographic factors such as the increase of elderly citizens in

western societies (WHO, 2011, Nordens Velfærdscenter, 2013, The European Commission, 2017). The predominant argument for the focus on telemedicine initiatives in the western world is primarily because of a change towards a patient-centered healthcare perspective. In the northern European countries, the focus on the possibilities of telemedicine is mainly connected to raising the quality of life in chronically ill patients and patients undergoing longer periods of treatment/rehabilitation. Telemedicine for rehabilitation and chronically ill is highly founded on the principles of patient empowerment, through education and supervision in regard to patients learning to manage their illness, and live as good lives as possible with a permanent or temporary diagnosis. Other factors that are significant in relation to implementation of telemedicine in northern Europe are health economical savings, and telemedicine as a possible solution to a fast-growing elderly population (Nordens Velfærdscenter, 2013).

1.2.1 DANISH IMPLEMENTATION OF TELEMEDICINE

In Denmark, the implementation of telemedicine is and has been in effect over the past two decades, in both small and large-scale initiatives. The Danish Agency for Digitisation published a telemedicine action plan in 2011, as a part of the national digitization strategy. The action plan targets five areas of implementation; clinically integrated home-monitoring, home-monitoring for COPD-patients, tele-psychiatry, internet-psychiatry and telemedicine for wound assessment (Digitaliseringsstyrelsen, 2012, Regeringen/KL/Danske Regioner, 2012, KL, 2013). In 2012, the action plan got a capital injection of 80 million dkk. from the foundation for welfare-technology and with contributions from the Danish Regions and Municipalities (Digitaliseringsstyrelsen, 2012). One of the bigger commitments in Danish telemedicine initiatives up till today, is telemedicine in home-monitoring for COPD-patients. The goals for the COPD-initiative are stated as:

• Reduction in hospitalizations and ambulatory visits.

• Increased quality in treatment, flexibility and safety in everyday life from self-management.

• Telemedicine should be easy to use for both citizens receiving treatment and the healthcare professionals involved.

(Digitaliseringsstyrelsen, 2016)

The COPD-initiative is currently implemented in the northern region of Denmark and involves all 11 municipalities in the region, with a project period that ran from 2012-2015[1]. The initiative is being run as a cooperation between TeleCare North as an expert instant on telemedicine, The North Denmark Region, the municipalities of the region, the general practitioners, the regional hospitals and project partners such as

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[1] http://www.rn.dk/Sundhed/Til-sundhedsfaglige-og-samarbejdspartnere/TeleCare-Nord

Aalborg University and The Danish Lung Association[2]. The initiative is to be implemented nationally in 2019 (Digitaliseringsstyrelsen, 2017a).

1.2.1.1 PAST AND CURRENT INITIATIVES

The COPD project in The North Denmark Region is the biggest telemedicine project for home-monitoring in the history of Danish telemedicine (Digitaliseringsstyrelsen, 2017b). However, the project is not the first big telemedicine initiative in Denmark. TELEKAT was a previous project with a similar focus as the TeleCare North COPD initiative, researching in prevention of hospitalization and ambulatory visits in COPD-patients using ICT. The project ran from 2008–2011 and included several private and public partners[3]. The research results of the TELEKAT project show that home-monitoring prevents hospitalization in COPD-patients and that there is a general wish for self-monitoring

amongst these patients (Aalborg Universitet, 2011). Other Danish telemedicine initiatives count 'Horsens på forkant' – an initiative in cross-sectoral coorporation in treatment of citizens with chronic illnesses, that ran from 2012-2015 as a collaboration between public and private partners. The results of the project show that citizens with chronic illnesses feel a general improvement in quality of life when they have access to self-monitoring with supervision from healthcare professionals. There have also been proven savings regarding the transportation of citizens between their homes, clinics and hospitals, and thereby an increased efficiency in relation to resources spend per citizen which enables savings in health economics (Horsens på forkant – Kvalitativ evalueringsrapport, 2016).

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[2] http://www.rn.dk/Sundhed/Til-sundhedsfaglige-og-samarbejdspartnere/TeleCare-Nord

[3] http://www.telekat.dk/index.php?id=67

1.2.1.1.1 TELECARE NORTH COPD

The COPD telemedicine initiative running in northern Jutland, is as mentioned in section 1.2.1 implemented as a cooperation between TeleCare North as project management unit and sparring partner, The North Denmark Region, the 11 municipalities of The North Denmark Region and general practitioners in the region[4]. For a more detailed overview of the TeleCare North COPD organizational set-up and the actors involved see section 1.4.4. The COPD-initiative is now fully implemented and has run as a fixed offer for citizens with severe COPD for nearly one and a half years. The initiative is based on the findings from the previous telemedicine initiative for citizens with COPD in northern Jutland, TELEKAT, as the results were predominantly positive[5]. The main goals of the TeleCare North COPD initiative are to increase the quality of life for patients and save resources in public health services related to COPD (ibid).

Patients that comply with the requirements of participation are handed technologies for conducting home-monitoring, and trained telemedicine nurses, in the patient's respective municipality, are responsible for reviewing the patient's data and act upon it if necessary[6]. The primary contact is therefore between patients and the telemedicine nurses. After the duration of the project period there has been conducted (and still being processed) research on the project within the fields of health technology and health economics.

The different research focuses are primarily functionality, health economic performance and evaluation of the impact of health literacy, effect and usability (Hæsum, 2015, Lilholt, 2016). The perspectives and findings from the referred research will be

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[4] http://www.rn.dk/Sundhed/Til-sundhedsfaglige-og-samarbejdspartnere/TeleCare-Nord/Telemedicin-KOL/Nordjyske-erfaringer-med-telemedicin.aspx

[5] http://kommunalsundhed.dk/saadan-blev-telecare-nord-en-tvaersektoriel-succeshistorie/

further introduced and discussed in our literature review. It is addressed in one of the studies, that the project is functional and meets the objectives regarding increased quality of life in the patients. However, research results also show that the initiative does not seem to deliver in regard to the health economic objectives (Lilholt, 2016: 49-50).

1.3 THESIS PROBLEM FIELD AND RESEARCH OBJECTIVES

In relation to the previously introduced topics this master thesis operates within the problem field of a very rich research field; telemedicine, which calls for further delimitation and explanation of the research objectives of this thesis. In regard to the rising focus on patient empowerment in healthcare, telemedicine as a mean to facilitate patient empowerment and its impact on healthcare as discipline we wonder how healthcare professionals competences thrive in the changing environment. As TeleCare North COPD is one of the big-scale Danish telemedicine initiatives that has expired its project period and is now fully implemented, we find it interesting to choose this initiative as a case for studying how the professional practice of the telemedicine nurses manifests itself in a tension between distance and nursing, and how technology affect the purpose and possibilities of providing care from a distance.

Furthermore, we find it interesting to develop an understanding of how nursing as discipline is influenced from a telemedicine setting. The aim of the analysis is to identify the structures that determine how the nurses' practice caring for the COPD-patients from a distance. It is our understanding that the previous and current research focuses on the TeleCare North COPD initiative does not target the practice development of the telemedicine nurses, which we assess can be a valuable perspective in understanding the current status of the initiative, and it might provide answers to results from previous studies, e.g. why there is a lack in improvement of efficiency. The problem statement and research objectives of this thesis are therefore as follows:

"How is the professional practice of the nurses working with the TeleCare North COPD initiative manifested one and a half year after end project period and what can be furthered from this knowledge?"

Sub-questions:

- What are the current local set-ups for the TeleCare North COPD initiatives and why are they as they are?
- How can a general practice understanding of the nurses work in TeleCare North COPD be defined?
- How does telemedicine influence nursing as discipline in the auspices of TeleCare North COPD?

1.3.1 RESEARCH CONTRIBUTIONS

The above objectives will be approached by conducting a qualitative study, and analyzing the obtained data with the analytical perspective of activity theory, to provide insight in how the different activities the nurses engage in are constituted. It is our hope that this thesis will be a contribution to the field of practice studies in the auspices of ICT, and more specifically in the understanding of practices undergoing change in the auspice of digitization. As the TeleCare North COPD project is the pilot initiative for the national rollout in 2019, our expectations for the results of this thesis is to give insight in the relation between the initiative objectives and the established structures, with a practice focus on how nursing as profession is influenced under telemedicine conditions. It is our assessment that by analyzing the practice of the telemedicine nurses we can obtain valuable indications for how the initiative is functioning currently and how it can be developed in the future, with emphasis on all involved parties. The thesis is therefore also meant as a sharing of the nurses involved in the TeleCare North initiatives experiences. Furthermore, the thesis objectives purpose is to provide some pointers about what development nursing as profession is exposed to in the field of telemedicine.

1.4 LITERATURE REVIEW

In the following sections, we will present the literature review conducted for this thesis and the search strategy used for choosing relevant literature. The literature review is comprehensive in relation to the number of topics introduced and discussed, as the purpose of it is not only to review the literature targeting the same themes as this thesis, but also telemedicine as phenomenon and term, as well as the disease characteristics of COPD. The review is structured in a narrative manner, which emphasizes that the review is more subject oriented and targets a wider range of topics than systematic reviews (Bryman, 2012: 110).

As Telemedicine is a broad field, that will need further introduction to grasp its influence in modern healthcare practice, it is our assessment that a narrative literature review will allow us to explorer the concept of telemedicine on a deeper level. In short, telemedicine can be explained as healthcare services over a distance. This is a very simple explanation of the term and does not differentiate it from other terms, such as e-health or telehealth. Furthermore, it does not clarify what kind of technology is needed as to provide these services. This section will therefore investigate relevant literature as to come to an understanding of how telemedicine came to be, what it implies and what defines it as a concept.

It is our assessment that considering research perspectives and findings on the historical and developmental aspects of telemedicine can benefit our understanding of telemedicine as phenomenon and further our understanding of the developmental intentions and the purpose of the concept. The review will also contain perspectives on similar studies on telemedicine's influence on nursing, as well as the research that specifically targets the TeleCare North COPD initiative, as to introduce what results have been found and on what basis.

1.4.1 SEARCH STRATEGY

To secure the relevance and quality of the literature chosen for the literature review, we planned a search strategy emphasizing which keywords, search-strings, databases and journals that were suited for finding the useful literature. As we have chosen to conduct a narrative literature review, the planning of what keywords and search-strings that should be used has been less fixed, as the different topics of the review already set determinations for what should be searched for. These topics are: development in telemedicine, history of telemedicine, e-health, branches in telemedicine, COPD, Nursing practice in telemedicine and research on TeleCare North COPD.

All topics besides from the research on TeleCare North COPD have been searched for in several of the bigger "all-round" research databases such as ResearchGate, ScienceDirect, Elsevier, Springer, Sage Journals, Jstor and The Danish Research Database, as these all contain a wide selection of journals in a broad specter of research fields. These databases have a big

selection of journals on telemedicine such as Journal of Telemedicine and Telecare and Journal of Telemedicine and Telehealth. We have also embraced the use search engines such as Google Scholar as a platform for accessing smaller and more topic specified databases such as BMJ (British Medical Journals) and JAMA (The Journal of The American Medical Association).

1.4.2 THE EMERGENCE OF TELEMEDICINE

The first mentioning of the use of telemedicine in literature, we could find, is an article describing the term of Telognosis from 1950 (Gershon-Cohen and Cooley, 1950). The article describes a machine that can send x-ray images from one hospital to another. This is meant to solve a problem concerning, not every hospital having access to such an x-ray machine and thereby making it possible to provide better healthcare for citizens in rural areas. It is questionable whether Telognosis is actually telemedicine. It fits the description of using ICT to provide a healthcare service that were not already available to the patients

of a specific region and that this service is provided across a distance. However, it is important to note that it is a radiologist sending an x-ray image to a doctor or another radiologist. The patient does not directly get a healthcare service over a distance. With today's technology, any communications between healthcare professionals would then be described as telemedicine. The definition of telemedicine must therefore be more complex than just the provision of healthcare services over a distance. Another understanding of telemedicine is that it is the use of telecommunications technology as to provide medical services and information across a distance (Zundel, 1996). The article provides an example of its use, which is that it can be used to make it possible for less trained healthcare personnel to provide healthcare services across a distance with help. It is further explained that telemedicine usually will be between medical centers where it provides the possibility of two-way communication, using video transmission or a telephone network as to provide information needed to perform medical services. What is interesting about this definition is that the patient is not the direct receiver of the information, but that the two-way communication is between healthcare professionals. This understanding of telemedicine requires that there is a healthcare professional at both locations. These two articles do not see the patient as a participating actor in telemedicine which provides a lackluster understanding of what telemedicine is.

Bashshur (1995) gives another perspective on telemedicine. The article proposes that telemedicine is more complex than the mere transmission of information. In defining the characteristics of a telemedicine system Bashshur (1995) focuses on six key points. There need to be a geographic distance between the healthcare professional and the receiver of care. ICT facilitates the interaction. These two key points are similar to the previous two articles, but the article continues to identify that there needs to be competent staff as to manage the interaction, but also to manage the technology used. Furthermore, the use of a telemedicine system affects the organization and it is therefore important to account for these organizational changes. The fifth

key point concerns the need for clinical protocols as to enhance the ability to treat different diagnosis and the associated treatment. Lastly, it is important to understand that the interaction changes as it goes from face-to-face communication to a different way of communicating, this being e.g. video transmitted communication or by telephone. This understanding of telemedicine clarifies the complexity.

These three articles present three different approaches to what telemedicine is but looking at how other researchers are defining it, it is not strange that these three views are different. In 2007, a group of researcher's peer reviewed 104 perspectives on what telemedicine is (Sood et al, 2007). They conclude that there is a large number of commonalities between the different views on what telemedicine is within the field. They summarize telemedicine as being the use of ICT as to gap a geographical distance between a caregiver and a recipient. Furthermore, while ICT, in all its forms, are a focus it is the patient that telemedicine is centered on. The complexity is also acknowledged. They also find that the reason for researching telemedicine is the possible benefits of lowering costs of healthcare services, breaching the gap of unequal healthcare in rural areas and that it improves quality and efficiency of healthcare services. While this article provides a good overview of the different views on telemedicine and their commonalities, it also provides an understanding of a research field that have not agreed on what telemedicine is. An example can be found in the articles overview of the different definitions, here it can be seen that e.g. one definition concerns itself with telemedicine being the use of ICT as to examine the patient (Sood et al, 2007). This is very different from the definition Bashshur (1995) provides. It is the communication between the healthcare professional and the patient that is in focus, in this definition. While it could seem as a minor difference, it is shows two different pictures of what the purpose of telemedicine is. Even though the literature presents different views of telemedicine it is important to note that it is different from the larger term of E-health. E-health is broader and concerns itself with healthcare

and ICT in a larger sense (Bashshur et al, 2011). Telemedicine lies within the field of E-health, but E-health is much more than telemedicine. It is important to note that the term telehealth is comparable to telemedicine and can be seen used in the same meaning (Bashshur et al, 2011).

While this section provides an overview of what telemedicine is, it is important to note that the field of telemedicine focuses around a variable that have been subject to change – ICT.

1.4.2.1 ICT AND TELEMEDICINE

One of the first articles written about telemedicine was in 1950 (Gershon-Cohen & Cooley, 1950), it was revolutionizing that it was possible to transmit images of x-rays from one location to another. In the late 1960's the idea of telemedicine was broadened and was thought of as a different way of communicating with patients (Bashshur et al, 2011). A paradigm shift. The patient was thought of as a participant. It is most likely not a coincidence that this shift in what telemedicine is happens

in the late 1960's where the capabilities of computers are expanding. The point being that what telemedicine is and what it is capable of is intertwined with the capabilities of the ICT available. This can also be seen in the amount of research articles that are written about telemedicine.

Taking the article written by Sood et al (2007) as an example, it can be seen that there are very few articles in the 1970's and this is the case until the mid-1990's where telemedicine again becomes a popular subject. Moreover, when moving to the late 1990's and the early to mid-2000's there are more articles represented. While it is possible that they may have excluded or not found a lot of research articles with the topic of telemedicine is possible, but the large sample size the provide in their article makes it very feasible that this representation of when articles with the topic of telemedicine are written can be understood as being true. Focusing on ICT it is also here that it evolves and becomes something the public is much more comfortable with and as ICT takes up more space in the public sphere it also

becomes a larger topic of interest within the field of telemedicine (Wang et al, 2017).

As ICT evolves, the field of telemedicine also becomes larger in the sense that it branches out to a wide array of different use-contexts.

1.4.2.2 BRANCHES OF TELEMEDICINE

The literature on telemedicine shows a wide variety of uses. The domain of healthcare is large and the domain of ICT is also large, which in turn means that telemedicine initiatives can vary a lot from each other. While these different branches of telemedicine do not have a patient group that are comparable with COPD patients regarding diagnosis, it is interesting to investigate whether the literature can provide insights that might be useable in this thesis.

One telemedicine initiative concerns medical abortions (Grindlay and Grossman 2017). The initiative removes the need for an onsite physician as to provide the medication required for a medical abortion, while having an equivalent success rate. Another initiative is that of telemedicine for minor injuries (Wootton, 1999) and the initiative for having maritime telemedicine (Dehour et al, 2012). While these initiatives are concerned with different patient groups, they all have the commonality of using telemedicine as a mean to have a medical consultation across a distance.

Another way of using telemedicine is within the field of anesthesia (Firth et al, 2017). Here telemedicine is discussed as a way for medical professionals to collaborate and educate each other and thereby making the general level of knowledge of anesthesia higher across the world. Here telemedicine is thought of as tool for medical professionals. Opposite from this view of telemedicine Bowes & McColgan (2013) write about telecare for older people. Here the focus is that of using ICT as to help elderly people exercise. It is in opposition to Firth et al (2017) because it focuses on the individual instead of the healthcare professional. On the note of telecare for the elderly Söderlund (2004) takes a

critical stance against the idea of ICT being the main facilitator of care as a substitute to having a person provide the care. While Söderlund (2004) sees the benefits of having ICT in the homes of elderly in need of care, she argues that while not every individual is alike, they will need different care and for some that means a healthcare professional instead of ICT as the provider of care. This critical stance is very relevant when looking at the practice of the healthcare professional in the TeleCare North operations as it can be imagined that not all citizens will need the same amount of attention by the healthcare professional, which in turn could mean that some citizen will experience more contact with the healthcare professional than others. This raises the question of whether citizens with COPD are receiving different quality of care and whether it is important or not.

The last example of different branches of telemedicine is that of telemedicine for patients with chronic diseases. Hwang et al (2017) discuss the possibility of using telemedicine as a mean to assessing patients with chronic heart failure. They conclude that

video-based tele-rehabilitation assessment for patient with chronic heart failure is promising. Also on the topic of heart failure Koulaouzidiz et al (2016) uses data from a telemedicine initiative to predict when patients will need to be admitted to a hospital. A more critical view on telemedicine initiatives for patients with chronic heart failure can be found in an article by Albert et al (2017). They seek to uncover the factors associated with using tele-monitoring for patients with chronic heart failure. They conclude that the ICT used in telemedicine initiatives for patients with heart failure needs to be more user focused as to make patients more health literate. While this thesis is not focused directly on the citizen's ability to use the ICT involved in the TeleCare North operations, their ability to use the equipment does affect the practice of the healthcare personnel in charge of monitoring their data. It is therefore interesting to see if similar problems can be found in the TeleCare North operations or if the healthcare personnel are obstructed in their work practice as a consequence of how the ICT system is designed. As there is much literature regarding telemedicine for chronic disease patients,

we will in the following section, take a deeper look into what COPD is, as this is the chronic disease of focus in the TeleCare North operations, and what insights might be valuable to the work presented in this thesis.

1.4.2.2.1 CHRONIC OBSTRUCTIVE PULMONARY DISEASE

As we are to work with health care personnel who works with citizens that suffer from COPD it is important that we have a rudimentary understanding of what it is. This is not to imply that this section will go in depth with COPD and what it is like to have COPD, but it will provide the basic understanding, which we thought necessary as to be able to interview the healthcare personnel and understand their work vocabulary. COPD is the presence of either chronic bronchitis or lung emphysema (damaged lungs causing the lungs to expand with the result that lung capacity is lowered), which can lead to airway obstruction. The COPD diagnosis is often related to smoking or a lot of environmental exposure to e.g. dust or oxidant gasses (Edelman et al, 1992). COPD varies from mild to severe. As it is a chronic disease, it is important to start the patient up in rehabilitation and lessen their exposure to e.g. smoking or environmental exposure as to slow down the progression of the disease. COPD has a high morbidity rate and as it is a chronic disease that affect people all over the world, it was therefore chosen in 1998 to create the global initiative for chronic obstructive pulmonary disease (GOLD).

GOLD was formed as a way to increase the patients' knowledge of their disease, to prevent people getting COPD and to have international standards for diagnosing patient with COPD (Rabe et al, 2007). GOLD uses the classification of GOLD A, B, C and D to refer to the severity of the disease. Patients with mild COPD are classified as GOLD A and patients with very sever COPD is classified as GOLD D. These classifications are used in the Danish healthcare system as can be seen in the operations of the TeleCare North operations for citizens with COPD. While COPD is more complex and much more can be written about it we believe that this information provides a rudimentary understanding of

what COPD is. As the focus of this thesis concerns the healthcare personnel working in the TeleCare North operations we will present the research that was done when it was in trial.

1.4.3 STUDIES ON HEALTHCARE PROFESSIONALS PRACTICE IN TELEMEDICINE

Since telemedicine made its took in patient centered care with the development of suited ICTs, much have been written on the influence of telemedicine on healthcare organization and professionals practice. Research in this field in generally targeting how nurses and general practitioners can accommodate with the concept in regard to the changes in their professional profile and the relation between professionals and patients. As to the different research perspectives on nursing practice in telemedicine, much of the research we have studied is focused on education, organizational change or technology acceptance. In this section, we will introduce the literature we have found on the topic, their research focuses and results.

Currell and Urquhart 2003 have conducted a literature study that we find to have some similarities (topic-wise) the objectives of this thesis, focusing on the effect of respectively telemedicine and face to face patient care with emphasis on both patients and healthcare professionals. The objectives of Currell and Urquharts study is to define the difference between the two healthcare concepts. The results of the literature study address several aspects that calls for more research within the field. In Currell and Urquharts results we have found some aspects that we assess make significant points in relation to the topic of this thesis. From the literature study, it is amongst other concluded that there is a lack of research that targets the different technologies in their use contexts, which according to Currell and Urquhart might be because the literature that exist on the topic revolves around primarily what is referred to as immature technologies. These are never truly defined and are therefore difficult to measure regarding their impact on the practices which they are a part of. Another result targeting a problematization of the research field, proposed by Currell and

Urquhart 2003 is that of reluctance in participation from physicians. It is deemed difficult to access some groups of healthcare professionals, which complicates having a holistic perspective on telemedicine's influence on healthcare professionals in general. Another interesting result from Currell and Urquharts literature study is on the evaluation criteria for telemedicine initiatives. It is found that the research reviewed predominantly targets the evaluation of telemedicine from a current practice perspective instead of a comparison with traditional face to face patient care. The overall results on telemedicine's influence on healthcare professionals practice shows that the initiatives seem to meet the needs of patients, but have little or none clinical benefits (Currell and Urquhart, 2003: 11). This implies that telemedicine initiatives should be considered in detail in regard to their implementation and compatibility with clinical environment and routines. We will like to stress, that Currell and Urquharts study is from 2003 and that our insight in the literature shows that telemedicine has been developing rapidly since, with the rise of new technologies and digital platforms. However, we find the addressed results interesting regarding the research approach for this thesis.

Another study by Reed 2005 targets the effect of telemedicine in APNs (Advanced Practice Nurses) clinical practice. The nurses involved in the cases reviewed in the study are all deemed as being the primary contact for patients living in rural areas or in the clinical setting in general (Reed, 2005: 1). Reeds study is focused on the contributing factors of telemedicine in regard to healthcare services, compatibility with APNs professional role and how telemedicine initiatives are constructed and deconstructed in the auspices of the APNs work practice (Reed, 2005: 1). We find this study particularly similar to the objectives of this thesis, as we are also concerned with understanding how telemedicine manifests in telemedicine nurses practice as well as how the practice allows for telemedicine to function as concept. It is concluded by Reed 2005, that both healthcare professionals (APNs) and patients are generally satisfied with the compatibility of telemedicine initiatives, but that telemedicine should be

approached as a supporting option to clinical care, but should not completely replace face to face care. Another interesting result from Reeds study is that telemedicine initiatives is perceived as a way for healthcare professionals to support otherwise neglected groups of patients and telemedicine is therefore perceived as an extra channel for research these patients.

Rutledge et al 2014 arrive at similar conclusions in a study on APNs influence in reaching underserved patient groups though telemedicine, focusing on rural areas. The results of the study showed that APNs practice in reaching undermined groups of patients were enhanced by the telemedicine and APNs felt better equipped in meeting the patient, as the telemedicine technology also allowed the APNs to connect with other healthcare professionals about each patient, which showed to ensure the APNs in their work. Jenkins and White 2001 also review the impact of telehealth in relation to the function of APNs. Their findings show that telehealth technologies are a

good supplement to APNs work functions and clinical purpose: to have strong knowhow within a specific nursing field, as the technology allows the APNs to provide professional supervision of patients without big economic costs or overuse of resources (Jenkins & White, 2001). According to Jenkins and White telehealth seems to have a positive influenced on the field of advanced practice nursing as the technologies enable nurses to enforce their supervisor role. Gherardi 2009 presents a practice-based approach to analyzing the influence of telemedicine on internal work practices of respectively cardiologist and general practitioners involved with tele-cardiology, which is a type of professional to professional consultancy on how to treat patients.

What we find particularly interesting in the study of Gherardi is his case oriented approach in which we are also engaged in the objectives of this thesis. Furthermore, Gherardi study the practice of the healthcare professionals involved on different levels; their activities as they unfold from the outside, from the

perspective of know-how (tacit knowledge) and as a product of structures enforced by society. Gherardis 2009 overall findings are that the telemedicine initiative of tele-cardiology is predominantly a product of a reassurance-discourse in society, which is emphasized by the healthcare professional's joint supervision of specific patient cases through tele technology.

The summary of the perspectives and findings from the before mentioned studies all seem to target telemedicine as having a positive impact on healthcare professional's flexibility within advanced medical fields and advanced nursing. Professional abilities and competences such as supervision, education and support regarding patient care in specialized medical fields, such as chronic illnesses, rehabilitation or intense treatment periods. Another perspective that seem to be a general finding in the mentioned studies is that of telemedicine as an enhancement of APNs patient sphere. With the use of telemedicine APNs can use their knowledge in reaching out to underserved patient groups, that otherwise would have been undermined in the healthcare

system, such as in patients with lifestyle diseases or other often self-inflicted illnesses. The studies show that APNs have a higher professional satisfaction when able to aid more patient groups. Furthermore, the function of APNs as patient advocates is also enhanced with the use of telemedicine initiatives, as technology allows for healthcare professionals and patients to collaborate in a new way and without the structures of clinical care.

1.4.4 RESEARCH ON TELECARE NORTH COPD

The TeleCare North COPD project was a collaboration between the Northern region of Denmark, the municipalities in this region, TeleCare North and Aalborg University. The role of Aalborg University was that of researching the effect that the telemedicine initiative had. Four PhD thesis were initiated during the project phase. The four PhDs had different foci. One PhD is on the subject of health economic effects of the initiative. We have not been able to find this dissertation and believe that it has not been published yet. The second PhD is on the subject of

cross sectorial collaboration. This dissertation has also not, to the best of our knowledge, been published yet.

The third PhD focus on the topic of health literacy. The dissertation seeks to understand if citizens who participated and received a TeleKit, in the TeleCare North COPD project have increased their health literacy (Hæsum, 2015). The dissertation focuses on the citizens with COPD and their health literacy, this is a very different focus than that of this thesis and while the health literacy level of the included citizens does affect the practice of the municipal telemedicine nurses, we do not see this dissertation as relevant in regard to this thesis.

'Evaluation of telehealthcare intervention for patients with COPD' (Lilholt, 2016) is the fourth PhD. The dissertation seeks to understand the effect the TeleCare North COPD initiative have on patients. Furthermore, the dissertation also usability test the OpenTele system as to understand whether it is user friendly. Similar to the third PhD, this dissertation has a patient focus. Differently the conclusion of this dissertation affects the idea the

nurses might have of the TeleCare North operations. The dissertation concludes that there is no notable difference for the health state of the patients receiving telemedicine and does who acted as the control group, whom did not receive telemedicine. Though it is important to note that Lilholt (2016) does make a notion of whether a different conclusion would have been drawn if the timeframe of the research were longer. Furthermore, it is concluded that OpenTele is user friendly and the citizen does not have critical issues while using it.

It is unfortunate that we have not been able to find the second PhD, which focused on cross-sectoral collaboration as this might have looked into the practice of the nurses. We see this thesis as the most relatable one to our thesis, and while the two published PhDs does have interesting notions in regard to the effect of telemedicine, we do not see their contributions as needed in the work of this thesis.

1.4.5 DELIMITATION OF THE UNDERSTANDING OF TELEMEDICINE IN THIS THESIS

The previous sections have provided a discussion of how telemedicine can be understood when reviewing the literature and as this thesis is focusing on the practice of the healthcare personnel in the TeleCare North COPD operations, we need to understand telemedicine as the use of ICT as to facilitate a means to communicate and care for patients with COPD. Investigating the caregivers understanding of the relationship between caregiver, citizen and ICT does mean that our position in what telemedicine is cannot be that of seeing telemedicine as solely being a mean for healthcare professionals to cooperate or that of seeing telemedicine as a tool that facilitates the individual to care for themselves. While both these perspectives are a part of the TeleCare North operations, understanding the practice of the municipal nurses we need to see the complexity and therefore the more structural view that Bashshur 1995 provides a greater insight into this complex practice. Understanding that telemedicine is not merely the provision of care across a distance, but that it also affects the healthcare professional, the citizen and each of the communities they are a part of, from organizational change to the individual skill set needed as to be part of the operations of the TeleCare North operations.

2.0 RESEARCH DESIGN

2.1 THE TELECARE NORTH COPD INITIATIVE

The TeleCare north COPD project was done through a collaboration between the Northern region of Denmark, the eleven municipalities within this region, TeleCare North. Furthermore, Aalborg University participated and was responsible for the research done in the project. Furthermore, as the project was partially funded by the Danish Agency for digitization they also participated in the sense that they oversaw the on goings in the project.

TeleCare North functioned as the link between the other organization and facilitated the process of creating the COPD initiative. While TeleCare North is a public organization, it is not directly a part of The Northern Denmark region or The Northern Denmark municipalities.

The organizational setup of the TeleCare North COPD project can be seen in figure 3.
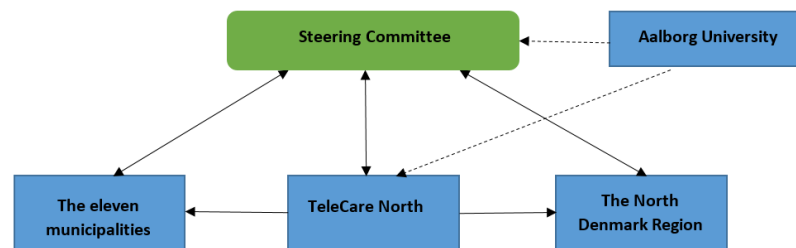
Figure 3: Overview of the organizational set-up and key actors involved in TCN COPD project

The organizational setup for the project consists of the eleven municipalities, TeleCare North and the North Denmark region working together as to develop and implement the initiative. The *steering committee* is made up of representatives from each of the organizations. The members of the steering committee provide input from their organization and collaborates with the other members as to develop and implement the initiative. The arrows between the committee and the organizations represents the information flow that happens. TeleCare North facilitates the process and the arrows towards the other organizations represents information regarding what the

committee have decided and furthermore represent the facilitation of the process. TeleCare north was also responsible for outlining the guidelines for the initiative and the use of OpenTele. These can be found at their website[7] . It is important to note that while TeleCare North outlined the guidelines, they were a result of the collaborative work done in the project. Aalborg University have dotted lines, as they are present and participating, but as their objective is to conduct research while the other organizations have the goal of developing and implementing the initiative, Aalborg University have a different role in the organizational setup. It is important to note that the organizational setup shows that each of the organizations had an equal say in the development of the initiative.

As the project at its end was deemed a success, it went into operations. It was chosen to keep some of the organizational setup. TeleCare North functions as a secretariat that handles information between the region and the municipalities and

furthermore, the guidelines for the use of OpenTele is also their responsibility. This leads to the following figure of the organizational setup:

Figure 4: Overview of key actors in rollout set-up

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[7] www.Teleccarenord.dk

2.1.1 RESEARCH PARTICIPANTS

Our initial thoughts for studying the practice of the nurses involved in the TeleCare North COPD initiative was to involve as many of the municipalities as possible, as the objectives of this study is not only to understand how each of the nurses practice is influenced by telemedicine, but also to get a more general insight of how the practice of the nurses thrives in the initiative.

Through the listed phone numbers on the telemedicine responsible in the municipalities (found on the TeleCare North website) we got in contact with the local coordinators on the initiative. The outcome was that three municipalities chose to participate in our study, allowing us to conduct interviews with the coordinating nurse/leader and the primary nurse(s) in each of the three municipalities. In the following sections, we will make a short introduction of the three participating municipalities and the nurses involved.

2.1.1.1 HJØRRING

In the municipality of Hjørring the TeleCare North COPD set-up involves three nurses; two primary nurses working with the weekly monitoring of the citizens measurements, training of citizens and other activities in the auspices of the telemedicine initiative and COPD in general. In Hjørring the telemedicine nurses are working from the municipal health-center, located in the city of Hjørring. From the health-center the nurses provide care for citizens involved in the whole municipality. In our study, we had one primary nurse and the coordinating nurse as research participants and thereby the sources in which our empirical data have been collected in the auspices of the TeleCare North COPD initiative in this municipality.

2.1.1.2 FREDERIKSHAVN

In the municipality of Frederikshavn there are three primary nurses working in the TeleCare North COPD initiative. There is no coordinating nurse in this set-up, but a general leader of health and training for all health services in the municipality. The three

telemedicine nurses are situated at the three health-center in the municipality; Frederikshavn, Skagen and Sæby. There is a nurse at each of the centers, who's primary functions are to read citizens measurements, training of citizens in the use of the telemedicine equipment and other COPD related activities such as smoking cessation courses and rehabilitation courses. One of the primary nurses (located in Sæby) and the municipal leader of health and training were the research participants in this study and the primary sources for data collection in the municipality of Frederikshavn.

2.1.1.3 AALBORG

The Telecare North COPD initiative set-up in the municipality of Aalborg involves six nurses; five primary nurses and one coordinating nurse. The primary functions of the nurses are weekly readings of citizens measurements and training in the use of the equipment. The Aalborg set-up involves nurses who work in two different areas; the home-nurses and the health-center in the city of Aalborg. The home-nurses cover both the hinterland

cities of the municipality of Aalborg, as well as different city areas in Aalborg and are therefore responsible for the citizens in the initiative who are receive home-care. The nurses located at the Aalborg health-center are responsible for the citizens involved in the initiative in the auspices of the health-center. Four primary nurses (three in the home-care and one from the health-center) and the coordinating nurse were research participants in our study and the sources for data collection in the municipality of Aalborg.
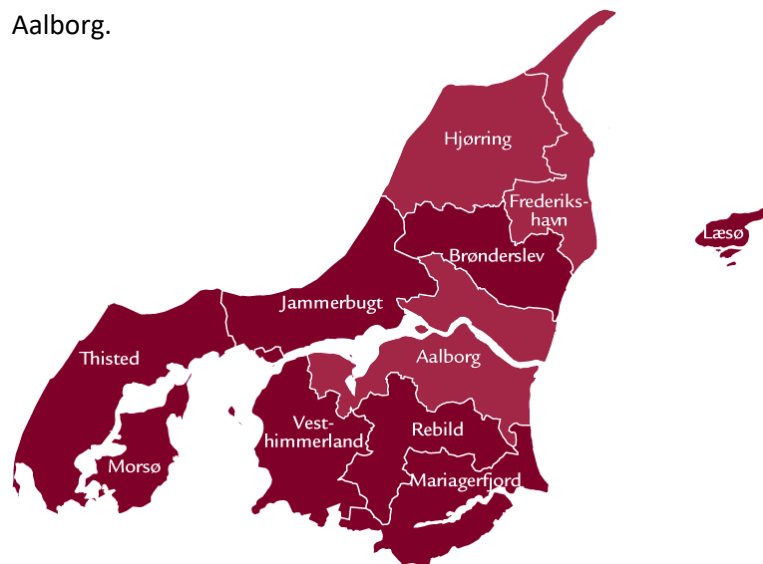
Figure 5: Participating municipalities marked on regional map (Map source: Region Nordjylland)

2.2 RESEARCH PARADIGM

In this section, we will define the research paradigm for this thesis, emphasizing the ontological, epistemological and methodological considerations regarding our research design. We will discuss the scientific implications for conducting the study of the telemedicine nurses in the TeleCare North COPD initiatives practice, and what decisions we made based on these implications. The research presented in this thesis is situated within an activity theoretical paradigm, as a mean to analyze and understand human practice.

To further define how our research of the telemedicine nurses practice unfolds in the auspice of an activity theoretical paradigm, we will explain our scientific approach to understanding human practice as phenomenon. Our understanding of human practice and its' constitution is on the that of theorists Yrjö Engeström, Victor Kaptelinin and Bonnie Nardi who all have contributed to the field of activity theory, building on the work of cognitive psychologists such as Lev Vygotsky and Aleksej Leontev who formed the basis for early activity theory, with research in human consciousness and learning (Kaptelinin & Nardi, 1997).

When the research objectives of this thesis are situated within a activity theoretical paradigm in understanding human practice, it is because of the factors and elements that constitute what practice is and how it can be understood from the perspective of activity theory. Early definitions of the driving forces behind human activity and thereby the basis for human activity and practice, was as mentioned made by Vygotsky and Leontev among others in the psychological field of human consciousness, with a strong emphasis on the individuals' development through cognitive structures (Nardi, 1996).

One of the late contributors to activity theory is Yrjö Engeström, who suggests that human activity is constituted by a system of interconnected structures and driven by the primary forces; the *subject* (doing something/wanting something), *object* (the subjects focus/goal) and *outcome* (the results of the activity)

(Engeström, 1987). What is important to notice is that Engeström (1987) presents a perspective on human activity as the individual in the system, moving away from the focus on the individuals' activity being merely shaped by social structures and elements, by proposing that human activity is manifested and cultivated through structures – which implies that the subject does not operate "outside" the system (Engeström, 1987). Thereby said that humans act on their individual consciousness within a set system determined by socio-cultural structures and elements. Activity is therefore not steered by one or the other, but the interaction between the two. Human activity is therefore constantly influenced by environmental settings and the individuals' possibilities to operate within these settings (Engeström, 1987). The dynamics determining how activities are situated, outplay and how they might evolve is a constant process of negotiation between the internal (the individual) and external (socio-cultural) objectives (Engeström, 1987).

According to Engeström the systematization approach to understanding the elements and structures which forms human activity is a key element in developing an understanding of for example work practices, as these consist of a range of different activities that also are interconnected and influence each other and thereby the practice as a whole. By understanding each element of an activity and how they affect each other it is possible to analyze the activity as a phenomenon, detect indications of dysfunctionality between different elements, which Engeström (1987) refers to as contradictions or identify which elements should be addressed in order to evolve or change an activity. The beforementioned functionalities of Engeströms (1987) activity system approach is our theoretical framework for outlining the elements of the activities the telemedicine nurses engage in, how it impacts their overall practice, and furthermore we will used at to identify dysfunctionalities between elements in their different activities, as these are often the catalyzers for defining areas for

development, both within specific activity, but also the practice in which it is included (Engeström, 1987).

Regarding our study of the telemedicine nurses practice in the auspices of the TeleCare North COPD initiative, the activity theoretical perspective of the understanding of activity as a system of interconnected elements is our primary approach to outlining the nurses practice. This will be further elaborated in section 2.3 on the theoretical framework for researching the objectives in this thesis, where we will introduce Engeströms (1987, 2000, 2001) framework for analyzing the systematization of human activity by the means of his activity system.

As to activity theory in regard to technological settings and in relation to human-computer interaction, we find the perspectives of Kaptelinin and Nardi (1997, 2006) and Nardi (1996), as a relevant extension to the activity perspective of Engeström, by addressing the influence of technology in structuring human activity and the purpose of activity theory in this specific field. Kaptelinin and Nardi (1997) introduces different perspectives on how to analyze the influence of technology in human practice, by suggesting how functionality of technology can be approached in regard to activity theory. These perspectives will as Engeströms activity system, be introduced in a later section.

2.2.1 ONTOLOGICAL CONSIDERATIONS

As to the activity theoretical perspective we approach the understanding of human practice with the ontological positioning of the research in this thesis operates with knowledge situated in an interplay between individual and sociocultural structures. As to what knowledge reality the objectives in this thesis lie within, can be defined from the very nature of practice as phenomenon. Slife (2004) argues that the ontology of practice is situated in the changeable character of the phenomenon. Slife mentions that the ontology of practice can be explained as knowledge on relationality – how elements function in relation to each other. Slife (2004) further categorizes

relationality in to two; weak relationality and strong relationality. Weak relationality is when the relationship between different elements only functions as channels for canalizing information, which implies that the elements in a given system/structure only purpose is to secure a slow of information, and the different elements involved does not necessarily influence each other. Weak relationality can therefore be said to be a static perspective on the interplay between elements in a given system. In relation to our activity theoretical perspective on studying the practice of the telemedicine nurses in the TeleCare North COPD initiative it is our assessment that we do not operate with an ontological perspective on practice as being constituted from weak relationality, as we recognize that practice is constituted by activities, which are constituted by individual and sociocultural structures that are influencing each other, and thereby practice as a whole is also influenced by the relationality of the activities it comprises. This leads us to the second category of relationality proposed by Slife (2004); the ontological perspective of practice as strong relationality, which implies that the elements constituting practice and their relationship are not only channels for information sharing, but changeable structures influencing each other's individual meaning. On the two perspectives on relationality as ontology presented by Slife 2004 it is our assessment that the ontological positioning regarding studying practice in this thesis is that of strong relationality, as the objectives of our study of the telemedicine nurses practice is to identify structures within specific activities of the practice and how these structures affect each other, the outcome of specific activities and the overall practice. By considering structures with the perspective of activity theory we acknowledge that the ontological nature of our study is consistent with that of strong relationality, as to our understanding of the constitution of human activity and the relation between activity and practice as presented in the previous sections.

2.2.2 EPISTEMOLOGICAL CONSIDERATIONS

With activity theory as approach to studying the practice of the telemedicine nurses and the ontological positioning of the study in researching knowledge on relationality, this section will argue how we as researchers position ourselves in relation to the type of knowledge we are working with. Both in relation to Engeström 1987 and Kaptelinin and Nardi 1997 human activity is comprised by respectively externalized and internalized activities. According to Kaptelinin and Nardi the two types of activities are inseparable, as they enable each other. When activities are internalized they belong to the individual, and internalized activities are described as a mean for individuals to consider their activity in a mental state – f.x before they play out in the external sphere. It can therefore be understood as individuals mentally manifested evaluations of an activity (Kaptelinin & Nardi, 1997).

Externalized activities are what the individual is acting upon in regard to performing the activity. An individual's mental state or thought-pattern becomes visible to others when externalized, as the individual incorporates it as a part of the activity they are engaging in. The tension field between internalized and externalized activities can therefore be defined as an interplay between thought/knowledge belonging to the individual regarding the activity and the individuals' thoughts/knowledge becoming the activity (Kaptelinin & Nardi, 1997). In relation to working with knowledge on different levels, it is our assessment that the premises of internalized and externalized activities have much resemblance to the two manifestations of knowledge; tacit and explicit. It is our assessment that externalized activities in relation to knowledge is what is visible to outsiders and is alike the concept of explicit knowledge – it is operational and explainable. Working with explicit knowledge implies the belief that individuals can be brought to articulate their knowledge and thereby share this with the outside world – making it explicit to others, so that they may come to understand it (Sanchez, 2004: 6). Explicit knowledge operates with the assumption the knowledge can be passed on from individual to individual through a structured learning process, which is also how new

knowledge is obtained in this perspective (Sanchez, 2004: 6). It is our assessment that internalized knowledge in relation to human activity also can be explained from the premises of tacit knowledge, that implies that knowledge belongs to the individual and is therefore difficult to obtain for others (Sanchez, 2004: 3). When working with tacit knowledge individuals are perceived as carriers of knowledge, and the one way for them to share their knowledge is to pair them with other carriers of knowledge within the same field (Sanchez, 2004: 3).

When we study the practice of the telemedicine nurses it is our assessment that it implies working with both externalized knowledge (Explicit) and internalized knowledge (tacit). It is our assessment that this calls for some considerations as to how we approach extracting knowledge from the telemedicine nurses and on what level we as researchers can allow ourselves to be involved. We assess that it can be difficult to obtain a strictly objective or subjective epistemological positioning because of the dualistic aspects of practice studies and the analysis of human activity. It is our assessment that we as researchers operate from a predominant subjective approach to understanding the telemedicine nurses practice, as our research set-up and the organizational set-up of the telemedicine initiative has not allowed for us to pair them with each other as for them to articulate and discuss their knowledge as peers in all cases, and thereby position ourselves in a more objective manner in relation to our roles as researchers.

There have been situations where we have been the articulation partners of the nurses, which is what calls for attention regarding our subjective influence on the results. When we mention ourselves as articulation partners it is because of the problems that may occur regarding bias and validity, as we partake in conversations on a topic that we know very little about when it comes to practical and professional considerations. In one of the data collection sessions we have held us more on the "sideline" so to say, as the nurses have been functioning as articulation partners for each other. However, having to take both positions

has not only been problematic, but in our assessment, it has also been an advantage, as we have had a varied foundation for comparison and validation of the research results. Furthermore, our choice of methods has functioned as a way of securing that all data collection sessions are processed in the same manner before, regardless of the set-up that may have been when collecting the data.

2.2.3 Methodological framework

As activity theory is our approach to understand the practice of the telemedicine nurses, we will further introduce what methodologies our data collection and analysis is conducted from and how the methodologies have influenced what methods we have taken into use in our study. With its roots in many scientific fields, it is our understanding that accessing a phenomenon using activity theory and collecting data to do so can be conducted in many ways in regard to what scientific field one belongs to and what methodologies the field comprise. Based on the activity theoretical perspective we have chosen to

incorporate for our analysis, the methodologies for collecting and analyzing data is rooted in social science and cognitive psychology. When we access the telemedicine nurses practice with the perspective of Engeström (1987) and Kaptelinin and Nardi (1997) we recognize practice as constituted by activities and activities as an interplay with the individual in a sociocultural system. As mentioned our ontological positioning implies that human activity and practice is knowledge about how different elements of activity are structured and their mutual relationality, and working with understanding human activity is a balance between what is understood/ being said and what is actually going on/what can be seen and how we as researcher position ourselves in regard to gain insight into the telemedicine nurses tacit knowledge in activities as well as their explicit knowledge expressed in their actions. In relation to all these notions we have chosen to conduct the data collection and analysis with qualitative research methods, as it is our assessment that working with knowledge as primary data implies studying unstructured data.

Conducting qualitative research implies that data is detailed and in depth with a set topic, which emphasizes choosing the right methods to process the data to make it more tangible and thereby make it implementable in further analysis (Charmaz, 2010). What we mean by addressing the data, we have collected on the telemedicine nurses practice as unstructured, it is because it is our assessment that there are no obvious methods to make the data more tangible. Based on our ontological, epistemological and methodological positioning regarding analyzing the practice of the telemedicine nurses, we have chosen to use interview (single person and focus group) and contextual inquiry as methods for data collection. For data analysis, we have chosen to use theme analysis as the method for processing the data from the interview sessions and for the analysis of the data obtained from our contextual inquiry sessions we have used sequence models as data analysis method. The beforementioned methods (for both data collection and analysis) and how we used them in our qualitative inquiry will be presented in the following sections, where we will discuss the methods functionality in regard to our research objectives as well as make critical identifications from their usefulness in this study.

Another consideration regarding working within a methodology of qualitative approaches that we will address before introducing the methods for data collection and analysis, is that of the representability of the data. As stressed by Charmaz (2010) one of the most important variables in making qualitative data strong, is the amount of it. According to Charmaz having a large amount of data is one way of securing that the full scope of a phenomenon is covered to the best abilities. However, it is not only the amount of data that makes for representability in researching a phenomenon, but also how detailed the data is. Though a researcher might be strongly focused on specific parts of a phenomenon, Charmaz stresses that a strong insight in the phenomenon as a whole is just as important, as it also diminishes the chances of bias, as it will be necessary to consider what data should be presented and why. As mentioned earlier we have

entered a field that we in regard to medical understanding know little about. What makes the phenomenon of telemedicine interesting in relation to our competences is that technology is a fundamental part of the phenomenon. Making our research representable will therefore also imply that our study of the nurses practice should be as detailed as possible. In figure 6 we have outlined the elements of the activity theory paradigm in which our study is situated, and how its different elements influence our approach to understanding the telemedicine nurses practice. The large circle represents the activity theoretical paradigm in practice studies. The medium size circle represents the elements of the paradigm; ontology (how we understand what knowledge is in relation to practice and human activity), epistemology (how we position ourselves as researchers in relation to the type of knowledge we are working with) and methodology (how we approach the type of knowledge we are working with). The small circle in the center represents our research focus:
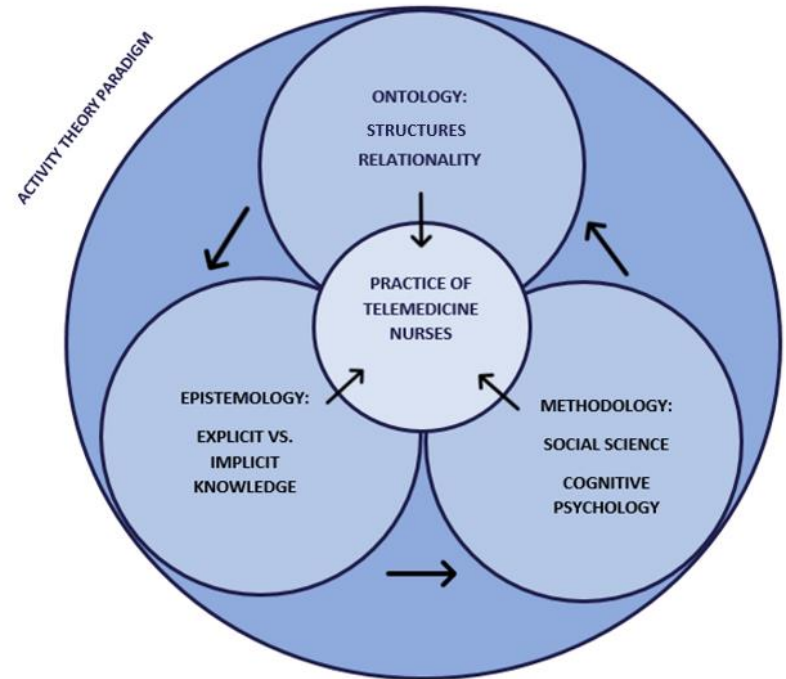
Figure 6: Research paradigm for understanding the practice of the telemedicine nurses

2.3 THEORETICAL FRAMEWORK

To further our understanding on how telemedicine influences the role of the nurses working with the TeleCare North COPD initiative, we will as mentioned earlier introduce Engeströms activity system as a theoretical framework for analyzing the nurses practices in the auspices of telemedicine. As Engeström does not target technology specifically in regard to human activity, we will include Kaptelinin and Nardis perspectives on the role of technology in human computer interaction (HCI), as guidelines for how we can approach the technological aspect in the telemedicine nurses practices in the right manner when addressing the practice in the use-context with emphasis on the impact of the technological aspects.

2.3.1 ACTIVITY THEORY

As touched upon in section 2.2 activity theory is described as a way of understanding human activity. The focus lies on understanding an activity as a subject performing operations and actions as to achieve a desired outcome and understanding that these operations and actions are interconnected with surrounding factors (Engeström, 1987). A way of visualizing it is through an activity system. This section has the purpose of explaining Activity theory on the basis of Engeström (1987, 2000, 2001). The last part of this section will explain how one can apply activity theory to the field of HCI.

2.3.1.1 ACTIVITY SYSTEMS

The activity system can be seen as the core of Engeströms view of Activity theory. The system is built on Vygotsky's understanding of mediation (Engeström, 2001). The idea is that action revolves around the triad of subject, object and mediating artefact (Engeström, 2001). Engeström builds on that idea with the notions that an activity is not merely based on this triad, but

that for a subject to perform an activity as to achieve a desired outcome there are more factors involved. This does not mean that actions and activities are the same, but this will be explained in a bit. The activity system consists of a subject, rules, instruments, community, division of labour, an object and an outcome. The subject is the individual performing an activity. For the activity to be performed the subject must adhere to the rules that are in place.

Furthermore, the community affected by the activity also influence the activity. As to perform the activity, the use of instruments or mediating artefacts takes part in the activity. The object is that set forth by the subject when engaging in the activity, which have a desired outcome as a result (Engeström, 2000). Figure 5 shows an example of an activity system of a doctor reading patient records and test results.
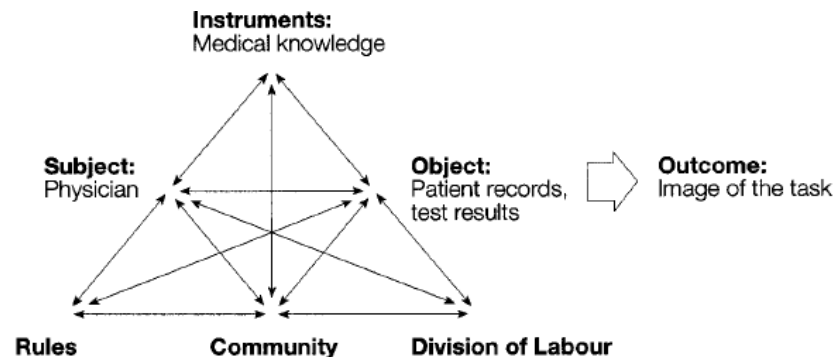
Figure 7: Activity system (Engeström, 2001)

Figure 7 shows that an instrument can be more than a tool. It is represented here, as previously obtained knowledge, which shows that the instrument applied in the activity, does not necessarily take physical form thereby hinting towards that an activity cannot be performed without an instrument. It can also be seen in figure one that there is nothing noted below Rules, Community and Division of labour. This does not mean that they are not a part of framing the activity, but as explained in the article (Engeström, 2001), they are not shown or said by the subject performing the activity. This leads to another important

factor when understanding activity systems. Not being able to identify parts of the activity system does imply that the activity has not been understood in its entirety, while it is possible to understand the subject desired outcome, we cannot argue that we understand all the actions or operations taking place in said activity. Lastly, the relationship between the object and the outcome is that of making sense or creating meaning for the subject (Engeström, 2001). It is the answer to the question of why an activity was performed or initiated.

2.3.1.1.1 OPERATIONS AND ACTIONS

To perform an activity, the subject needs to perform actions or operations. The distinction between the two comes from the idea that we as individuals perform activities with both conscious and unconscious actions. The activity of e.g. drinking a glass of water requires the action of lifting the glass, which is conscious but hitting the mouth and swallowing, happens, but not necessarily consciously. There is a difference in the actions that happens. Therefore, the distinction between action and operation is used. Actions are those that we think about while operations are automated (Engeström, 2001). This also explains how it can be difficult to explain an activity. The object and outcome of an activity are consciously thought about and so are the actions that needs to take place, but the more subtle operations that "we just do" can be difficult to explain.

2.3.1.1.2 CONTRADICTIONS

While we use actions and operations to perform an activity, the activity is also subject to change. While the successful achievement of a desired outcome gives an activity continuity, the influence of the rules, community, division of labour and instruments can cause a change in how an activity is performed. This is caused by contradictions or disturbances between the different factors in the activity system (Engeström, 2001). If e.g. a desired outcome can be achieved through using a specific instrument, but that the community disapproves or over time changes attitude towards the use of this instrument it causes a disturbance or contradiction between the two resulting in that

the subject changes the action and operations needed to achieve the desired outcome. While these contradictions do not necessarily entail a change in how an activity is performed it causes an instability in the activity. Therefore, the contradictions imply that there is a change potential in the activity (Engeström, 2001).

This understanding of Activity theory from Engeström (1987, 2000, 2001) provides a mean to investigate the practice of the nurses in the TeleCare North COPD operations. Though, as this view of Activity theory is meant for the field of learning, the next section will look into how activity theory has a place in the field of HCI.

2.3.2 TECHNOLOGYS ROLE IN ACTIVITY

Kaptelinin and Nardi are prominent researchers in the field of HCI and have done much work on the role of technology in activity theory. Their perspective on activity theory builds on the same factors as presented by Engeström and his theoretical framework of the activity system. However, Kaptelinin and Nardi (1997, 1999, 2006, 2012) target the technological aspects of human activity regarding its use context. As Engeströms activity system does not emphasizes that technology has a certain role besides being merely a tool or other element in the system, the Kaptelinin and Nardis perspectives on the role of in human activity offers principles on which technology can be embraced as more than a tool (Kaptelinin & Nardi, 1997, 2006, 2012, Kaptelinin et al 1999).

Kaptelinin and Nardis perspectives on technology's role in human activity is highly influenced by HCI field in which they operate, where interaction design is a major discipline (Kaptelinin & Nardi, 2006, 2012, Kaptelinin, 1999). Influenced by an evaluation and user understanding mindset, Kaptelinin and Nardi address technology as a concept of context in regard to human computer interaction, and thereby activities that are centered around the use of technology. Kaptelinin and Nardi (2006, 2012) and Kaptelinin et al. (1999) stress that

understanding the use context of technology is an approach to understand the fundamentals of the activity unfolding in the auspices of the use context. In regard to our use of Engeströms activity systems as theoretical framework for analyzing the different elements of the telemedicine nurses practices and the elements relatability and effect on each other, the use context approach on Kaptelinin and Nardi offers a fundament for situating an activity involving technology in the tensions field between the acting subject (in our case the nurses), The object of the activity and the purpose/functionality of the technology involved (in our case the telemedicine technologies).

Kaptelinin et al. (1999) offers a guideline of principles to approach the understanding of use-context in relation to activities revolving around or influenced by technology. The principles are referred to as 'The Activity Checklist' and is founded on the elements of activity theory. Kaptelinin and Nardi suggests that the approach is to be used for understanding how a specific technology both a large all-embracing perspective on

the use-context and a more activity specific use-context, which in this thesis is the telemedicine nurses activities in relation to the TeleCare North COPD initiative as a whole. This will therefore be one of the analysis sections in which the practice of the nurses will be addressed in a comparative manner. Kaptelinin et al. (1999) then proposes that the perspective on the use-context is narrowed in relation to specific activities and the objectives of these, which in our case could be one of the nurses contacting a patient regarding their measurements or similar. This perspective will be addressed in relation to the specific nurses and later compared as to identify their overall similarities and define a more general perspective on technology's influence on the role of the nurses. As to the content of the 'Activity Checklist', it contains the following principles for analyzing and situating the use-context of technology:

- **Means and ends**: is much like Engeströms perspective on contradictions, just with a special emphasis on technology and how it increases the subject ability to

reach their objectives or if it hinters them. This principle also targets whether technology creates barriers between different goals and thereby the large vs. small perspective on the use-context of the technology become relevant in understanding this.

- **Social and physical aspects of the environment**: This principles studies how the specific technology/ies involved suits the use-context both emphasizing the resources it provides and the social structures in which it is to be implemented.

- **Learning, cognition and articulation:** Targets the internalization and externalization perspectives of activity theory, and thereby how internal processes become manifested externally and vice versa, herby focusing on the technology's influence on these processes.

- **Development:** Summarizes how the previous components influence the subjects actions, with focus on the developmental aspects of the activity.

(Kaptelinin et al, 1999: 33)

It is our assessment that merging Engeströms activity system framework with Kaptelinin and Nardis perspectives on the use-context of technology is a meaningful approach for us in regard to situating the activities of the nurses in a more technologically focused context. The figure beneath visualizes the merge of Engeströms activity system and Kaptelinin et als perspectives on the use-context of technology in human activity:
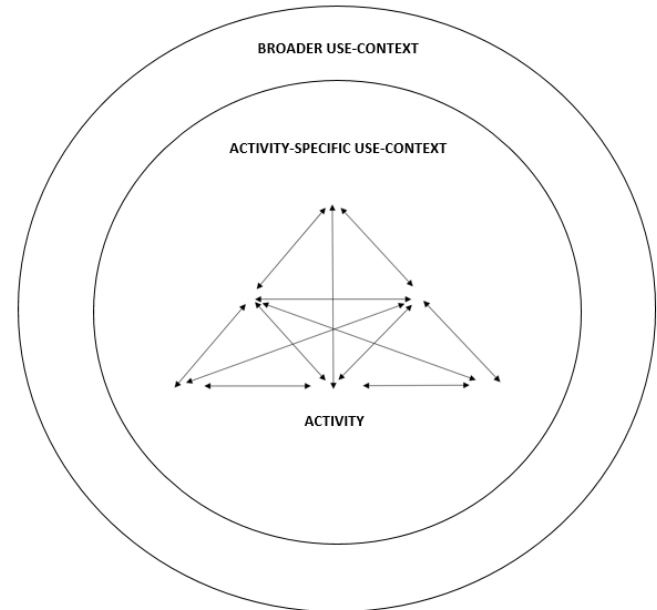
Figure 8: Activity system with HCI perspectives

2.4 DATA COLLECTION

In the following sections, we will introduce how we collected data on the telemedicine nurses' daily practice, through qualitative interview and contextual inquiry. We will argue why the specific methods were chosen, how we have used them and what the outcome in relation to their applicability. The data analysis methods will be introduced from section 2.4.1.

2.4.1 OVERVIEW OF DATA COLLECTION SESSIONS

Figure 9 shows the three different municipalities, the different data collection activities and their duration. The data collection activities are ordered as they were conducted. We sought to do the data collection activities in the same order in each of the municipalities. This was done in an effort to have the same level of information, before engaging in the next data collection activity. Thereby having data set from each of the municipalities that were approached in a similar fashion. While we acknowledge that the data collected in the first municipality,

Hjørring, could affect the collection of data in the municipality of Frederikshavn, we made an effort to not use the information obtained in the first municipality, when conducting data collection in the next municipality. This was not possible in Aalborg and as can be seen in Figure 9, instead of starting with interviewing the coordinator we started with the focus group interview. The figure visualizing the overview of our data collection sessions can be seen on the following page →

Hjørring

Interview –
Coordinator

Duration: 25 min.

Interview –
Primary nurse

Duration: 32 min.

Contextual Inquiry –
Primary nurse

Duration: 40 min.

Frederikshavn

Interview –
Coordinator

Duration: 16 min.

Interview –
Primary nurse

Duration: 44 min.

Contextual Inquiry –
Primary nurse

Duration: 90 min.

Aalborg

Focus group
Interview

Duration: 58 min.

Interview –
Coordinator

Duration: 36 min.

Contextual Inquiry –
Primary nurse

Duration: 90 min.

Figure 9: Overview of data collection sessions

2.4.1 QUALITATIVE INTERVIEW

To understand the practice of telemedicine from the perspective of the healthcare professionals in the TeleCare North COPD operations we choose qualitative interviews (Brinkmann & Tanggaard, 2015) as a mean to do so. With the knowledge obtained from reading the TeleCare North COPD project documents and literature on telemedicine, it became apparent that we wanted to interview the healthcare personnel in charge of monitoring the citizens' data. Furthermore, to understand why the practice is structured as it is, we also wanted to interview the managers of the healthcare personnel working with telemedicine. As we wanted to explore the interviewees understanding, their attitude towards their practice of telemedicine and we knew that we were trying to understand a work practice that we had little previous knowledge of we choose to construct semi structured interviews (Brinkmann & Tanggaard, 2015). Furthermore, we wanted as many perspectives on the subject as possible and therefore we conducted a focus group interviews. The possibility of having the interviewees explore questions together and possibly challenge each other's opinions of the practice would provide valuable data (Brinkmann, 2014). When reaching out to the municipalities we explained how we would prefer to do focus group interviews and if this was not possible we would like to conduct single person interviews.

The municipalities informed us on the amount of healthcare personnel that was working with the TeleCare North COPD operations and one nurse working at the health-center with citizen with COPD. It became clear that it would not be possible to conduct a focus group interview with both Hjørring and Frederikshavn as there are not enough healthcare personnel as to achieve the preferable group size of 3-7 people. Aalborg being the largest municipality we were able to set up a focus group interview with four nurses working with the TeleCare North COPD operations. Before the interviews, we prepared the interview guides, which will be presented in the next section.

2.4.1.1 INTERVIEWGUIDES

Through the knowledge obtained from the literature (see section 1.4), the TeleCare North COPD project documents and discussion we identified four themes that is the basis of the semi structured interviews. The first theme focuses around understanding what they see as their main job function and their previous experience with telemedicine. We labeled this theme as *Presentation*. The second theme revolved around the organizational changes that had taken place during the TeleCare North COPD project and when the project went into operation. This theme was only applicable if the interviewee worked in their position when the project was running. This theme was labeled as *organizational changes* and *COPD roll out and operation*. The last theme was labelled *Current notions and thoughts on the future of telemedicine*. This theme has the purpose of understanding how the interviewee sees their work practice in the future and it also provides an opportunity to obtain an understanding of what changes they would like to happen to their work practice in the future.

These four themes created the basis of the manager interview, the single person interview and the focus group. As to be sure to keep the conversation going a number of questions was prepared for each of the themes. These questions serve as inspiration to what to ask the interviewee. These questions also differentiate the interviews from each other. What we want to ask the manager is not the same, as we want to ask in the single person interview. The interview guides can be found in appendix 1.

2.4.1.2 CONDUCTING THE INTERVIEWS

An interview was conducted with the manager of the TeleCare North COPD operations in each of the three municipalities. The duration of the interviews ranged from 15 – 40 minutes. The difference in duration was because the managers had a different relationship to the practice. The shortest interview was with the manager in Frederikshavn who oversaw the operations but have delegated most of the operations to the healthcare personnel

doing the daily work tasks. The audio records for these interviews can be found in appendices 3, 5 and 7.

As the municipalities of Hjørring and Frederikshavn respectively have two and one nurse working with the TeleCare North COPD operations, we conducted a single person interview with a nurse from each of the municipalities. The audio records for these interviews can be found in appendix 2 and 4.

In Aalborg, a focus group interview was conducted. Three nurses from different parts of the municipality working with the TeleCare North COPD operations attended. Furthermore, a nurse working with citizen with COPD at the healthcare center also attended. The audio file can be found in appendix 6.

The interview guides served as a good tool to help explore the topic of the work practices and their differences in the Telecare North COPD operations in the three municipalities. Furthermore, each of the interviewees signed informed consent form, which can be seen as a standard in appendix 8.

2.4.2 CONTEXTUAL INQUIRY

While the focus group and interviews provides an insight into how the health care professionals and the managers of these understands the practice of telemedicine, it is also important to understand how the healthcare professionals work with telemedicine. Their understanding of the practice that is uncovered in the interviews will give an insight into how they work with telemedicine, but as we also seek insights into their tacit knowledge, we will observe the healthcare professionals as they conduct their work. As observations can be conducted in different ways (Bryman, 2012) it was important that we conducted, the observation in a way that helped us explore the practice of the healthcare personnel. While we were able to read about the guidelines for the overall practice as explained in the TeleCare North COPD project, we were also aware that the different municipalities are able to have different work practices and furthermore, the work practice of the individual employee could be different than that of other employees. Furthermore, we believe that the work practice revolves around reading the

citizen submitted data and reacting to said data, which could mean that it can be hard to observe the internal processes of the healthcare employee as they contemplate what action to take when interpreting the data submitted. Sitting and watching what they do was therefore not an option, we needed a method of observation that made it possible to explore the healthcare personnel' actions and thought processes as they work.

As to overcome these obstacles we found the observation method *Contextual Inquiry* (Holtzblatt, Beyer, 2014) interesting. Contextual inquiry is a data collection method used in contextual design as a way to gather field data, which is then to be used to understand a practice and with that knowledge be able to design a system (Holtzblatt, Beyer, 2014). While we are not designing an ICT system, the reason for using this data collection method is similar in that it is a way of understanding the practice of a specific group. Holtzblatt & Beyer (2014) explains that the need for using contextual inquiry lies in that the individuals of the group of interest cannot simply explain what they do, are not fully aware of what they do or are most likely not able to explain *work* arounds to problems they face within their practice. It is therefore needed to engage with the individual in their practice. Contextual inquiry is the observation of an individual performing actions in the practice as to be able to observe and inquiry into how they feel, why they act and what actions sparks sensation within the individual. It is not simply observing the individual in their practice, but it is an interview where the interviewed act as they normally would do and the interviewee inquiries into what happens and tries to interpret what that means for the practice. It is about immersing oneself into the world of the individual of interest, through observation and inquiry.

A contextual interview last for one and a half to two hours. The interview is built on the following four guidelines, *Context, Partnership, Interpretation* and *Focus*. These four guidelines are somewhat self-explanatory. Focusing the interview as it progresses while interpreting the actions, feelings and emotions of the interviewee within their practice.

In contextual design, one team member performs the contextual interview. The interview and the data gathered is then used in a team effort to unveil design ideas (Holtzblatt, Beyer, 2014). In the case of this thesis, we have chosen a somewhat different route.

2.4.2.1 APPROACH

We planned to conduct three contextual interviews with three nurses in three different municipalities – Hjørring, Frederikshavn and Aalborg. We knew that they all used OpenTele and that the nurses in Hjørring and Frederikshavn are both situated at the healthcare center, while the nurse in Aalborg is situated in the home care department. We did not know how their individual work place is organized or how they would react to being inquired while performing their work tasks. Furthermore, as we have no previous experience with this method, we choose the following approach.

2.4.2.2 ROLES

We chose to have an interviewer and a note taker. While we were both present, we did not want to overwhelm the interviewee and give them space as to be able to perform their work tasks. We believe that this would make a more comfortable situation for the nurse as the nurse would focus on the interviewer and their work tasks. Having the interviewer engage with the nurse could also have the effect of removing focus from the note taker.

The note taker was tasked with taking note of interesting comments made by the nurse and to note how the nurse was using OpenTele and other possible systems.

2.4.2.3 DURATION

Holtzblatt & Beyer (2014) recommends a duration of one and a half to two-hour session. When we approached the municipalities, we did not specify how long it would take, but instead requested that we could observe and question an

employee in regard to their work practice. This lead to us coming to an agreement with each individual nurse how much time should be allocated when meeting with him or her.

Previous experience with the method could have provided more insight into how much time we should have asked to be allocated to the interviews at the initial contact with the nurses. While this did not become a problem and all the nurses were very accommodating, should we use this method in future studies it would be recommendable to provide a more precise timetable ahead of collecting the data.

2.4.2.4 DATA

We wanted to use the data as mean to understand the actions that the nurses take when working with telemedicine, but we also wanted to understand how they feel and think when working with telemedicine. The data collected is our impressions of what took place and hand written notes on what happened. As to present the data, we used the notes as to create *sequence models* to show the actions taken and thought processes of the nurses.

A short example of the notes will here be presented. These are some of the notes taken during the contextual inquiry at Hjørring health center:

Setup

Have a Dual monitor setup. One monitor has the Open Tele program open. The other have the municipal documentation program, KMD Care, open. A telephone with a headset is also on the desk.

Observation

Clicks on a citizen who have a red bell. She looks at the data the citizen has submitted. Both questionnaire answers and measurements are included. The nurse notices there is a problem with an answer given to one of the questionnaire questions. Furthermore, because the citizen also has a red bell the nurse decides to call the citizen.

talks to the citizen

They talk about the data that have been submitted and how the citizen feel like her health is decreasing. Increased breathing trouble. They also talk about earlier data submissions, and the nurse tries to find out when her health started deteriorating. The nurse continuously checks current and earlier data while talking to the citizen. The nurse also makes hand written notes during the conversation. The nurse recommends that the citizen should make a visit to their own doctor, if the citizen wants to. At the end of the call she informs the citizen when the next data reading will take place.

*after the conversation ends, she explains how OpenTele works and goes into further detail about the work. The nurse writes the event into KMD Care.

After this conversation, we agree that the observation ends. We believe that the remainder of her telemedicine work for the day is a repetition of what was observed. Therefore, as to not disturb her anymore we thank her for her time and participation*

Instead of presenting all of the notes, we have chosen to use sequence models to provide an overview of the actions taken by the nurses in their work practice, as a part of our data analysis which will be introduced in the following section. Furthermore, the notes will also be used in our analysis as to understand the nurses thought processes when working.

2.5 DATA ANALYSIS

In the following sections, we will introduce the methods used for processing the empirical data collected in the qualitative interviews and contextual inquiry. We will argue why we have chosen the specific methods and discuss the different implications in their use regarding our study of the telemedicine nurses practice. As mentioned earlier, qualitative data is in its nature complex and it calls for the attention of researchers to find the methods to make it tangible (Bryman & Burgess, 2002).

One of the primary processes of handling qualitative data is conceptualization, which Bryman and Burgess stress is an important but difficult step in analyzing collected qualitative data. Much research conducted in the qualitative field and in research in general emphasizes an agenda, whether this is indicated or merely hinted at (Bryman & Burgess, 2002). Conceptualizing data is a step in which the collected data is being categorized to get an overview of what the data contains and to further analyze elements of certain relevance for the emphasis of a study (Bryman & Burgess, 2002). To analyze the data collected from the qualitative interviews we chose to follow the qualitative research manner as described by Bryman and Burgess (2002), and conceptualized the data. Regarding the process of conceptualization, we discussed how to secure that the research participants (the telemedicine nurses) opinions and perspectives were kept as uninterpreted as possible, as failing to comply with a certain level of objectivity towards the data will make for questionable research results.

However, as mentioned in section 2.2.2 we cannot exclude that some aspect of subjectivity may have influenced the data collection sessions as we have acted as articulation partners for most of the telemedicine nurses during the interviews, with this in mind we have aimed to let this awareness influence how we have chosen to analyze the data. It is our assessment that conceptualization process is necessary to prepare the collected data for further analysis in an activity theoretical framework. In the following section, we will present how we have analyzed our data in the manner of theme analysis and the method of thematic networks, which has functioned as the conceptualization process in this study.

2.5.1 THEMATIC ANALYSIS

Thematic analysis or theme analysis is a method for analyzing qualitative data and is most often used instead of meaning condensation (Aronson, 1994). The purpose of theme analysis is to identify structures in qualitative data, with a focus on coding and thereby defining themes. The analysis is to be conducted

through different processes of finding structures/patterns in the data, to compare each process with the others and thereby validating the results. As mentioned in a previous section we have considered several methods for analyzing the data collected from the qualitative interviews and found that thematic analysis was a suitable approach to this as it is in the manner of our paradigm in knowledge as structure/systematization and furthermore it was a method for making the data more tangible in regard to analyzing the results from our theoretical framework (Engeström, Kaptelinin & Nardi). The processes of conducting thematic data analysis in qualitative research consist of:

- **Extraction of data**: gaining an overview of what has been collected. The data is being reviewed several times to find the elements that stand out or is most represented – all data is of relevance but in regard to making themes (coding) the data should be relatable.

- **Processing of data**: the data is being further processed and divided in to clusters based on relatability. Data that is not relatable is not included in this process, but should be kept in mind.

- **Coding the data**: The final process is to code the data, based on what each cluster represents as a whole, and thereby forming themes.

We will explain how we have approached the abovementioned processes in the subsequent sections.

2.5.1.1 EXTRACTION OF DATA

The first step process of conducting a thematic analysis is as mentioned to extract data from the data, so to say. This is commonly done by transcribing interviews and looking through the transcripts to identify patterns in the text (Aronson, 1995). Ward et al (2013) argues in a presentation of framework analysis (which is very similar to thematic analysis) that it is a usable method in working with qualitative data in nursing research. As on both Aronson (1995) and Ward et al (2013) we went through the data to get familiar with the content before it was being further processed. However, we chose not to transcribe the

interviews, as we found that listening to the audio records would be sufficient for conducting the analysis. To secure that we approached the extraction of content as precise as possible when not transcribing, we divided the extraction process in to several smaller sub-processes. We treated each audio record one by one, so that we would go through each dataset without having the content of the other sets fresh in mind, to secure as little obstruction of the data as possible.

In the second sub-process, we carried out the actual data extraction. After we both had listened to the audio record we had an individual overview of the content of the records. As described by Aronson (1995) and Ward et al (2013) the extraction process should emphasize the recognition of relatable data by defining inherent structures or patterns between different notions in the data/text. As mentioned we chose not to transcribe the audio records and instead we had a joint session of listening to the audio while writing down the notions that we individually detected along the way on post-it notes.

To secure that we were not influenced by what each other wrote, we placed ourselves on each side of a long table with the audio record playing in the middle. After we were done listening to the audio and writing down notions, we moved along to the next process of the thematic analysis were the extracted data was further processed. This is also the first process were our individually extracted data were compared.

2.5.1.2 PROCESSING OF DATA

Aronson (1995) and Ward et al (2013) describes the data processing phase as the phase were the extracted date is being categorized. This can be done by comparing each written notion with the others, to find the ones that are verbally the same or address the same topics. By dividing the notions into clusters of relatability, the patterns in the data is being identified and the data is ready for the final step of coding and definition of structures.

Regarding how we carried out the processing of data in relation to the above guidelines we used this process as a way of negotiating the meaning of our individually extracted data as to secure that we had the same understanding of the content and thereby increase the validity of the data. This was done by going through each statement or expression we had written down while listening to the audio record and discuss the meaning of them, as it was not given that the same notions had the same meaning in our individual opinion and therefore the negation aspect was crucial in categorizing the data.   After the data was divided into clusters we went through each of these to identify the pattern between them.   As argued by Aronson (1995) and Ward et al (2013) patterns in qualitative data can be defined from different premises upon the categoric division, as this is often determined from the research topic.   As stressed by Charmaz (2010) and Bryman and Burgess (2002) one of the weaknesses when it comes to analysis of qualitative data is that it is very easy to add aspects to the data that it does not contain in its uninterpreted nature, and there is a risk that the research focus is to strong a factor when the data is being analyzed and thereby researchers can inattentive to their own research agendas influence reflects in the results. To minimize the obstruction of the data or adding it any value that it did not contain, we chose to listen to the audio files a second time individually and discuss our reflections afterwards in relation to the categorizations made from the joint session.

2.5.1.3 CODING THE DATA

The final process of conducting the thematic analysis is to code the processed data by defining the content of each cluster and thereby assign each cluster a theme and define the structures between each theme (Aronson, 1995, Ward et al., 2013). The coding of data is a common process in qualitative data analysis in general and is where researchers should be specifically aware of not letting research focus/objectives determine what how the clusters are both individually and conjoint coded (Bryman & Burgess, 2002). As described by Aronson and Ward et al the process of coding the data should be based upon a set

framework to make the explanation of the approach clear and thereby being able to discuss and argue each decision made in the coding process. When working with thematic analysis we found that looking through all statement/expression in each cluster and discussing their individual meaning and interrelated thematics was an approach to increase our objectivity in the coding of the data. In this approach, we were inspired by the framework of Attride-Stirling (2001) of making thematic networks, which in our assessment can be argued as a framework-approach within the data analysis category of thematic analysis.

2.5.1.3.1 MAKING THEMATIC NETWORKS

Attride-Stirling (2001) argues that thematic networks is an approach to making both qualitative data itself tangible, but also the analysis of it. We found it difficult to code each cluster of data and therefore it was also problematic to define the structures between each one. The approach of making thematic networks provided us with a guideline for how to thematize each cluster of notions and how to outline their interrelatedness.

Attride-Stirling (2001) operates with three conceptual categories of themes in her description of thematic networks. These are; *Global themes*, *Organizing themes* and *Basic themes*. Each category represents a level of inclusion in regard to other themes/clusters and can therefore be described as a hierarchy of relatability between all sub-datasets in a unit of analysis.

The three conceptual categories of themes described by Attride-Stirling (2001) are both means for coding the notions in a cluster by naming them a theme, but it is also a way of identifying the structures between each theme, as the network element of the approach is to outline each themes relatability to the others. The first conceptual category of themes described by Attride-Stirling is Global themes. The clusters of notions that should be in this category are the ones that functions as conceptual headings to other themes (clusters) in the network. We have defined the Global themes of each thematic analysis we conducted, by

comparing the content of all clusters in an analysis and thereby identifying the one(s) that could contain the others – thereby making them the heading-themes of a network. Global themes should be the definition of an entire thematic network, which mean that it should somehow summarize the themes and inherent notions of all other clusters. Global themes should therefore function as the highest level of abstraction.

In our different thematic analyses, we have chosen to use the concept of Global themes as a way of identifying a topic in which all other themes seem to have a connection. We have therefore not used the Global theme category to label each thematic network we have made, but merely as mean to identify the core element(s) of each analysis, which in turn implies that one network can have more than one global theme.

The second conceptual category of themes when making thematic networks is Organizing themes (Attride-Stirling, 2001). The conceptual theme-category should contain clusters of notions that have a lower level of abstraction that the global theme(s). This means that the theme(s) (clusters) within this category is the mid-level of the theme-hierarchy and should function as a branching of a global theme and are thereby the foundation for global themes. Furthermore, the function of organizing themes is also to be superior-themes to the underlying basic themes, which emphasizes that they somehow represent the principles of the content in the lowest level of the theme-hierarchy (Attride-Stirling, 2001). In our different thematic analyses, we have used the category of organizing themes as a mean to identify themes (clusters) which are relatable/represented in the content of the global theme(s). As organizing themes have a lower level of abstraction we used this category to identify which cluster of notions could function as middle links between the remaining clusters and the global theme(s).

Basic themes are as described by Attride-Stirling (2001) the category of theme with the lowest level of abstraction and thereby the bottom of the theme-hierarchy. Though basic

themes are based on notions that are not as comprehensive as the other theme categories, they are nonetheless a corner to in a thematic network, as they are premises representing single notions from the data. In our thematic analyses, we have used the category of basic themes to identify which cluster of notions that were targeting specific topic or contained very few notions.

To summarize how we have approached the making of thematic networks based on each of our qualitative interviews, the focus has been on structuring the different cluster and defining their relatability, rather than using the different theme categories as way of labelling sub-themes. We have therefore not followed the approach of Attride-Stirling by the book, but have been highly inspired by the elements she argues that a thematic network should consist of and the hierarchical approach to the division of themes (clusters) in which their inherent structures and relatability become outlined. Our thematic networks are therefore not necessarily bound by levels of abstraction either.

Attride-Stirlings (2001) approach to making thematic networks also emphasize that one unit of analysis (dataset) can have different thematic networks, depending on how many global themes and underlying sub-themes that are occurring when analyzing the data. We have chosen to make one thematic network per unit of analysis (interview) and are therefore operating with more with more than one global theme in some of our networks. In the following section, we will present our six thematic networks and thereby the results of our data analysis sessions. Each network will be presented in a figure and its contents and structures will be described with the purpose of exploring the relatability between each cluster of notions. After each thematic network has been presented, we will discuss how the results can be used in regard to the theoretical framework of this thesis.

The results of each thematic network will be presented with a figure of the network. However, what the results can be used for in relation to our theoretical framework with activity theory and

how the thematic networks result can be comparable will be discussed in section 2.5.2 on data matrix.

2.5.1.3.1.1 THEMATIC NETWORK ON INTERVIEW WITH PRIMARY NURSE (HJØRRING)

The first thematic network we will present was conducted from the analysis of the data collected from our interview with one of the primary nurses in the TeleCare North COPD initiative in the municipality of Hjørring (for audio record see appendix 2). The thematic network is set up in a figure, that can be viewed on the following page →

Figure 10: Thematic network primary nurse, Hjørring

THEMATIC NETWORK – PRIMARY NURSE (HJØRRING)

GLOBAL THEME(S)

WORK TASKS
- Professional assessment (alarms)
- Guidance/Supervision
- Call Citizens with red alarm
- Professional discretion (alarms)
- Guidance/Supervision
- COPD courses - rehabilitation

ORGANIZING THEME(S)

PROFESSIONALISM
- Fewer senses
- Fewer senses to work with
- More contact/time with patients
- Cannot see symptoms of illness/worsening
- New nursing discipline
- Professional assessment in development
- More time with TM
- Nursing discipline changes
- Senses are weakened
- Develop other senses than sight
- TM is here to stay
- More contact with citizens
- More time per citizen

PURPOSE
- Security for the individual citizen
- Avoid hospitalization
- Catch disease before worsening
- Preventive effect
- Avoid hospitalization
- Prevent worsening in citizen's illness
- Security
- Greater quality of life
- Before they were more frequently admitted
- Detect aggravation
- Frequent hospital visits (Before TM)

BASIC THEME(S)

COMPETENCES
- TM is specialized fields
- Experience with TM for COPD
- Experienced in TCN KOL
- No previous experience with TM

TECHNOLOGY
- Systems are not integrated
- Oxygen meter could be better
- Systems does not" coorporate" with each other
- Camera is not a necessity
- Oxygen meter does not work
- Webcam would create insecurity for the citizens

ORGANISATION
- Flexibility towards citizens
- Training of citizens in their home or in groups
- Difficult to find citizens for initiative (criteria)
- Narrow inclusion of citizens
- Something happens when you are in the citizens home
- Side profit for the economy
- Side profit to the economy
- Training of citizens at home or in health centers
- Current set-up is functioning
- Citizens with moderate COPD could also benefit from TM
- Coordinator gives room to operate
- Leader allows to use the time needed

EFFECT
- Citizens take ownership
- The citizens are the center
- The Citizen as the center
- Citizens should take ownership
- The long haul (indulge citizens)
- Citizens should become aware of their symptoms
- Encourage citizen
- Citizens decide on their own to participate
- Takes time to familiarize citizens with concept

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As it can be seen in figure 10 the thematic network on our interview with one of the primary nurses working with TeleCare North COPD in the municipality of Hjørring consist of seven cluster of notions, all defined by a theme. In this network, there is only one Global theme which is named 'Work tasks' and covers notions found on the nurse commenting on what different tasks were the pivot points in working with the TeleCare North COPD initiative. the **Global theme** 'Work tasks' contains the notions; 'Professional assessment(alarms)', 'Call citizen with red alarm', 2 x 'Guidance/supervision', 'Professional discretion (alarms)' and 'COPD courses – rehabilitation'. As it might be noted some of notions in a theme might be the same or very similar. We have chosen to include the same notions as it is a part of the validation aspect of our qualitative data analysis, that we somewhat should reach the same conclusions or notice the same notions in the unit of analysis. The content of the global theme 'Work tasks' is in our assessment targeting the more practical aspects of the primary nurse handling telemedicine. The notions in 'Work tasks' are primarily addressing how the nurse uses much of the time when working with telemedicine on assessing the measurements from the citizens. Other tasks include assisting with guidance/supervision when the citizens need it – in relation to red alarms, other indications and other indications of possible worsening or activities that are related to COPD treatment in general, such as smoking cessation courses.

The current thematic network has two **Organizing themes**. We have chosen to name these 'Professionalism' and 'Purpose', based on their content. The 'Professionalism' theme contains the following notions; 'Fewer senses', 'More contact/time with patients', 'New nursing discipline', 'More time with TM', 'Senses are weakened', 'TM is here to stay', 'More time per citizen', 'Fewer senses to work with', 'Cannot see symptoms of illness/worsening', 'Professional assessment in development', 'Nursing discipline changes', 'Develop other senses', 'More contact with citizens'. This organizing theme comprises notions where the nurse explains what impact the framework for working with telemedicine has on her professionalism. There is

a strong focus on how the senses she would normally use as a nurse is weakened and how she must develop other senses in regard to analyzing the citizens' symptoms and general health. It is our assessment that this development of new senses also is relatable to her professional assessment basis. Another general notion that is represented several times in this theme is those on having more time per citizen, which she explains in the interview as being one of the upsides of telemedicine.

The second organizing theme 'purpose' contains notions on what the nurse's understanding of the purpose of the TeleCare North COPD initiative is, and thereby also the purpose of her function in being a part of it. These are as follows: 'Security for the individual citizen', 'Preventive effect', 'Security', 'Detect aggravation', 'Avoid hospitalization', 'Greater quality of life', 'Frequent hospital visits (before TM)', 'Catch disease before worsening', 'Prevent worsening in citizen's illness', 'Before they were more frequently admitted'. In these notions on the purpose of the telemedicine initiative there is a focus on the security aspect regarding the involved citizens feeling safer when they know a professional is reading their numbers and comments every week. Another reoccurring notion in this theme is that of telemedicine having the purpose of avoiding unnecessary hospitalizations, as the nurse explain many of the involved citizens call 112 more often than needed. The notions on telemedicine as being preventive in relation to worsening in the citizens illness and general health is in our assessment closely connected to the ones on minimizing unnecessary hospitalizations. The last notion that is also represented a few times within this organizing theme is that on telemedicine improving the citizens quality of life, which in our assessment is connected to making the citizen feel secure. Both Organizing themes are emphasized are branching from the Global theme 'Work tasks'.

There are four **Basic themes** in this thematic network and we have named them; 'Competences', 'Technology', 'Organization' and 'Effect'. The theme 'Competences' contains the following

notions; 'TM is a specialized field', 'Experience with TM for COPD', 'Experienced in TCN KOL' and 'No previous experience with TM'. The notions are based on the nurse explaining how she sees her professional competences in working with the TeleCare North COPD initiative. It is our assessment that most of the notions are the same and address that she feels experienced within the current set-up, but she did not necessarily have all the competences needed prior to the initiative as she has not working with telemedicine before.

The second Basic theme 'Technology' is based on the notions; 'Systems are not integrated', 'Systems do not coorporate with each other', 'Oxygen meter does not work', 'Oxygen meter could be better', 'Camera is not a necessity' and 'Webcam would create insecurity for the citizens'. The notions in this theme targets two different topics related to the system used by the nurse as the platform for accessing the citizens measurements and messages (OpenTele), as well as other municipal IT systems in which she has to report when she is in contact with a citizen

regarding their numbers, and the other topic is based on her opinion on the opportunity to have a webcam as a part of the digital contact with the citizens. It is our assessment that the nurse wish for a more integrated set-up regarding her use of different systems and that the idea of a webcam is not a relevance for her nor the citizens.

The third Basic theme 'Organization' comprises the following notions; 'Flexibility towards citizens', 'Narrow inclusion of citizens', 'Side profit to the economy', 'Citizens with moderate COPD could also benefit from TM', 'Training of citizens in their home or in groups', 'Something happens when you are in the citizens home', 'Training of citizens at home or in health-centers', 'Coordinator gives room to operate', 'Difficult to find citizens for initiative (criteria)', 'Side profit for the economy', 'Current set-up is functioning' and 'Leader allows to use the time needed'.

The notions in this basic theme address several different topics related to the organizational set-up of the TeleCare North COPD initiative. One of the reoccurring topics is the criteria for

inclusion of citizens being as a complicating factor in regard to reaching all citizens who would benefit from being a part of the initiative, as the nurse explains in the interview there are just a many citizens with moderate COPD whom she assesses would be helped in learning to cope with their illness from being a part of the initiative. Another notion that is represented more times in this theme is those on her possibilities for training the citizens in using the telemedicine equipment (TeleKit). It is our assessment that the notions show that the nurse prefers a personal contact with the citizens in the training-phase, which she also address in the interview. Other notions the occur a few times are the ones targeting that there is a hope for an economic profit in relation to the telemedicine initiative and that the leader/coordinating nurse allows for the primary nurse to use the time she needs on each citizen, which in our assessment is expressed as a positive factor in her approach to consulting the citizens over the phone.

The notions on the economic profit as being a parameter of telemedicine can in our assessment be understood as a factor is

aware that she is working under but does not feel involved in on a daily basis. The first three Basic themes 'Competences', 'Technology' and 'Organization' are all branching from the Organizing theme 'Professionalism'.

The fourth and final Basic theme is 'Effect' and it addresses what the nurse sees as the actual effect of the telemedicine initiative and thereby how her work is influencing the involved citizens. The notions are; 'Citizens take ownership', 'The citizen as the center', 'The long haul (Indulge citizens)', 'Encourage citizens', 'Takes time to familiarize citizens with concept', 'The citizens are the center', 'Citizens should take ownership', 'Citizens should become aware of their symptoms', 'Citizens decide on their own to participate'. It is our assessment that the notions in general represent that the nurse's perception on the effect of the initiative is for the citizens to enhance their abilities regarding their illness and to make them realize how they can look after themselves and making them want to be a part of the initiative, instead of participating out of f.x. goodwill. This current basic

theme and the basic theme 'Organization' are both related to the Organizing theme 'Purpose'.

2.5.1.3.1.2 THEMATIC NETWORK ON INTERVIEW WITH COORDINATING NURSE (HJØRRING)

The second thematic network that will be introduced is made from the data from the interview with the coordinating nurse in the TeleCare North COPD initiative in the municipality of Hjørring (for audio record see appendix 3). The thematic network is set up in a figure, that can be viewed on the following page →

Figure 11: Thematic network coordinating nurse, Hjørring

GLOBAL THEME(S)

ORGANIZING THEME(S)

BASIC THEME(S)

ORGANIZATION

- Leader is not that interested
- Municipal project coordinator as guarantor
- Quality assurance
- Project to operation as process of change
- Quality assurance – are we on the track?
- Transition was a possibility to comment on set-up
- Did not see any results after end project period
- Criteria for participation cuts citizens from the initiative
- Difficult to admit new citizens (criteria)
- TM functions well for rehabilitation
- TM difficult in the start-up phase
- Crucial that time was available to adapt (nurses)
- Nice with clearly defined target group
- Local implementation committee
- Project start-up good for input

PROFESSIONALISM

- The citizen is more than his/her Gold-group
- Draw out numbers
- Away from diagnosis-thinking
- Make citizens realize they are ill
- Retrieve senses
- Care cannot be delivered from a distance
- Overlooks use of resources
- Trust gets another meaning (communication)
- Senses disappear
- Help people to take care of themselves
- Senses are important in nursing
- Trust changes (communication)
- Handle several roles
- Good at asking the right questions

SYSTEM

- No difference if there is a camera or not
- Uses a lot of time in managing different

PURPOSE

- Citizen as the center
- Citizens being able to take care of themselves
- Help citizens to comprehend their illness
- Citizens need the tools to take responsibility
- Citizen will automatically be secreted when they become self-managing
- Empowerment of citizens
- Rehabilitation: citizens become able to handle their everyday lives
- Learn citizens to act on their symptoms

EFFECT

- Over time fewer resources are needed
- Doubting the validity of measurements
- Generic set-up several smaller projects
- Have you really got them?
- Citizens with moderate COPD can also benefit from the initiative
- Provide citizens with a foundation for recognizing their illness

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As presented in figure 11 the thematic network on the interview with the coordinating nurse in the TeleCare North initiative in the municipality of Hjørring is composed by five clusters of themes; one Global theme, three Organizing themes and one Basic theme. The **Global theme** of this thematic network is named 'Organization' and comprises the following notions; 'Leader is not that interested', 'Municipal project coordinator as guarantor', 'Quality assurance', 'Project to operation as process of change', 'Quality assurance – are we on the track?', 'Transition was a possibility to comment on set-up', 'Did not see any results after end project period', 'Criteria for participation cuts citizens from the initiative', 'Difficult to admit new citizens', 'TM functions well for rehabilitation', 'TM difficult in the start-up phase', 'Crucial that time was available to adapt (nurses)', 'Nice with clearly defined target group', 'Local implementation committee' and ' Project start-up good for input'. The notions in this Global theme address how the coordinating nurse understands her professional role in regard to the telemedicine initiative. Several of the notions are recur and we will address

the most predominant in the following. It is our assessment based on the notions from the interview that the coordinating nurse understands her main functions as being mostly within the organizational part of the telemedicine initiative, focusing on aspects such as quality assurance and the establishment of the initiative as operational after the end of the project period. Other notions that are represented more times is that of working with the criteria for including citizens, which in our assessment is perceived as the coordinating nurse as having predominantly negative influence, but also a positive side to it, as the target group was clearly defined in the initiatives start-up phase.

The thematic network encompasses three **Organizing themes**, these are named; 'Professionalism', 'System' and 'Purpose'. The first theme 'Professionalism' covers the following notions; 'The citizen is more than his/her Gold-group', 'Draw out numbers', 'Away from diagnosis-thinking', 'Make citizens realize they are ill', 'Retrieve senses', 'Care cannot be delivered from a distance', 'Overlooks use of resources', 'Trust gets another meaning

(communication)', 'Senses disappear', 'Help people to take care of themselves', 'Senses are important in nursing', 'Trust changes (communication)', 'Handle several roles' and 'Good at asking the right questions'. The notions in this theme all target how the coordinating nurse understand her role as a professional regarding the telemedicine framework. The frequently reoccurring notions in this theme is among other about being weakened on senses and developing new ways for coping with this weakening. The trust aspect of the relation with the citizen is also addressed more times as a change in communication. It is our assessment that this change is what marks the foundation for developing trust between herself and the citizens. The notions are also targeting her professionalism in relation to telemedicine as a coordinating nurse, which implies her having to draw out numbers and have a more organizational perspective on the initiative as to assess if the objectives of the initiative are being met. It is our assessment that her role as coordinating nurse implies that she as a professional nurse also have to possess management skills in regard to advocate for the initiatives organizational framework, as well as representing/supporting the primary nurses working in the initiative.

The second Organizing theme is 'System' and it covers the notions; 'No difference is there is a camera or not' and 'Uses a lot of time in managing different systems'. This is one of the smaller themes notion-wise and it address how the coordinating nurse considers the functionality of the technology in the initiative. It is our assessment based on the notions that she does not find that a camera would be a benefit the initiative in regard to communicating with the citizens. The notion on the time spend on different system is in our assessment an expression of that specific tasks as taking up a lot of time and a wish for a more integrated system.

The third organizing theme of this thematic network is 'Purpose' and contains notions on what the coordinating nurse understands as being the purpose of the TeleCare North initiative in relation to her professional role. The notions in the

theme are; 'Citizens as the center', 'Citizens being able to take care of themselves', 'Help citizens to comprehend their illness', 'Citizens need the tools to take responsibility', 'Citizens will automatically be segregated when they become self-managing', 'Empowerment of citizens', 'Rehabilitation: citizens become able to handle their everyday lives' and 'Learn citizens to act on their symptoms'. It is our assessment that the notions in an overall perspective represent that the coordinating nurse understands the purpose of the telemedicine initiative as a way of center the focus on the citizens and generally help them become self-managing and adapt to living with a chronic disease. All three organizing themes are branching from the Global theme 'Organization'.

As mentioned in the introduction there is only one **Basic theme** in this thematic network. It is named 'Effect', and covers notions on the coordinating nurse's assessment of the effect of the TeleCare North COPD initiative. The notions are as follows; 'Over time fewer resources are needed', 'Doubting the validity of measurement', 'Generic set-up several smaller projects', 'Have you really got them?', 'Citizens with moderate COPD can also benefit from the initiative' and 'Provide citizens with a foundation for recognizing their illness'. It is our assessment that the notions target different topics in relation to the effect of the telemedicine initiative. It is expressed by the coordinating nurse that the demand for resources might be minimized as the initiative along the way will be costumed to fit the needs. She is also expressing that she is sometimes doubting the validity of the measurements which in our assessment is an expression for an insecurity on only handling citizens as data and also mentioning a uncertainty in relation to knowing if the citizens really understand what the initiative holds for them. Another notion in this theme is on the possibilities of telemedicine spreading/branching into several smaller projects in the healthcare sector as to get a generic set-up. Furthermore, she is addressing that citizens with moderate COPD also benefit from participating in the initiative, based om the knowledge on the ones that are included now. The final notion targets that she

assesses that the effect of telemedicine is building a foundation of knowhow and security in which the citizens can allow themselves to recognize their illness, as she express this can be difficult for many COPD patients, as they used to be an undermined group in the healthcare system. The Basic theme is related to all three Organizing themes.

2.5.1.3.1.3 THEMATIC NETWORK PRIMARY NURSE (FREDERIKSHAVN)

The third thematic network is based on the data collected from our interview with one of the primary nurses working with the TeleCare North COPD initiative in the municipality of Frederikshavn (for audio record see appendix 4). The nurse we interviewed is located in Sæby, which is one of the main-cities in the municipality, the other two primary nurses in the municipality are located in respectively Skagen and Frederikshavn. The thematic network is like the previous ones presented in a figure on the following page →

GLOBAL THEME(S)

PROFESSIONALISM

- The individual estimate can lift many
- I chose this work
- Professional pride
- Respect citizens own feelings
- When they act on their own I become proud in my nursing-heart
- Not box-oriented
- The talk is often the most important part
- The citizens know when they are ill
- Constraint that I cannot see the citizen
- In-depth question-technique
- Good at being a detective
- It is a constraint that I cannot see the citizen
- Negative stigma for COPD patients
- Citizens need support/contact
- Talk about how they are feeling
- Proud when citizens wonder and act
- Does not make me a better nurse in other circumstances
- Better at being a detective
- The whole picture is important
- The personal contact Feel and sense
- Not so box-oriented
- Telephone contact is enough to understand
- COPD patients is a difficult group: shame
- Measurement do not tell how they feel

ORGANIZATION

- Only putting out a fire
- The municipal care has other premises (pedagogy)
- Criteria for inclusion should be individually fixed
- Ambulatory was very goal-oriented
- Wish for COPD-nurse with driving function
- Stronger connection between courses and TM
- Include citizens outside the criteria
- More reluctance from citizens in municipal initiatives
- Nice with early effort (criteria)
- Citizens get included in rehabilitation
- Wish for new criteria of inclusion
- Use rehab courses as a way of including citizens

ORGANIZING THEME(S)

PURPOSE

- Gain for the citizens when they get the idea
- Help to self-help
- Help to self-help

SYSTEM/TECHNOLOGY

- Tired of working in several systems
- Nice if systems could be incorporated in each other
- Nice if phone could be accessed through OpenTele (system)
- Nice with a camera to see the citizens

WORK TASKS

- Contact citizens if there is inactivity
- The measurements give a hint about whether to contact the citizen or not
- Have not met all citizens in person
- Collect TM-equipment if citizen is inactive
- Not personal contact with all citizens

BASIC THEME(S)

EFFECT

- Citizens become engaged when they know there is a follow-up on their results
- Citizen become aware of symptoms that can tell which way they illness is going
- The citizens who participate have a sincere interest
- People like to talk about themselves and how they feel
- Citizens are in general positive towards TM

FUTURE

- The danger is if the citizens are being reduced to numbers
- TM cannot stand alone and needs to be handled by healthcare pros
- Hope there will be room for the personal contact in the future
- Does not have to meet at a physical place in the future
- Include the double KRAM as guideline in TM too
- Annoying to have to meet at a certain place at a certain time
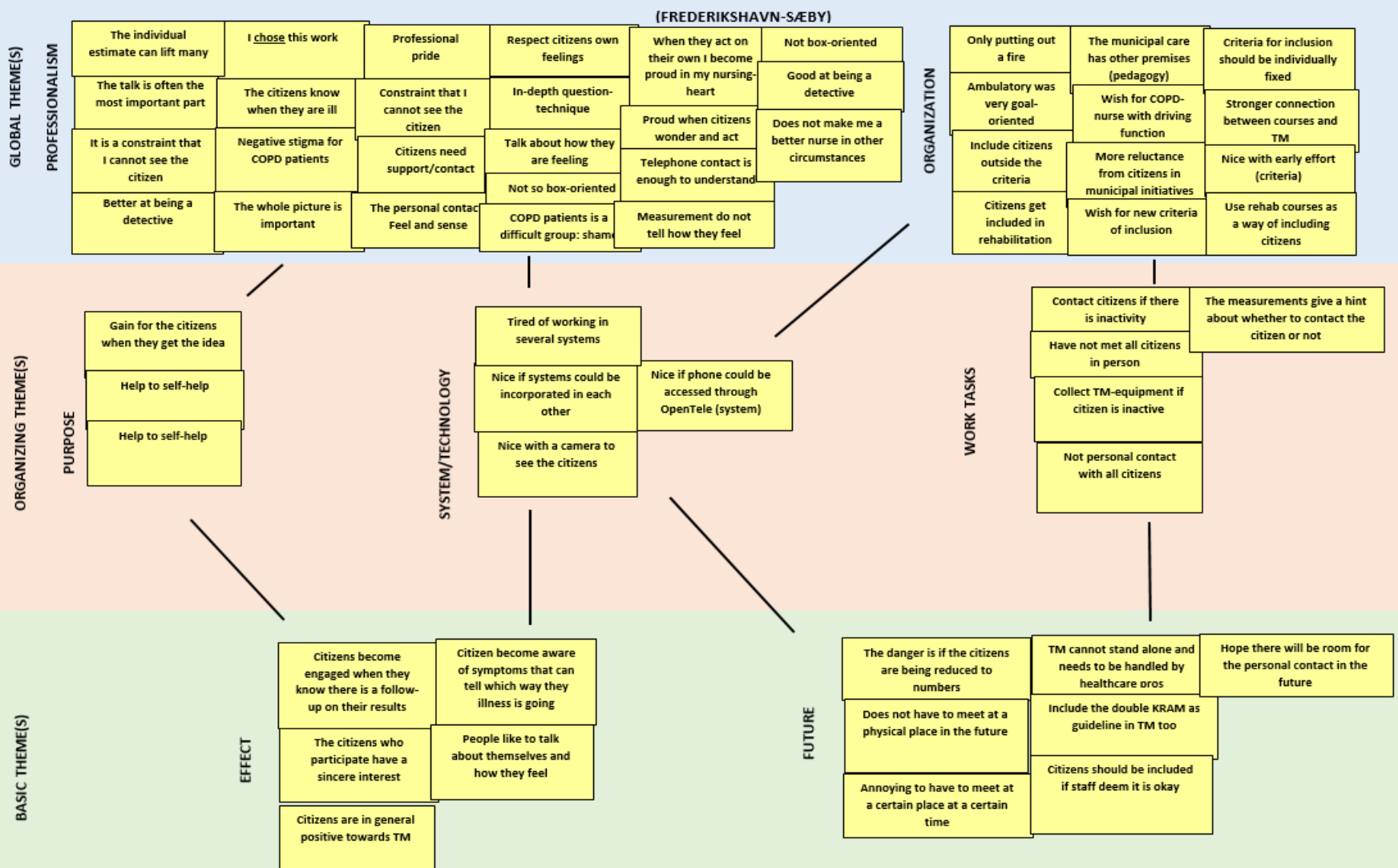- Citizens should be included if staff deem it is okay

Figure 12: Thematic network Primary nurse, Frederikshavn (Sæby)

The thematic network on the interview with the Primary nurse working in the TeleCare North COPD initiative in the municipality of Frederikshavn consist of seven different themes divided in; two Global themes, three Organizing themes and two Basic themes. The first of the two **Global themes** is 'Professionalism' and covers the following notions; 'The individual estimate can lift many', 'The talk is often the most important part', 'It is a constraint that I cannot see the citizen', 'Better at being a detective', 'I chose this work', 'The citizens know when they are ill', 'Negative stigma for COPD patients', 'The whole picture is important', 'Professional pride', Constraint that I cannot see the citizen', 'Citizens need support/contact', 'The personal contact: feel and sense', 'Respect citizens own feelings', 'In-depth question-technique', 'Talk about how they are feeling', 'Not so box-oriented', 'COPD patients is a difficult group: shame', 'When they act on their own I become proud in my nursing-heart', 'Proud when citizens wonder and act', 'Telephone contact is enough to understand', 'Measurements do not tell how they feel', 'Not box-oriented', 'Good at being a detective' and 'Does not make me a better nurse in other circumstances'. All notion in this Global theme represent how the primary nurse understands her professional role in relation to the telemedicine initiative. There are several reoccurring notions, especially the ones focused on her relation with the citizens. It is our assessment that there is strong emphasis on emotional and pedagogical support in the perspective of this primary nurse. She assumes the supporting role by focusing on making each citizen develop to the best of their abilities and engagement. She also has a strong focus on the psychological aspects of listening to the citizens and letting them share their feelings, as she seems to deem that there is more to telemedicine than what the measurements can tell. It is our assessment that she has what can be described as a holistic approach in her professionalism in working with the TeleCare North COPD, not only addressing the measurable symptoms of the citizens but also the emotional and developmental factors, which she expresses adds to her professional pride.

The second Global theme is 'Organization' and the notions in this theme target the primary nurse's perspective on the organizational set-up of the TeleCare North COPD initiative in relation to her professional role. The notions are; 'Only putting out a fire', 'Ambulatory was very goal-oriented', 'Include citizens outside the criteria', 'Citizens get included in rehabilitation', 'The municipal care has other premises (pedagogy)', 'Wish for COPD-nurses with driving function', 'More reluctance from citizens in municipal initiatives', 'Wish for new criteria of inclusion', 'Criteria for inclusion should be individually fixed', 'Stronger connection between courses and TM', 'Nice with early effort (Criteria)' and 'Use rehab courses as a way of including citizens'. It is our assessment that the notions in this theme generally express that the primary nurse's focus regarding the organizational set-up of TeleCare North COPD is on the criteria for inclusion of citizens, which she deems is set to late in the citizens' illness. Another set of notions that we assess are targeting the same topic are the ones addressing how the initiative is thriving within the framework of the municipality. It is our assessment based on the notions targeting this topic, that the primary nurse recognizes that the municipal offers can well support the telemedicine initiative but that there could be a stronger connection between non-telemedicine courses for COPD-citizens and the TeleCare North COPD initiative.

As mentioned this thematic network has three **Organizing themes** which are 'Purpose', 'System/Technology' and 'Work tasks'. The first organizing theme 'Purpose' is based on the primary nurse's assessment of the purpose of the telemedicine initiative and contains the following notions; 'Gain for the citizens when they get the idea' and 2 x 'Help to self-help'. As this is a rather small theme in regard to number of notions, it is our assessment that its content can be summarized as her understanding of the purpose being that citizens can become aware of their own condition and able to handle their symptoms.

The second Organizing theme is 'System/Technology' and it comprises notions on the primary nurse's perspectives on the telemedicine technology (systems, instruments etc.) and the

notions are as follows; 'Tired of working in several systems', 'Nice if systems could be incorporated in each other', 'Nice with a camera to see the citizens' and 'Nice if phone could be accessed through system (OpenTele)'. It is our assessment that based on the notions from this theme the nurse's find that it would be beneficial to her work if more systems were integrated into each other and that she would like to be able to see the citizens and therefore a camera would be needed as a part of the communication between her and the citizens.

The third Organizing theme is named 'Work Tasks' and contains notions on the primary nurse's understanding of her own professional tasks in relation to the telemedicine initiative. The notions of this theme are; 'Contact citizens if they are inactive', 'Have not met all citizens in person', 'Collect TM-equipment is citizen is inactive', 'Not personal contact with all citizens' and 'The measurements give a hint on whether to contact the citizen or not'. It is our assessment that the notions in this theme reveal that the primary nurse understands her main tasks as follow-up

on citizens' level of participation and try to keep them on the initiative. Her function is to act on the data she receives and to be able to provide supervision on the same level for all citizens – also the ones that she has never met.

Regarding the structures between the two Global themes and three Organizing themes, the Organizing theme 'Purpose' branches from the Global theme 'Professionalism', the Organizing theme 'System/Technology branches from both the Global themes 'Professionalism' and 'Organization'. The third Organizing theme 'Work tasks' branches from the Global theme 'Organization'.

There are two **Basic themes** in the network, which are named; 'Effect' and 'Future'. The theme 'Effect' covers notions on the primary nurse's assessment of the effect of the telemedicine initiative and these are as follows; 'Citizens become engaged when they know there is a follow-up on their results', 'The citizens who participate have a sincere interest', 'Citizens are in general positive towards TM', 'Citizens become aware of

symptoms that can tell which way their illness is going' and 'People like to talk about themselves and how they feel'. Based on the presented notions it is our assessment that the primary nurse's assessment of the effect of the initiative in general is that citizens realize after some time that they develop/gain from being a part of the initiative. Furthermore, and just as important is the notions on the effect being that citizens become aware of their symptoms in regard to coping living with their disease.

The last of the two Basic themes is 'Future'. This theme encompasses notions on the primary nurse's professional perspectives on the future of the TeleCare North COPD initiative and telemedicine in general. The theme comprises the following notions; 'The danger is if the citizens are being reduced to numbers', 'Does not have to meet at a physical place in the future', 'Annoying to have to meet at a certain place at a certain time', 'TM cannot stand alone and needs to be handled by healthcare prod', 'Include the double KRAM as guideline in TM too', 'Citizens should be included if staff deem it okay' and 'Hope there will be room for the personal contact in the future'. It is our assessment that the general perspectives of the primary nurse presented in this theme shows that she professionally embraces the possibilities of telemedicine as being a solution in the future especially in regard to logistic circumstances. It is important that telemedicine is handled by trained healthcare staff and the staff should have a strong saying in admitting citizens in the initiative. Furthermore, we assess that there is also an underlying concern for a complete loss of personal contact between healthcare professional and patient.

In regard to structures the Basic theme 'Effect' is related to the Organizing themes 'Purpose' and 'System/Technology'. The Basic theme 'Future' is related to the Organizing themes 'System/Technology' and 'Work tasks'.

2.5.1.3.1.4 THEMATIC NETWORK ON COORDINATOR/LEADER (FREDERIKSHAVN)
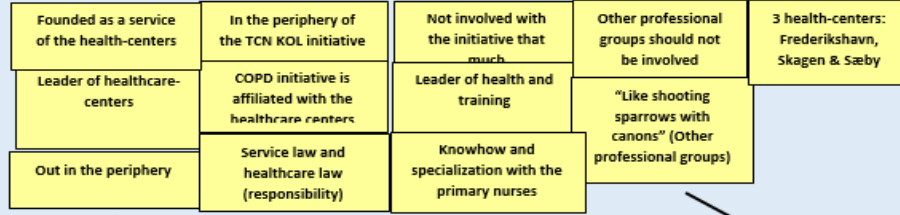
The fourth thematic network is made from the data collected from the interview with the coordinator/leader associated with the TeleCare North COPD initiative in the municipality of Frederikshavn (for audio recording see appendix 5). The thematic network is presented in a figure on the following page
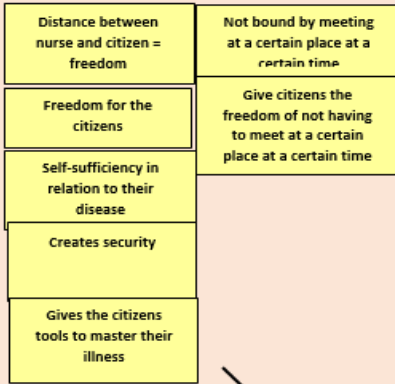
→

THEMATIC NETWORK – COORDINATOR (FREDERIKSHAVN)

Figure 13: Thematic network on Coordinator/Leader (Frederikshavn)

GLOBAL THEME(S)

ORGANIZATION

- Founded as a service of the health-centers
- In the periphery of the TCN KOL initiative
- Not involved with the initiative that much
- Other professional groups should not be involved
- 3 health-centers: Frederikshavn, Skagen & Sæby
- Leader of healthcare-centers
- COPD initiative is affiliated with the healthcare centers
- Leader of health and training
- "Like shooting sparrows with canons" (Other professional groups)
- Out in the periphery
- Service law and healthcare law (responsibility)
- Knowhow and specialization with the primary nurses

ORGANIZING THEME(S)

PURPOSE

- Distance between nurse and citizen = freedom
- Not bound by meeting at a certain place at a certain time
- Freedom for the citizens
- Give citizens the freedom of not having to meet at a certain place at a certain time
- Self-sufficiency in relation to their disease
- Creates security
- Gives the citizens tools to master their illness

STAFF

- The employees control it themselves
- It is each employee's decision how they do it (Home visits, only phone conversation)
- 3 COPD nurses working with TM
- 3 nurses for COPD and 3 nurses for the heart initiative
- Staff with to include citizens with moderate COPD (criteria)
- Nice for the citizens that there is a real person in the other end

BASIC THEME(S)

FUTURE

- Maybe connect the home-nurse as well?
- TM could be beneficial in psychiatry
- TM can be included in more fields (Psychiatry etc.)
- Staff wish for criteria for "admission" changed

OTHER PROFESSIONALS

- Talk with GPs at their consultations (in the front)
- Coorporation with GPs is to be cared for and developed (constant focus)
- Coorporation with GPs should be nursed and further developed
- A lot of work in reaching the GPs
- Information-meetings for GPs
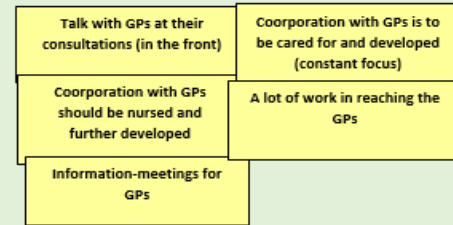
The thematic network on our interview with the Coordinator/Leader associated with the TeleCare North COPD initiative in the municipality of Frederikshavn consist of five themes, divided into; one Global theme, two Organizing themes and two Basic themes. We have chosen to name the **Global theme** of this network 'Organization' and it represents the Coordinator/Leaders perspectives on the organizational set-up for the telemedicine initiative and her professional role in relation to being Coordinator/Leader. The notions in the theme are; 'Founded as a service of the health-centers', 'Leader of health-centers', 'Out in the periphery', 'In the periphery of the TCN KOL initiative', 'COPD initiative is affiliated with the health-centers', 'Service law and healthcare law (Responsibility)', 'Not involved with the initiative that much', 'Leader of health and training', 'Knowhow and specialization is with the Primary nurses', 'Other professional groups should not be involved', 'Like shooting sparrows with cannons (other professional groups)' and '3 health-centers: Frederikshavn, Skagen and Sæby'.

It is our assessment that based on the notions in this theme the Coordinator/Leader has many other responsibilities beside from the TeleCare North COPD initiative. She is more an all-round administrative leader, which we assess is reflected in her expressing that she is in the periphery of the initiative and is therefore not that involved. She has certain organizational opinion which seems to be set, such as the responsibility should lie with the nurses and that involving several groups of healthcare professionals might make the initiative too comprehensive.

The first of the **Organizing themes** in the network is named 'Purpose' and like the previous networks this theme covers notions on the Coordinator/Leaders understanding of the purpose of the TeleCare North COPD initiative. The notions in this theme are; 'Distance between nurse and citizen = freedom', 'Freedom for the citizens', 'Self-sufficiency in relation to their disease', 'Creates security', 'Gives the citizens tools to master their illness', 'Not bound by meeting at a certain place at a

certain time' and 'Give citizens the freedom of not having to meet at a certain place at a certain time'. It is our assessment that the notions in this theme tells that Coordinator/Leader perceives the logistic perspective on telemedicine as a gain for both citizens and the nurses involved as no one is bound by meeting physically. In relation to the citizens her understanding of the purpose of the initiative is in our assessment that it should create a feeling of security with the citizens and make them able to manage their illness on their own.

The second Organizing theme is called 'Staff' and contains notions on the coordinator/Leader's perspectives on the municipal TeleCare North COPD set-up in relation to the staff involved. The notions count; 'The employees control it themselves', '3 COPD-nurses working with TM', 'Staff wish to include citizens with moderate COPD (Criteria)', 'Nice for the citizen that there is a real person in the other end', 'It is each employee's decision how they do it (Home visits/Only phone conversations)' and '3 nurses for COPD and 3 nurses for the heart

initiative'. Based on the topics of the notions we assess that the overall perspectives in this organizing theme in relation the telemedicine staff is that there is great professional trust in the Primary nurses being able to operate on their own within the set framework of the initiative, as they are deemed to be the true experts in that matter. The two organizing themes are both branching from the Global theme (Organization).

This thematic network has two **Basic themes** names 'Future' and 'Other professionals'. The first theme which is 'Future' comprises notions on the Coordinator/Leaders reflects upon the future of the TeleCare North COPD initiative and telemedicine as an offer in healthcare on a broader basis. The notions are as follows; 'Maybe connect the home-nurse as well?', 'TM can be included in more fields (Psychiatry etc.)', 'Staff wish for criteria for "admission" changed' and 'TM could be beneficial in psychiatry'. It is our assessment that the notions in this theme all target developmental perspectives of the organizational set-up of the

initiative and tells that the Coordinator sees a future with more telemedicine in different fields of healthcare.

The second basic theme is named 'Other professionals' and contains the notions wherein the Coordinator/Leader express her perspectives on the coorporation or involvement of other healthcare professionals. The notions of this theme are; 'Talk with GPs at their consultations (In the front)', 'Coorporation with GPs should be nursed and further developed', 'Information-meetings for GPs', 'Coorporation with GPs is to be cared for a developed (Constant focus)' and 'A lot of work in reaching the GPs'. It is our assessment that these notions all address that the Coordinator/Leader sees a big development potential in strengthening the coorporation with the local GPs and has this a constant focus in her involvement in the TeleCare North COPD initiative. The Basic theme 'Future' is related to the Organizing theme 'Purpose' and the second Basic theme 'Other professionals' is related to the Organizing theme 'Staff'.

2.5.1.3.1.5 THEMATIC NETWORK ON PRIMARY NURSES (FOCUS GROUP) AALBORG

In this section, we will present the thematic network based on the data from the focus group interview conducted with four Primary nurses working with the TeleCare North COPD initiative in the municipality of Aalborg (for audio recording see appendix 6). The thematic network will in the same manner as the previously introduced networks be presented in a figure on the following pages. However, as the network is comprehensive due to the participation of four research participants we have divided the presentation after each theme category. First of we will present the Global themes →

GLOBAL THEME(S)

PROFESSIONALISM

- Would always prefer personal contact (physical)
- Question citizens with how they feel (take contact and investigate measurements
- Does not influence the treatment if we have met/seen the citizens
- Have developed new competences from TM
- Relatives are more involved
- Takes time from other citizens when measurements are to be investigated
- Important to be passionate about it (nurse)
- Challenged on professionalism when reading measurements
- Do not think about how much time is used per citizen
- Always chose the personal contact
- Find out how citizens really feel through questions
- A challenge that I cannot see the citizens
- Handling citizens with other chronic diseases is difficult. (You do not know which disease is causing the symptoms)
- Be clear that we should not act like their friends when calling
- Good to have a detective-approach to measurements
- Can make it more difficult when I have not seen the citizen
- One gains a certain experience in what questions to ask and how
- Work on a safe relationship building with the citizens
- Help each other (check measurements, investigate)
- Rare that someone is out to check on the citizen
- Other chronic diseases also reflect in the measurements
- Follow-up on why citizens are in the initiative
- As a nurse, you are used to being curious (also on the phone)
- We are not the citizen's friends calling. Stick to the case
- Good to be detective/curious
- Challenging when you cannot see the citizens

ORGANIZATION

- TM is vulnerable as it is right now
- TM practice has high flexibility
- TM can be problematic with citizens who are nervous or physically hindered
- Citizens can receive rehab courses and TM at the same time
- Good to take in citizens that do not meet the criteria
- Criteria for admission of citizens is set to late in the illness
- Experience from project-period has given a good transition to operation
- Remarkable that each municipality has a different set-up
- With many hospitalizations, a citizen with moderate COPD can be included
- Important that only nurses read measurements and train the citizens
- Late effort means that it is only security in focus
- The citizens that are admitted outside of the criteria is found at the health-center
- Criteria for admission is too late in the illness
- Consider what citizens should be admitted (more all-round oriented + different healthcare professionals)
- Supporter in the project-period (technically) was good
- New nurses in TM are offered education
- TM cannot stand alone
- Important that nurses are in charge of educating the citizens
- Citizens can be admitted on other criteria (Professional assessment)
- Good that it is a large-scale initiative
- Skeptical about outsourcing to private partners
- Blood pressure measurements can be difficult to relate to (not necessarily COPD)
- Important that TM is given to the right and handled by the right professionals
- Important that nurses are reading measurements
- National rollout of TM for COPD is good
- Educating citizens in groups at the health-center
- National rollout is good

PURPOSE

- Want to save money (political)
- Prevent aggravation (illness)
- Increase the citizens compliance in regard to their disease
- Prevent hospitalizations
- Security
- Care for an overlooked patient-group
- Supervision/Guidance for the Citizens
- Self-sufficiency in relation to disease
- Take care of own illness
- Security
- Help citizens to have a meaningful life with the illness they have
- Increased the citizens quality of life
- Develop competences in regard to handling own illness
- Health economic gain
- Increased quality of life
- The citizens have a responsibility themselves

Figure 14: Global themes from focus group with four Primary nurses (Aalborg)

The thematic network on the data collected from our focus group interview with four Primary nurses working with the TeleCare North COPD initiative in the auspices of the municipality of Aalborg is as mentioned earlier presented differently from the other networks, as it is very comprehensive in relation to the amount of content.

The network contains among other of three **Global themes**, which we have chosen to name 'Professionalism', 'Organization' and 'Purpose'. The first Global theme 'Professionalism' covers the notions based on the primary nurse's perspectives on their own professional development from being a part of the initiative. These notions are; 'Would always prefer personal contact', 'Question citizens with how they feel (Take contact and investigate measurements)', 'Does not influence the treatment is we have met/seen the citizens', 'Have developed new competences from TM', 'Relatives are more involved', 'Takes time from other citizens when measurements are to be investigated', 'Important to be passionate about it (nurse)', 'Challenged on professionalism when reading measurements', 'Do not think about how much time is used per citizen', 'Always choose the personal contact', 'Find out how citizens really feel through questions', 'A challenge that I cannot see the citizens', 'Handling citizens with other chronic diseases is difficult (You do not know which disease is cause the symptoms)', 'Be clear that we should not act like their friends when calling', 'Good to have a detective approach to measurements', 'Can make it more difficult when I have not seen the citizen', 'One gains a certain experience in what questions to ask and how', 'Work on safe relationship building with the citizen', 'Help each other (Check measurements, investigate)', 'Rare that someone is out to check on the citizen', 'Other chronic diseases also reflect in the measurements', 'Follow-up on why citizens are in the initiative', 'As a nurse you are used to being curious (also on the phone)', 'We are not the citizens fiends calling. Stick to the case', 'Good to be detective/curious' and 'Challenging when you cannot see the citizens'.

The notions in this Global Theme target several different topics in relation to the Primary nurses perspectives on their own professionalism in relation to working with telemedicine. The most predominant of the reoccurring notions is among other their development of a certain question-technique for analyzing the citizens over the phone. Another set of notions that in our assessment is relating to the ones on the question-technique are the ones addressing the difficulties of investigating the measurements received from the citizens and how this aspect of telemedicine challenges the professionalism of the nurses regarding them having to be more detective-like when approaching the citizens. When these notions are described as challenges it is in our assessment not meant in a negative manner, but can also be a positive influence on developing competences in relation to telemedicine.
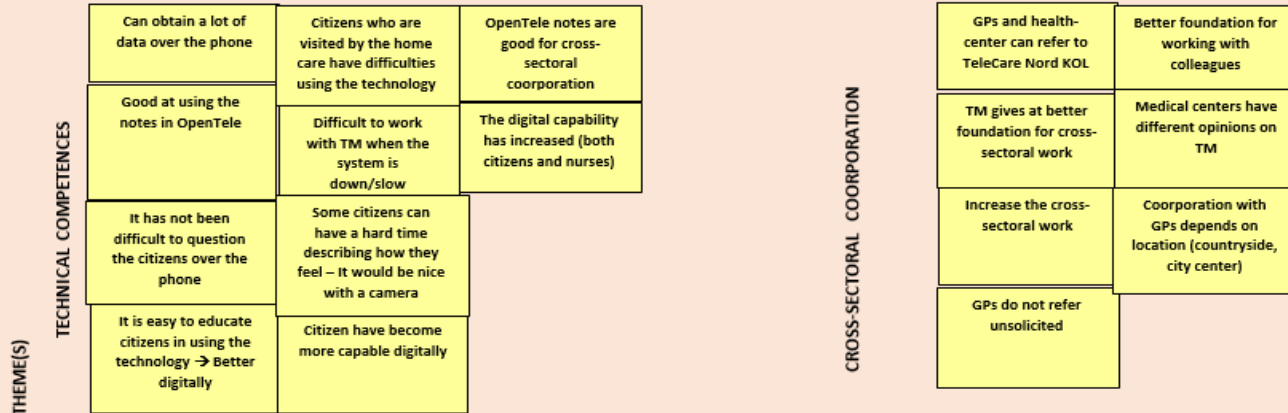
The second Global theme is called 'Organization' and the notions in this theme are based on the primary nurses perspectives on the organizational set-up of the TeleCare North COPD initiative.

The notions are as follows; 'TM is vulnerable as it is right now', 'TM practice has high flexibility', ' TM can be problematic with citizens who are nervous or physically hindered', 'Citizens can receive rehab courses and TM at the same time', 'Good to take in citizens that do not meet the criteria', 'Criteria for admission of citizens is set to late in the illness', 'Experience from project-period has given a good transition to operation', 'Remarkable that each municipality has a different set-up', 'With many hospitalizations a citizen with moderate COPD can be included', 'Important that only nurses read measurements and train the citizens', 'Late effort means that it is only security in focus', 'The citizens that are admitted outside of the criteria are found at the health-center', 'Criteria for admission is too late in the illness', 'Consider what citizens should be admitted (more all-round oriented + different healthcare professionals', 'Supporter in the project-period (technically) was good', 'New nurses in TM are offered education', 'TM cannot stand alone', 'Important that nurses are in charge of educating the citizens', 'Citizens can be admitted on other criteria (Professional assessment)', 'Good that

it is a large-scale initiative', 'Skeptical about outsourcing to private partners', 'Blood pressure measurements can be difficult to relate to (Not necessarily COPD)', 'Important that TM is given to the right and handled by the right professionals', 'Important that nurses are reading measurements', 'National rollout of TM for COPD is good', 'Educating citizens in groups at the health-center' and 'National rollout is good'. Based on the relatability of the notions in this theme it is our assessment that the richest topics address that the primary nurses are concerned with the criteria of inclusion on relation to the organizational set-up. Other notions that seem to reoccur in this theme is the focus on the importance of the nurses being in charge of the reading measurements and educating citizens in using the TeleKit tools. Some other topics that are also represented a few times in this theme is the vulnerability of TM in its current form and also notions of a general positive perspective on the national rollout.

The third Global theme is 'Purpose' and it contains notions in which the primary nurses explain what their professional understanding of the TeleCare North COPD initiative is. The notions are the following; ' Want to save money (Political)' , 'Prevent aggravation', 'Increase the citizens compliance in regard to their disease', ' Prevent hospitalizations', '2 x Security', 'Care for an overlooked patient group', 'Supervision/guidance for the citizens', 'Self-sufficiency in relation to disease', 'Take care of own illness', 'Help citizens to have a meaningful life with the illness they have', 'Increased the citizens quality of life', 'Develop competences in regard to handling own illness', 'Health economic gain', 'Increased quality of life' and 'The citizens have a responsibility themselves'. The majority of the notions in this Global theme target the nurses understanding of the purpose of the initiative as being able to help the citizens develop competences for handling their illness, general compliance with their condition and increase their quality of life. The notions in this theme also address the nurses awareness of the political aspects of the initiative and the influence it might have on their work. Go to next page to see figure of Organizing themes →

ORGANIZING THEME(S)

TECHNICAL COMPETENCES

Can obtain a lot of data over the phone	Citizens who are visited by the home care have difficulties using the technology	OpenTele notes are good for cross-sectoral coorporation
Good at using the notes in OpenTele	Difficult to work with TM when the system is down/slow	The digital capability has increased (both citizens and nurses)
It has not been difficult to question the citizens over the phone	Some citizens can have a hard time describing how they feel – It would be nice with a camera	
It is easy to educate citizens in using the technology → Better digitally	Citizen have become more capable digitally	

CROSS-SECTORAL COORPORATION

GPs and health-center can refer to TeleCare Nord KOL	Better foundation for working with colleagues
TM gives at better foundation for cross-sectoral work	Medical centers have different opinions on TM
Increase the cross-sectoral work	Coorporation with GPs depends on location (countryside, city center)
GPs do not refer unsolicited	

EFFECT

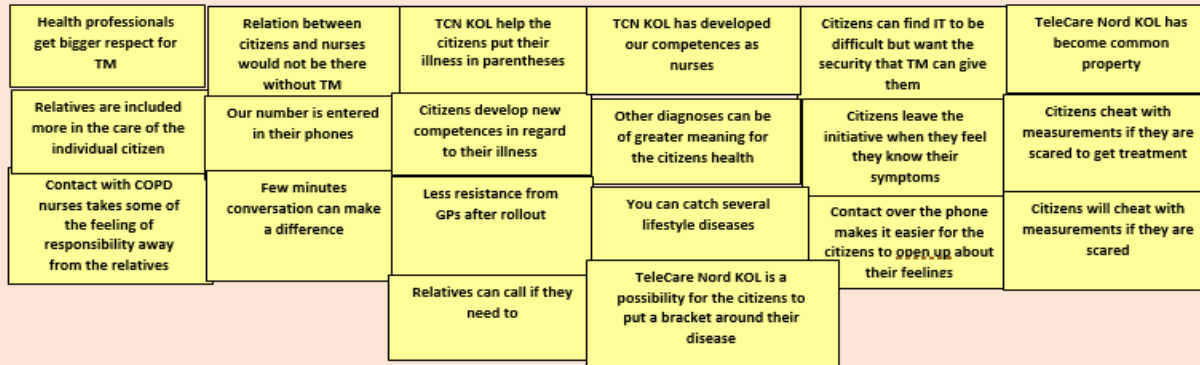|					
Health professionals get bigger respect for TM	Relation between citizens and nurses would not be there without TM	TCN KOL help the citizens put their illness in parentheses	TCN KOL has developed our competences as nurses	Citizens can find IT to be difficult but want the security that TM can give them	TeleCare Nord KOL has become common property
Relatives are included more in the care of the individual citizen	Our number is entered in their phones	Citizens develop new competences in regard to their illness	Other diagnoses can be of greater meaning for the citizens health	Citizens leave the initiative when they feel they know their symptoms	Citizens cheat with measurements if they are scared to get treatment
Contact with COPD nurses takes some of the feeling of responsibility away from the relatives	Few minutes conversation can make a difference	Less resistance from GPs after rollout	You can catch several lifestyle diseases	Contact over the phone makes it easier for the citizens to open up about their feelings	Citizens will cheat with measurements if they are scared
		Relatives can call if they need to	TeleCare Nord KOL is a possibility for the citizens to put a bracket around their disease		

Figure 15: Organizing themes from focus group with four Primary nurses (Aalborg)

The three **Organizing themes** of the thematic network on the focus group is constituted by the themes 'Technical competences', 'Cross-sectoral coorporation' and 'Effect'. The notions in the first theme 'Technical competences' are; 'Can obtain a lot of data over the phone', 'Good at using the notes in OpenTele', 'It has not been difficult to question the citizens over the phone', 'It is easy to educate the citizens in using the technology → better digitally', 'Citizens who are visited by home care have difficulties using the technology', 'Difficult to work with TM if the system is down', 'Some citizens can have a hard time describing how they feel – it would be nice with a camera', 'OpenTele notes are good for cross-sectoral coorporation' and 'The digital capability has increased'. It is our assessment that reoccurring topics in this theme are the nurses positive perspective on the digital capabilities of the citizens, which makes it easy for them to educate, consideration on the inclusion of citizens with physical or psychological disabilities and the possibilities for using the system OpenTele as a source of information on the patients in a cross-sectoral perspective.

The second organizing theme is 'Cross-sectoral coorporation' in which the notions cover the nurses opinions on the aspects of working with other healthcare sectors in relation to the initiative and telemedicine in general. The notions are; 'GPs and health-center can refer to TeleCare North COPD', 'TM gives a better foundation for cross-sectoral work', 'Increase the cross-sectoral work', 'GPs do not refer unsolicited', 'Better foundation for working with colleagues', 'Medical centers have different opinions on TM' and 'Coorporation with GPs depends on location (Country, City center)'. In our assessment, the notions in this theme represent that the nurses are focused on how the initiative is received by other healthcare professionals such as GPs, as they are a key to making the initiative stronger.

The third Organizing theme is named 'Effect' and does as in the previously introduced networks contain notions on the nurses assessment of the effect of the initiative. The notions in this theme are; 'Health professionals get bigger respect for TM', 'Relatives are included more in the care of the individual citizen',

'Contact with COPD nurses takes some of the feeling of responsibility away from the relatives', 'Relation between citizens and nurses would not be there without TM', 'Our number is entered in their phones', 'Few minutes conversation can make a difference', 'TCN KOL help the citizens put their illness in parentheses', 'Citizens develop new competences in regard to their illness', 'Less resistance from GPs after rollout', 'Relatives can call if they need to', 'TCN KOL has developed our competences as nurses', 'Other diagnoses can be of greater meaning for the citizens health', 'You can catch several lifestyle diseases', 'TeleCare North COPD is a possibility for the citizens to put a bracket around their disease', 'Citizens can find IT to be difficult but want the security that TM can give them', 'Citizens leave the initiative when they feel they know their symptoms', 'Contact over the phone makes it easier for citizens to open up about their feelings', ' TeleCare North COPD has become common property', 'Citizens cheat with measurements if they are scared to get treatment' and 'Citizens will cheat with measurements if they are scared'.

The notions in this Organizing theme address several topics regarding the nurses assessment of the effect of the telemedicine initiative. The reoccurring topics are on how the relation between the nurses and the citizens changes as they become as source of support, which also leads to the relatives being freer of their feelings of responsibility at the same time as they feel more involved when they know there is a specific person checking on their ill relative on a weekly basis. Other aspects of the effect of telemedicine as the nurses see it is that patients will try to cheat and provide them with "false" measurements to prevent that the nurses suggest certain treatments. It is also addressed in reoccurring notions, that the initiative is a way of discovering other lifestyle disease and it can therefore function as an all-round tool for detecting these, which also have implications for the nurses as they are only supposed to focus on the COPD.

The two Basic themes of this thematic network will be presented in a figure on the following page →

SYSTEM

BASIC THEME(S)

System is easy to use	System does not work after updates	The professional approach to TM should be influenced more by nurses experiences
Citizens cannot find the" heart" in the system (not making measurements)	Would be nice with a chat-function ala FaceTime	Nurses should be" on" earlier in the illness (criteria)
Would like to change alarm-limits for certain patients	Nice there is no camera involved in the communication	Nice that we do not have screen time (camera)
Do not think camera is a good idea	Citizens are put in a different situation if we are invited into their homes (camera)	OpenTele updates are annoying
Would be nice to face the citizens	System is very foolproof	System has to work – We should not have to use time on making it work
Without a camera, the set-up is very flexible	Citizens is put in another perspective if there is a camera	Very few citizens stop because they cannot handle the technology

FUTURE

Would be nice if experiences from this initiative was considered	Citizens should not have too many technological instruments at home	Would like to have a mandatory check-up every half year
Increased focus on special-functions in healthcare can mean that the patients is no longer seen as a whole, but in parts (lungs, heart etc.) TM is specialized	TeleCare Nord KOL is here to stay	Nurses can in the future have tele-measurements as a part of their everyday
	Patients should be caught earlier (some of the symptoms could be reversed)	
TM in the future should include more healthcare professionals (more embracing)	Will go a little crazy if I had to check numbers and other digital data all the time	
TeleCare Nord receive more attention	Where are our experiences in regard to the national rollout?	
The professional knowledge of nurses should be included much earlier in regard to the functionality of TM	Would like to catch the citizens when they are fresher (we can prevent something)	

Figure 16: Basic themes from focus group with four Primary nurses (Aalborg)

The two **Basic themes** of the focus group network are named 'System' and 'Future'. The first theme 'System' contains notions on respectively the nurses opinions on using the system (OpenTele) and other systems related to the initiative in general. The notions are; 'System is easy to use', 'Citizens cannot find "the heart" in the system (not making measurements)', 'Would like to change alarm-limits for certain patients', 'Do not think camera is a good idea', 'Would not be nice to face the citizens', 'Without a camera the set-up is very flexible', 'System does not work after updates', ' Would be nice with a chat-function ala FaceTime', 'Nice there is no camera involved in the communication', 'Citizens are put in a different situation if we are invited into their homes (camera)', 'System is very foolproof', 'Citizens are put in another perspective is there is a camera', 'The professional approach to TM should be influenced more by nurses experiences', 'Nurses should be "on" earlier in the illness (criteria)', 'Nice that we do not have screen time (camera)', 'OpenTele updates are annoying', 'System has to work – We should not have to use time on making it work' and 'Very few citizens stop because they cannot handle the technology'. The notions in this theme generally target the system OpenTele as being simple to use but it can be too bland in regard to the measurements as the nurses are often not allowed to change the alarm-limits for citizens who does not fit the standard. Another aspect of the system that the nurses notice when dealing with it is that system updates causes it to run slow, which is frustrating for them.

The second Basic theme is 'Future' and covers notions on the nurses perspectives on the future of the TeleCare North COPD initiative and telemedicine in a broader perspective. The notions are as follows; 'Would be nice if experiences from this initiative was considered', 'Increased focus on special functions in healthcare can mean that the patient is no longer seen as a whole, but in parts (lungs, heart etc.) TM is specialized', 'TM in the future should include more healthcare professionals (more embracing)', 'TeleCare North receive more attention', 'The professional knowledge of nurses should be included much

earlier in regard to the functionality of TM', 'Citizens should not have too many technological instruments at home', ' TeleCare North COPD is here to stay', 'Patients should be caught earlier (some of the symptoms could be reversed', 'Will go a little crazy if I had to check numbers and other digital data all the time', 'Where are our experiences in regard to the national rollout?', 'Would like to catch the citizens when they are fresher (we can prevent something)', 'Would like to have a mandatory check up every half year' and 'Nurses can in the future have tele-measurements as a part of their everyday'.

The notions in this theme do in our assessment address topics such as the nurses wish to make a difference for citizens with early stages of COPD as they have a feeling they can help prevent something and not just learn citizens to cope with their condition. Another aspect that occur from these notions is in our assessment that the nurses have a wish to be included more in the planning of the organizational set-up and actual making of the software for telemedicine, when they feel a lack of nursing

expertise influencing the decision-making. The notions also show that they see telemedicine as a part of the future but contain to problematize the influence of too many specialized fields and not being able to see the patient as a whole.

2.5.1.3.1.6 THEMATIC NETWORK ON COORDINATING NURSE (AALBORG)

The sixth and final of our thematic networks on our data collection session is based in the data collected from an interview with the Coordinating nurse involved with the TeleCare North COPD initiative in the municipality of Aalborg (for audio record see appendix 7). The network will be presented in a figure on the following page →

Figure 17: Thematic network on interview with Coordinating nurse (Aalborg)

The thematic network on the interview with the Coordinating nurse associated with the TeleCare North COPD initiative in the municipality of Aalborg consist of six different themes, divided into; one Global theme, three Organizing themes and two Basic themes. The **Global theme** is called 'Organization' and comprises the notions; 'Coorporation with health-center', 'Skilled project secretariat', 'Project was running great', 'Develop on nurses competences', 'Primarily COPD-nurses who find citizens to participate', 'Cross-sectoral coorporation with healthcare staff', 'Would like to include citizens earlier', 'The initiative is perfectly placed in the municipalities', 'Health-center and home-nurses involved', 'Important that all municipalities in the region have participated', 'COPD-nurses are the biggest source of recruitment (citizens)', 'Guidelines for TeleCare North COPD the same in the region, but different set-ups', 'Will fight for it is only healthcare professionals that are working with TM', 'We do not wish to take over the GPs function', 'Coorporation with the hospitals so we know that we can count on each other', 'Inclusion of health-center', 'Lucky that research also focused on

quality of life and empowerment', 'Make a professional network with other health professionals', 'Difficult to cooperate with GPs', 'Too little involvement of GPs in the project phase', 'Important that the responsibility is with the municipality', 'TM tasks should be handled by nurses (not non-healthcare professionals)', 'ERFA-meetings strengthen our knowledge and we can share experiences' and 'ERFA-meetings are a way of following up on the initiative'.

From the presented notions, we assess that the Coordinating nurse for the TeleCare North COPD initiative in Aalborg is satisfied with the initiative being municipally bound. The Coordinator has a strong focus on involving many professionals partners in order to shares knowledge and experiences. As the set-up is functioning currently the coordinating nurse sees the primary nurses as the ones best at setting the criteria for inclusion.

The thematic network contains three **Organizing themes** which are named 'Purpose', 'Communication' and 'Professionalism'. The first theme 'Purpose' address how the Coordinating nurse understands the purpose of the TeleCare North COPD initiative, and covers the following notions; 'TM is something different, something more but not instead of something', 'Security', 'Take care of an overlooked group of patients', 'Citizens learn to act on their own feelings', 'What is it that the municipality can offer? We need to make that clear', 'Hope there is an economic gain in relation to hospitalizations', 'Increased quality of life cannot outweigh the economic aspect', 'The municipality has let these citizens down before', 'citizens with severe COPD can stay in their homes' and 'They learn how to manage on their own'. It is our assessment that the reoccurring topic in this theme is that the initiative is somewhat an opportunity for the municipality to care for a group of citizens that before has been undermined. The purpose based on the notions in this theme is therefore also to prove the municipality's capabilities in handling this type of patients. Furthermore, we assess that some of the notions also express a concern for a downweigh of quality of life in relation to economy. And finally, the notions tell that the purpose of the initiatives from the perspective of the coordinating nurse is also to be able to help the citizens where they are.

The second Organizing theme is 'Communication' and targets how the nurses of the unit in Aalborg work on communicating the initiative to possible partners and the citizens themselves. The notions are; 'PR on TeleCare North COPD (Promotion)', 'Put focus on the importance of quality of life', 'Participating in symposium on TCN KOL', 'Problems in coorporation with GPs', 'Meeting with lung-nurses two times a year', 'Making material for campaigns on TCN KOL', 'Nurture the communication with GPs (so they feel included)', 'Participating in symposium (nurses + GPs)', 'Improve coorporation with GPs' and 'Increase the awareness on TCN KOL (GPs and citizens). It is our assessment that the notions in this theme reveal that the Coordinating nurse and the primary nurses in the unit in Aalborg has a strong focus on the communicative aspects of working with telemedicine

both in relation to strengthening the important relation to the local GPs, but also to create awareness in general on the possibilities of telemedicine.

The third Organizing theme is named 'Professionalism' and comprises notions on how the Coordinating nurse see her nursing professionalism in relation to the TeleCare North COPD initiative. The notions are; 'Draw on earlier experiences', 'Experiences from TELEKAT was a resource', 'Participated in TELEKAT', 'Educating and Supervising', 'Education and supervision' and 'Carry out the information dissemination'. Based on these notions we assess that the Coordinating nurse has a primary focus on coordinating communication on the TeleCare North COPD initiative in the auspices of the municipality of Aalborg and affiliated partners and co-participants, as she is experienced from the previous telemedicine initiative TELEKAT. The three Organizing themes are all branching from the Global theme 'Organization'.

The **Basic themes** of the network is made up of the following themes 'Effect' and 'Future'. The theme 'Effect' covers notions on the Coordinating nurse's assessment of the effect of the initiative, and the underlying notions are; 'Improvement in quality of life does not count in the evaluation', 'Citizens tell other citizens', 'Relatives feel security with TCN KOL', 'Politicians disappointed in less economic gain (so far)' and 'Prevent citizens calling 112 when it is not needed'. The notions in this theme address that the Coordinating nurse finds that the initiative has a positive effect in being able to help both the citizens involved and their relatives as the nurses' help carry some of the responsibility, especially for the relatives. Another concern that is noted a few times is that of the economical aspect diminishing that there is an actual benefit in the citizens quality of life.

The second Basic theme is 'Future' and does like in the previous networks encompass notions on the coordinating nurse's perspective for the future of the initiative and telemedicine in a broader context. The notions are as follows; 'Good that citizens

can follow up on their own disease', 'Good if all professionals had access to OpenTele data', 'They need to trust in what we are telling the (politicians)', 'Important to establish good communication with hospitals', 'Coorporation with GPs should be solid', 'Important with coorporation between home-nurses and health-centers', 'Data sharing between professionals would be good' and 'Coorporation between home-nurses and health-center is good'. It is our assessment that the notions in this theme can be summarized as a call for a strong coorporation foundation in the future regarding telemedicine where the nurses play a key role in advocating its purpose. Furthermore, the data obtained in the OpenTele system should be accessible for all health professionals as the measurements might reveal other lifestyle disease or a pattern of worsening that might be cared for by other healthcare professionals.

To round up our findings from the six thematic networks presented in the previous sections, we will introduce a data matrix that were made to compare the network results.

2.5.2 DATA MATRIX

As stressed by Bryman and Burges (2002), Charmaz (2010) and Bryman (2012) the nature of qualitative data is abstract and voluminous, which emphasizes that the data is treated in different processes to make it tangible and representable. There are several different methods for instantiating qualitative data, and in the previous sections we have introduced how we have used thematic analysis and the specific procedure of thematic networks to analyze the data collected from our interviews with the three primary nurses and three coordinating nurses (one coordinator who is not a nurse) working in the TeleCare North COPD initiative in their respective municipalities. To further the results of each thematic network and summarize the overall themes they introduce, we have made a comparison of the results and visualized them in a data matrix. This approach to instantiation of the results from our thematic networks is inspired by Bazeley (2009), who addresses the importance of manifestation of qualitative data through methods of comparison and visualization.

Bazeley (2009) stresses that the complexity of qualitative research calls for some considerations in regard to how results are handled and presented. The extraction, processing and coding of the data collected we have undergone with the approach of thematic analysis and thematic networks is according to Bazeley also a way of manifesting and visualizing the significant data in our different units of analysis (interviews). However, Bazeley describes how the findings from thematic analysis can become even more tangible by comparing different datasets, find patterns in the results and manifest/visualize these to give insight in what the data reveals in an overall perspective.

There are different methods for manifesting/visualizing results from qualitative data analysis. Bazeley (2009) presents data matrixes and sequence models as two such methods. Both methods emphasize that data is manifested in a figure/model/table and thereby visualized. We chose to use the beforementioned methods to instantiate the results from our

interviews (thematic network) and contextual inquiry (field notes).

As each of our thematic networks represent significant data from different units of analysis, we compared the results from each network to make a collected result based on all networks. The results are manifested in a data matrix conducted in the manner described by Bazeley (2009).

Bazeley (2009) describes on Miles and Huberman (1994) that displaying qualitative data is a beneficial way of making patterns in the data visualizable, as presenting the results of the analysis in a table is a simple method of handling large amounts of more or less abstract data. It is our assessment that the thematic networks also can be seen as a way of displaying data, as Attride-Stirling (2001) addresses that the theme-categories and the structures between them manifest and visualize data. However, as Bazeley stresses qualitative data analysis can be taken to a different level in regard to how processed the results presented

are. How much processing that should be done depends on what the results of the data analysis are to be used for. As the results of our thematic networks in our assessment are still very difficult to comprehend as a whole, and not just single units we compared the results of each network and made a data matrix to display the results on an overall basis. The purpose of making a data matrix in our case is that the results were to be used in our theoretical analysis, and we found that without any comparability it would be difficult to apply the findings to theoretical framework. The results of each network are still core values in the theoretical analysis. However, as we have conducted the theoretical analysis on each unit of analysis (network) and on all units as a whole (comparative), the results of the data matrix are another way of identifying which factors are important to consider in regard to comparing the results of the different networks.

We have approached making the data matrix inspired by the principles of Bazeley (2009), describing that by comparing themes from the results of qualitative analysis is one way of defining patterns in datasets. We went through each of the thematic networks to identify the themes in each theme category (Global, Organizing and Basic) and listed these in a table. As many of the networks display the same themes (in same or different orders) we decided to count how many times each of the listed theme was represented in a network, and visualize this in the table. The table is thereby functioning as a score chart representing what themes are the most significant when looking at all networks as a whole. We found the method of comparing data analysis results to find patterns of reoccurrence and display them in a data matrix as a profound method for making the overall results of the thematic network analyses more tangible. The data matrix will be referred as a data source in the theoretical analysis in regard to analyzing comparisons between the nurses practices in the three municipalities, along with the notions from the thematic network themes. The data matrix is displayed on the following page →

	HJØRRING		FREDERIKSHAVN		AALBORG		TOTAL OCCURRENCE:
	PN	CN	PN	CN	PN	CN	
(1) ORGANIZATION	X	X	X	X	X	X	6
(2) PURPOSE	X	X	X	X	X	X	6
(3) PROFESSIONALISM	X	X	X		X	X	5
(4) EFFECT	X	X	X		X	X	5
(5) FUTURE			X	X	X	X	4
(6) SYSTEM		X	X		X		3
(7) WORK TASKS	X		X				2
(8) TECHNOLOGY	X		X				2
(9) COMPETENCES	X						2
(10) STAFF				X			1
(11) OTHER PROFESSIONALS				X			1
(12) TECHNICAL COMPETENCES					X		1
(13) CROSS-SECTORAL COORPORATION					X		1
(14) COMMUNICATION						X	1

Figure 18: Data matrix on reoccurrence of themes in thematic networks

The data matrix in figure 16 outline each of the themes from the thematic network after frequency of occurrence based on all networks. Each municipality and the two nurses we have had as research participants (PN = primary nurse and CN = Coordinating nurse/Coordinator) are visualized as to give an overview of which municipalities and participants target which themes. The purpose of the color-codes is as mentioned to further the data's applicability in the coming activity analysis. The dark green numbers on the most represented themes by occurrence, the middle green numbers are the next most represented themes and so on. The red numbers represent the least represented themes based on occurrence. The color-codes ads an extra visualization aspects in regard to what topics might be most relevant to address in the theoretical analysis, especially emphasizing the comparative elements of the analysis, in comparing the practices of the nurses in the three municipalities. In the following sections, we will introduce another method; sequence models, used for displaying another part of our data collected from our contextual inquiry session.

2.5.2 SEQUENCE MODELS

The following sequence models are based on the notes taken during contextual inquiry at each of the municipalities – Hjørring, Frederikshavn and Aalborg. The models will be divided into three sections each showing the data collected at each of the municipalities.

2.5.2.1 READING THE MODELS

The start of the models is noted with a square box with a thicker outline. The arrows show the sequence of the actions. If there is more than one arrow from one box, it shows that actions were done simultaneously. Each of the boxes represent an action the nurse have taken. The clouds represent things the nurse have said between actions. It is often that the reasoning for an action that can be found in the clouds. The Abbreviation "DS" which can be seen in the models stands for documentation system and refers to the documentation system used in the municipality. We used the abbreviation because each of the municipalities used

different documentation systems, but as the documentation system is not under scrutiny in this thesis it was chosen to simply shorten it to "DS".

2.5.2.1.1 HJØRRING

This was the first place we conducted a contextual interview. It was done with a nurse at the healthcare center. The duration of the contextual interview was approximately 40 minutes. The nurse had her own office. Her workstation consisted of a computer with two monitors, a telephone, a block of paper and a pen. A small table with two chairs stands in front of the desk. This is where the note taker was seated. The interviewer sat next to the nurse. Before the interview started the nurse showed us that she preferred having the OpenTele system open on one screen and having the municipal documentation system open on the other screen. The screen with OpenTele showed approximately 18 citizens that had submitted data. The contextual interview centered around observing the actions

taken for the data set submitted by the first citizen on the list. The notes taken are visualized in the following model →
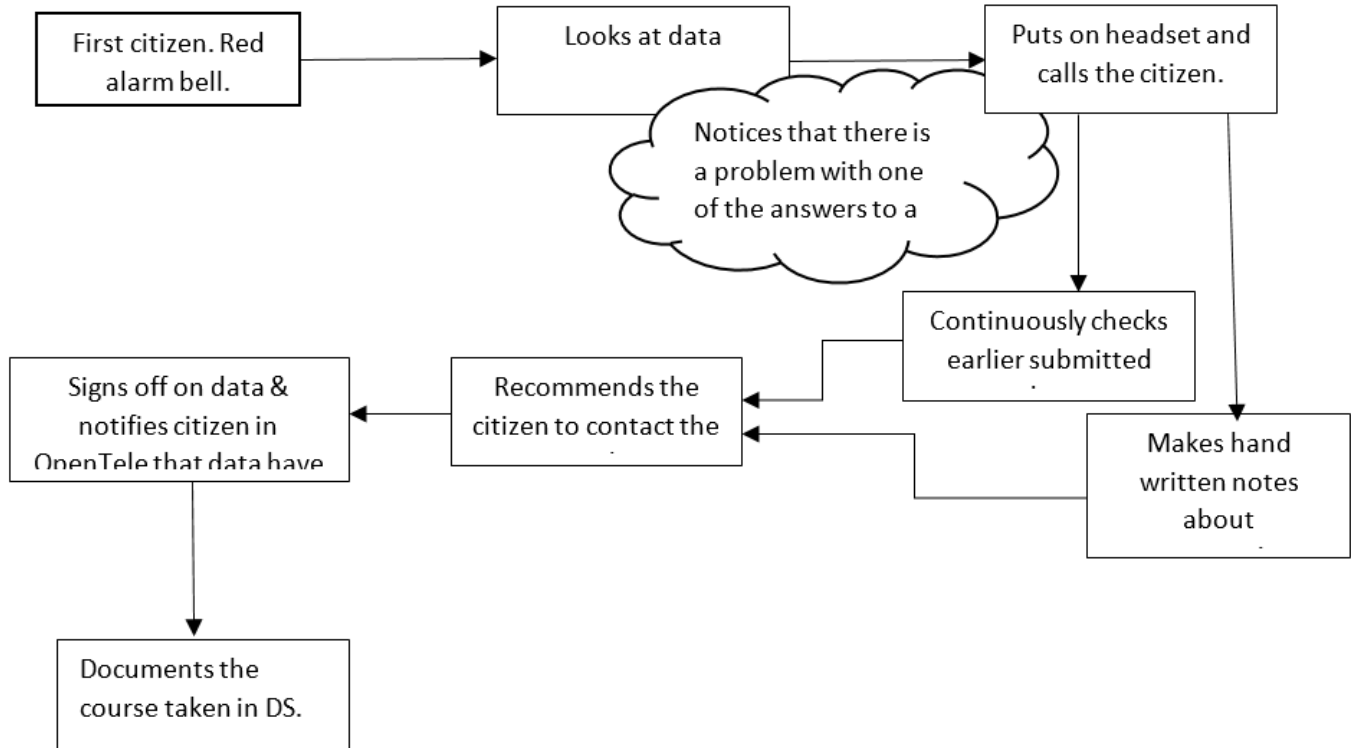
Figure 19: Sequence diagram on contextual inquiry notes, Hjørring

2.5.2.1.2 FREDERIKSHAVN (SÆBY)

The second contextual interview took place at the healthcare center in Frederikshavn. The duration of the interview was approximately one and a half hour. The nurse shared an office with three other nurses. Her workstation consisted of a computer with one monitor, a telephone with a headset and a block of paper and a pen. The note taker sat behind the nurse and the interviewer. The interviewer sat next to the nurse. During the interview, we observed the processing of three citizens. A sequence model was made for each of the citizens that was processed. The notes taken are visualized in the following two models →
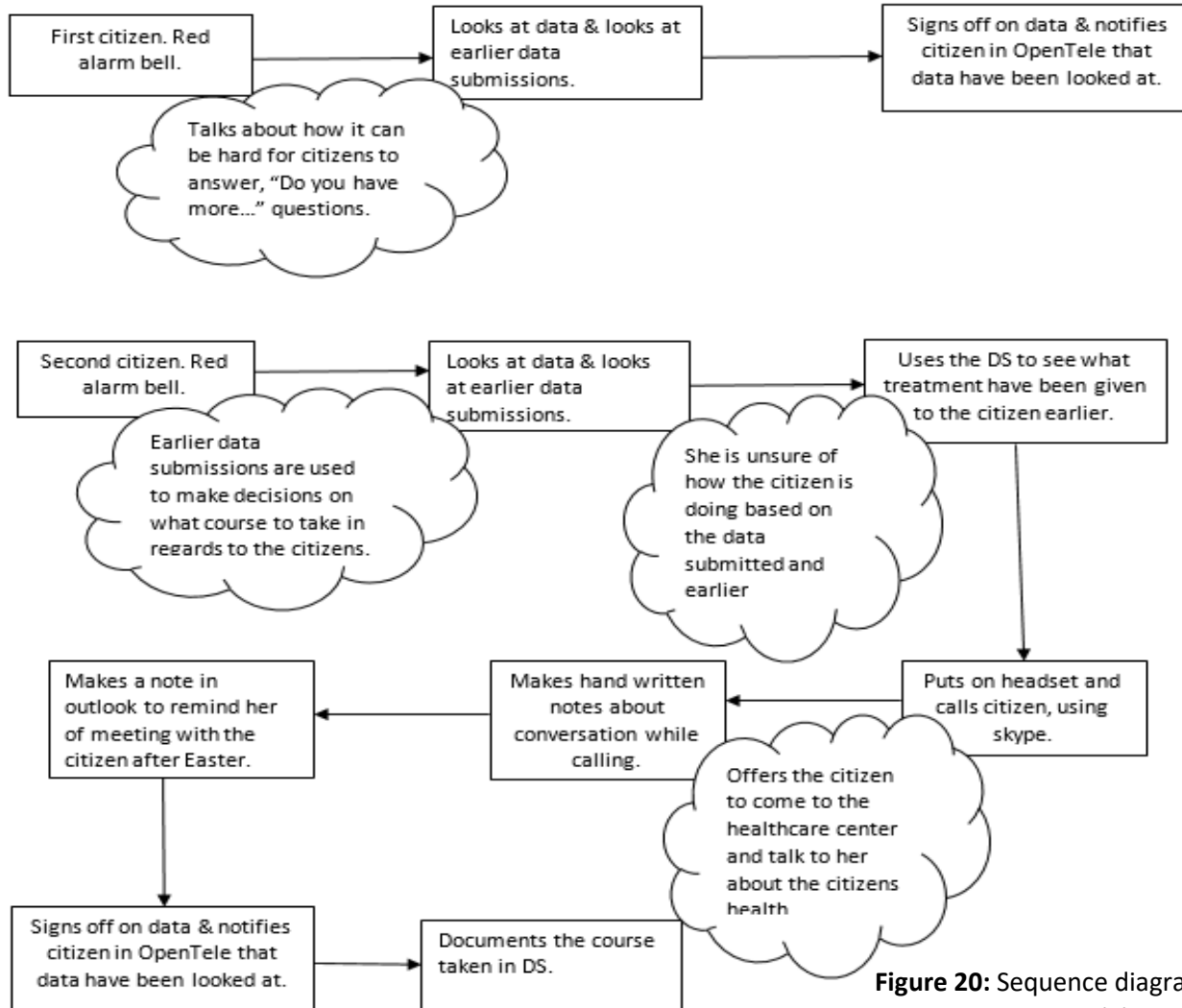
Figure 20: Sequence diagram on contextual inquiry notes (1), Frederikshavn
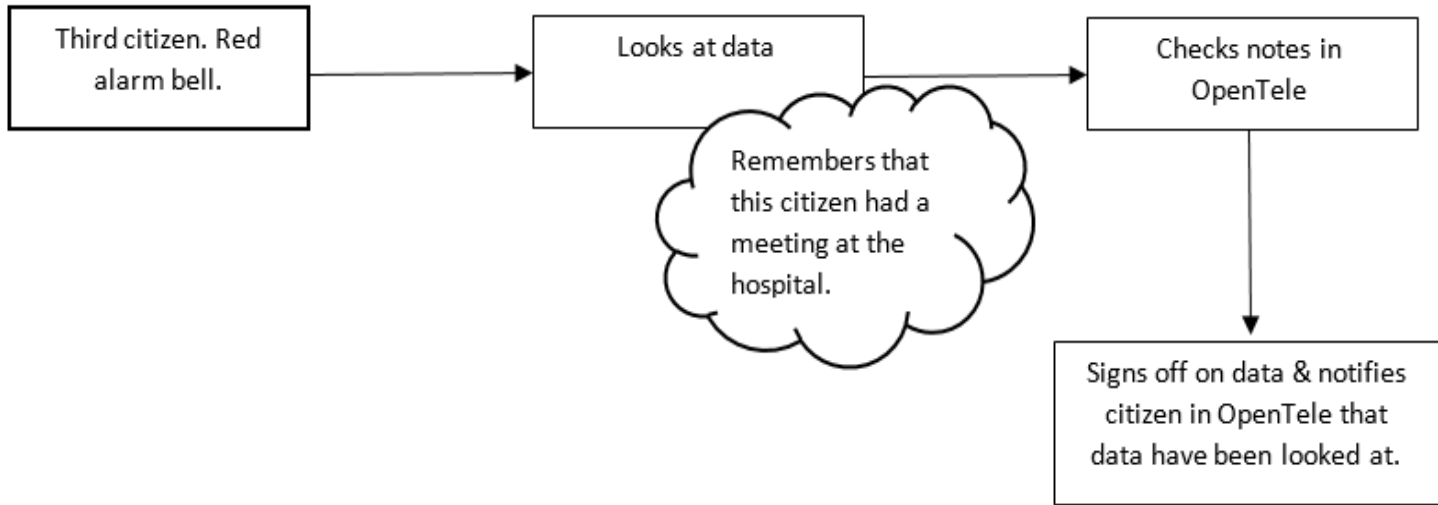
Figure 21: Sequence diagram on contextual inquiry notes (2), Frederikshavn

2.5.2.1.3 AALBORG

The last contextual interview took place in the municipality of Aalborg. More precisely, it took place at a care home for the elderly in the city of Sulsted. The duration of the contextual interview was approximately one and a half hours. The nurse shared an office with three other employees. The note taker sat at the workstation besides the nurse workstation while the interviewer sat next to the nurse at her workstation. During the interview, the nurse processed three citizens. Each action taken in this processing is visualized in the three following sequence models →

First Citizen. Red alarm bell.

Remembers details of citizens health. High blood pressure.

Looks at data. Checks earlier data.

Knowledge about citizens health means she does not react.

Signs off on data & notifies citizen in OpenTele that data have been looked at.

Checks DS.

Checks off citizen from printed list of citizens that she monitors.
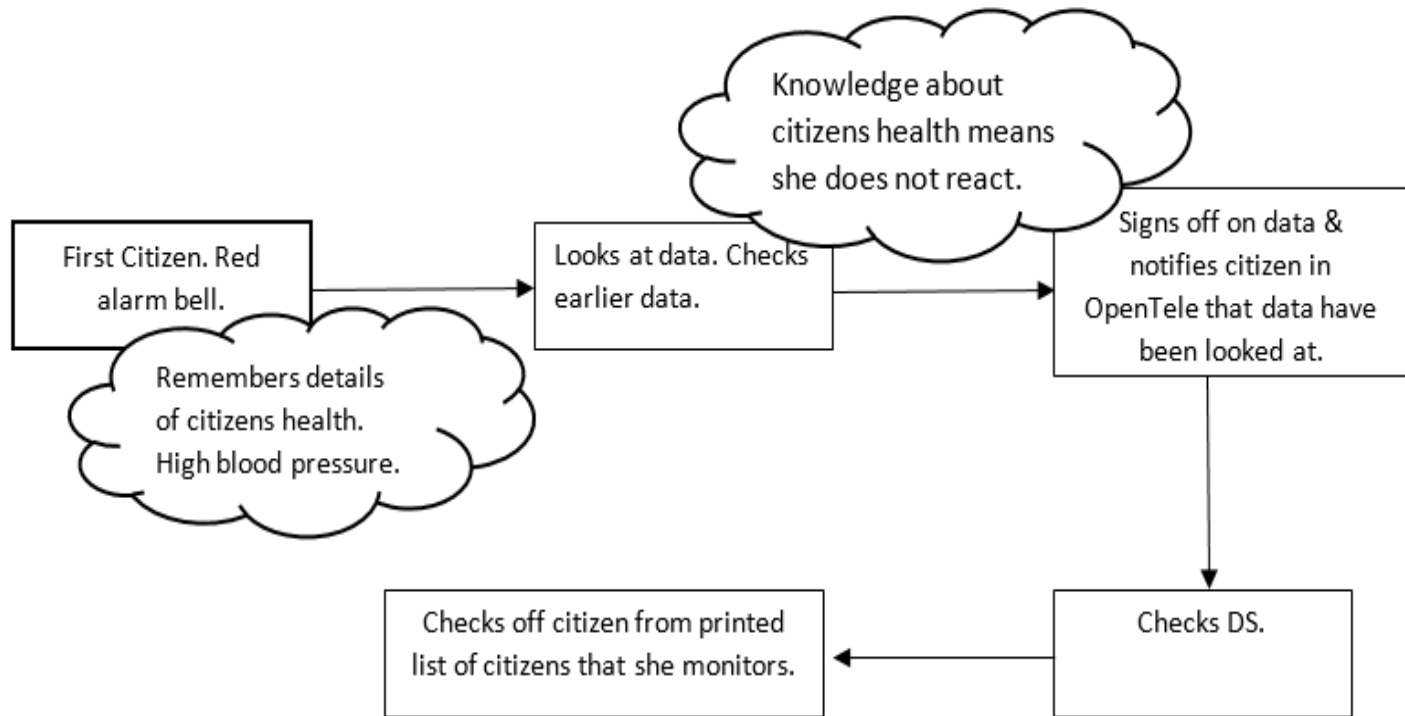
Figure 22: Sequence diagram on contextual inquiry notes (1), Aalborg
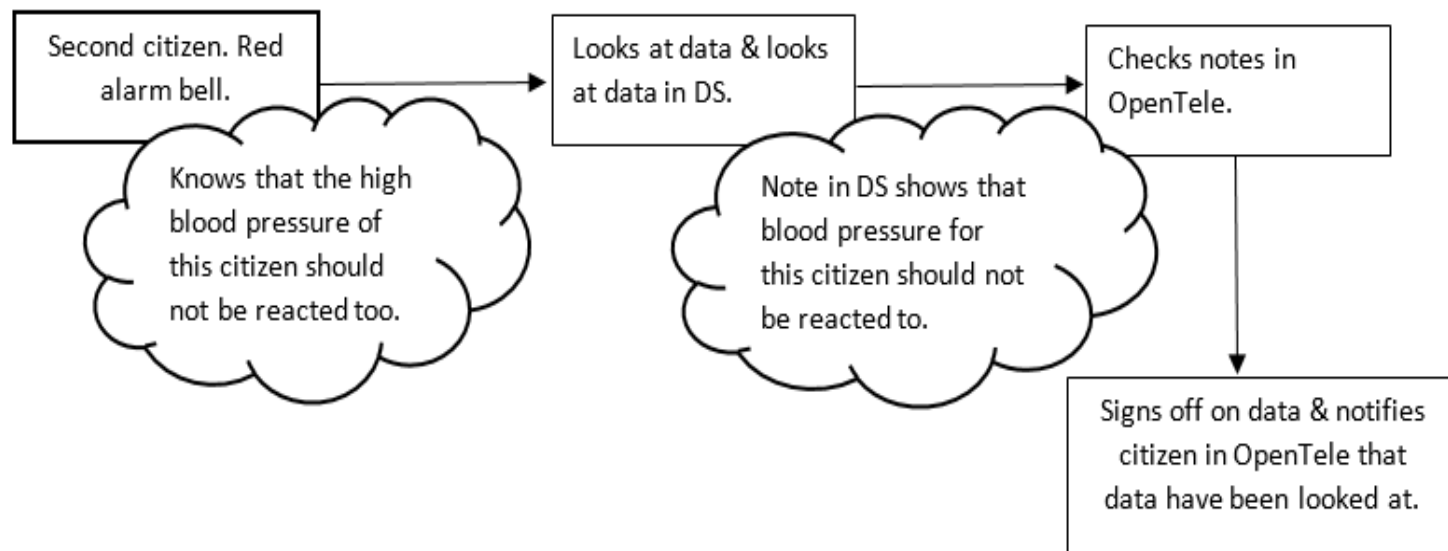
Figure 23: Sequence diagram on contextual inquiry notes (2), Aalborg
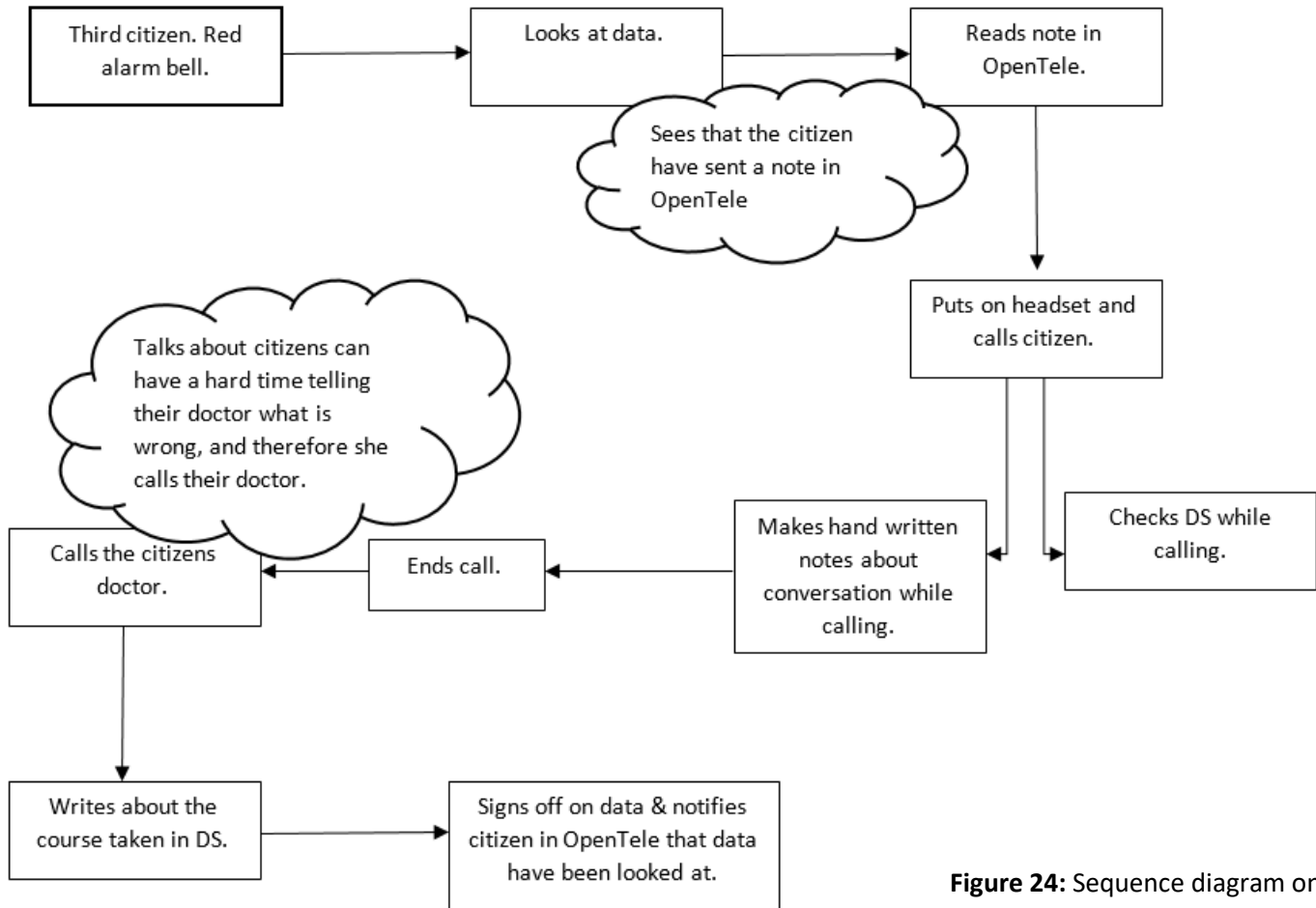
Figure 24: Sequence diagram on contextual inquiry notes (3), Aalborg

2.5.2.2 WORKING WITH CONTEXTUAL INQUIRY

Looking back at how we conducted the contextual interviews, we believe that we could have gotten more data had we done the following. Ask for a short description of the work tasks the nurses perform, through either calling them or email. A clearer understanding of what their work entails could have made it easier to plan how long the contextual interview should last. The way we did it, we choose to attend the first interview with only the knowledge of their work as described in the TeleCare North project. This lead to not only an exploration of their work practice but also an exploration of how to apply the method. This can also be seen in that there is less data from our first contextual interview.

Using sequence models was a great way for us to engage in conversation and discussion on what happened during the interview. We used the production of the sequence models as an opportunity to discuss the data collected. The models provide an overview of how the nurses work and together with the full notes will be valuable when understanding their work practice through Activity theory.

The following chapter contains the theoretical analysis of the telemedicine nurses' practice. The theoretical framework comprises Engeströms activity system as our primary approach to analyzing the different elements of activities in which the nurses engage. Furthermore, we will draw on the principles from Kaptelinin et als (1999) activity checklist in regard to analyzing how the technology itself (systems, tools etc.) suits the use context in a broader perspective (the initiative standards) in an activity-based (action oriented) perspective. We will analyze each nurse and coordinating nurse/leader as individual units of analysis and the chapter will terminate with a comparison on the findings from each analysis as to make a proposal of the understanding of the telemedicine nurses' practice in the TeleCare North COPD perspective in a general perspective.

3.0 ACTIVITY ANALYSIS

3.1 ACTIVITY SYSTEMS

As mentioned in the previous section this chapter contains the analysis of the telemedicine nurses' practice in the auspices of the TeleCare North COPD initiative in each of the three involved municipalities. The results from our data analysis sessions on thematic networks, data matrix and sequence models will be the primary sources for conducting the analysis. We will analyze each research participant's data from their respective datasets.

The different elements of the activity systems presented in the analysis will be argued from the notions from the related thematic network. The data matrix on the score of reoccurrence in the themes from the networks will also be used as foundation for identifying which aspects (activities) of the nurses practice that are important to look further into in the comparative part of the analysis. These parts of the activity analysis have the purpose of setting the tacit knowledge of the nurses in relation to their actions. The Sequence diagrams conducted from the observation notes from our contextual inquiry session with each

of the primary nurses will function as identifications for defining a general practice of all participants. We wish to address the interplay between what is observable (explicit) and what is latent (tacit). The purpose of conducting individual analyses on the respectively the primary nurses and the coordinating nurses/leader of each municipality is to analyze what specific activities and underlying topics that are representative for them, as to compare the results of each unit of analysis to define our overall insight in the nurses' practice in the auspices of the TeleCare North COPD initiative and thereby leading to discussion and conclusion on how telemedicine influences the role of the nurse. The activity systems presented in each unit of analysis represent sub-activities of the overall activity of providing care for citizens facilitated through technology and the different analyses will therefore culminate in an interconnective analyses of the relatability between the different sub-activities and the overall practices.

3.1.1 SUB-ACTIVITIES OF PRIMARY NURSE (HJØRRING)

The following sections comprises the analysis of the sub-activities of the primary nurse working in the TeleCare North initiative in the municipality of Hjørring's overall practice. Each sub-activity will be analyzed in the framework of Engeströms activity system.

3.1.1.1 SECURITY FOR THE CITIZENS

As mentioned earlier we will analyze how the technology itself (systems, tools etc.) is supporting or inhibiting the specific activities regarding the objectives of them and the overall practice in the auspices of the TeleCare North COPD standards. The first sub-activity systems of the primary nurse in the municipality of Hjørring is presented on the following page →

TOOLS:
OPENTELE SYSTEM
PHONE
TIME
PROFESSIONAL ASSESSMENT

SUBJECT:
PRIMARY NURSE

OBJECT:
SECURITY FOR THE CITIZEN

OUTCOME:
CITIZENS FEEL SAFE WITH THEIR SYMPTOMS

RULES:
PROFESSIONAL ASSESSMENT
ALARMS IN OPENTELE
CITIZENS PREMISES

COMMUNITY:
AFFILIATED NURSES
MUNICIPALITY
TELECARE NORD
CITIZENS

DIVISION OF LABOUR:
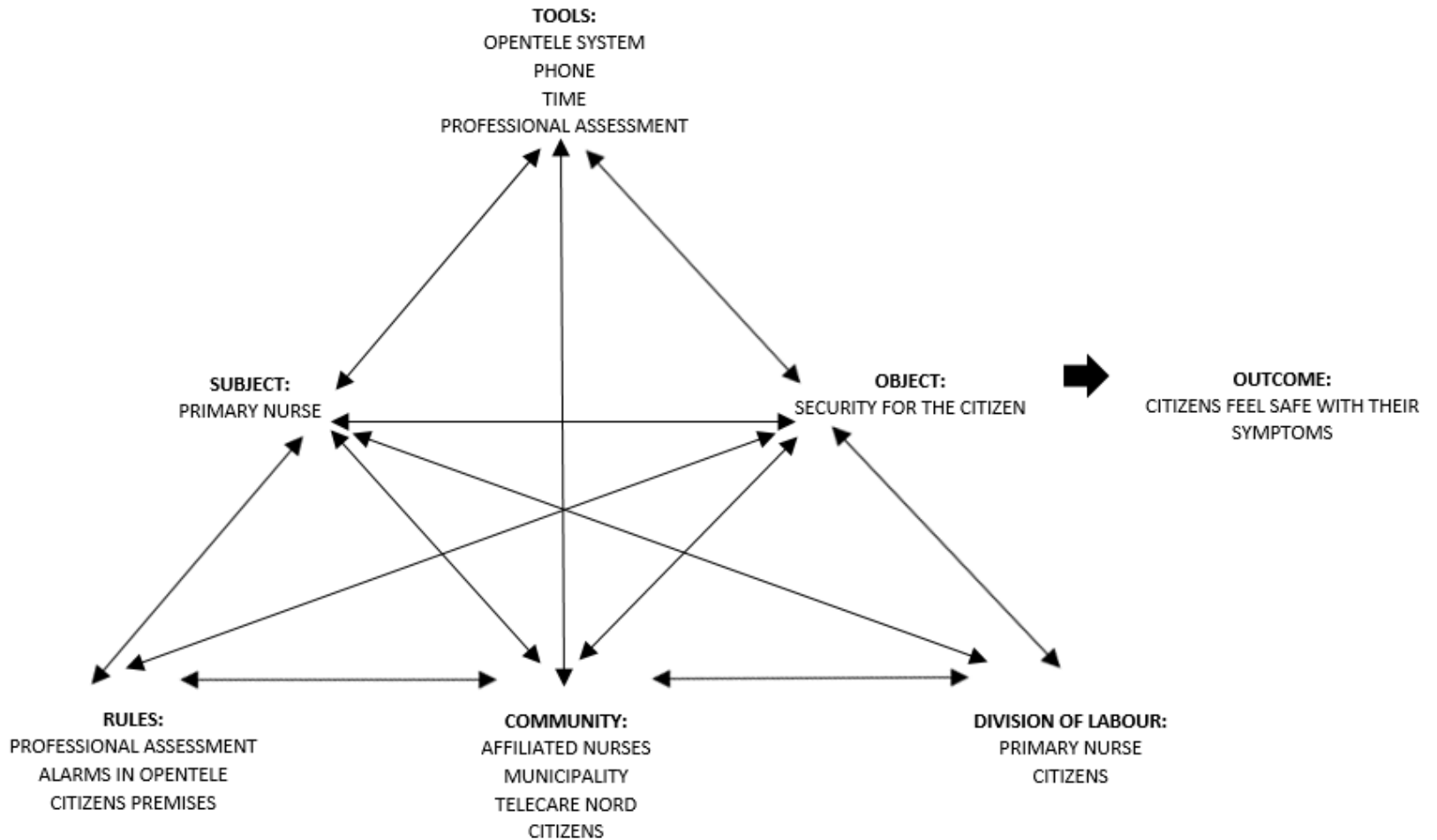PRIMARY NURSE
CITIZENS

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Figure 25: Activity system on making citizens feel secure

The **subject** of the activity system visualized in figure 25 is the primary nurse working in the TeleCare North initiative in the municipality of Hjørring. The **object** of the activity is to make the citizens receiving telemedicine treatment for COPD feel security in regard to their chronic condition, as this is one of the reoccurring topics in the notions in the thematic network data analysis as presented in section. The notions addressing this activity object are; 'Security for the individual citizen' and 'Security' from the theme 'Purpose'. It is our assessment that the data shows that making citizens feel secure is one of the main activities in regard to what the nurse understands as the purpose of the initiative.

The **tools** that the nurse has available to help citizens feel security in their condition is primarily the OpenTele system and its functionalities, such as measurements and alarms, and the telephonic contact with the citizens. The notions targeting which tools she uses (both physical and non-physical) are f.x; 'Call citizens with red alarms', 'Professional discretion (alarms)',

'Professional assessment (alarms)', 'More contact/time with citizens', 'More time with TM', 'More time per citizen' and 'More contact with citizens'. On the data from the thematic network several tools can be identified in relation to how the nurse can help the citizens feel safe. There physical tools are as mentioned the telemedicine system and the phone, as these are the primary sources for preliminary assessments of measurements and establishing contact with the citizen. The non-physical tools represented in the notions are in our assessment founded in the medical knowledge and general knowhow of the nurse. Another non-physical tool that is of importance in this activity is time. The nurse makes several statements on how time is an important factor in making citizens trust the functionalities of the initiative and fully indulge in it. The element **rules** in this activity are in our assessment constituted from an interplay between the nurse's own professionalism, the functions and limitations of the telemedicine system (alarms, measurements etc.) and the citizens willingness/level of devotion to being in the initiative. The notions on this element are f.x.; 'Professional assessment',

'Professional discretion (alarms)', 'Fewer senses', 'Senses are weakened', 'Fewer senses to work with', 'Develop other senses than sight', 'New nursing discipline', 'Nursing discipline changes', 'Professional assessment in development', 'Cannot see symptoms of illness/worsening', 'The citizen as the center' and 'The long haul (indulge citizens)'. It is our assessment that the notions show that the nurse's professional assessment is one of the most influential premises on which she can act. The OpenTele system itself has some inherent rules for how she can create a basis for assessing the citizens, as the key functionalities of the systems such as the standard alarm limits and how the citizen measurements are presented. Another factor regarding the rules of the activity is in our assessment the citizens premises for participating in the activity, as their level of engagement also influences the nurse's ability to help them feel more secure.

Based on the notions from the thematic network the **community** influencing the activity is the affiliated nurses (colleagues) who also work with the TeleCare North COPD initiative in the municipality of Hjørring, the municipality as institution (policies, values etc.), TeleCare North as expert instance and the citizen enrolled in the initiative. The notions targeting this element are; 'Coordinator gives room to operate', 'Leader allows to use the time needed', 'Flexibility towards citizens', 'TM is a specialized field' and 'The citizens as the center'. The affiliated nurses influence how the individual nurse understands her own abilities to help the citizen through professional sparring with colleagues, but also management related perspectives such as the nurse is given freedom to operate on her own within the framework of the initiative. TeleCare North COPD is also a community agent influencing the activity, as the initiative set-up and specialized knowledge is guarded by this unit. Finally, we assess that citizens also have a key role in the community element, as their conditions for accepting the initiative also influence the nurse's abilities to carry out the activity.

Division of labour is in our assessment shared between the nurse and the citizens, as her professionalism is what represents the expert aspects of the activity, but the citizens also need to contribute by making their measurements correct and consider how they can make the most of the initiative on their own premises. The notions relating to this element are in our assessment; 'Professional assessment (alarms)', 'Guidance/supervision', 'Citizens take ownership' and 'Citizens decide on their own to participate'. Without the nurse, no professional assessment of the citizens condition in relation to data from measurements or collected from phone calls, and without the citizens contributions there would be no foundation for the initiative. The **outcome** of the interplay between all the elements of this activity is that the citizens feel safe living with their symptoms. We assess that the activity has no contradictions and that the nurse generally feels that she is able to carry out the activity in a satisfactory manner.

3.1.1.2 MAKING CITIZENS TAKE OWNERSHIP

The next sub-activity of the primary nurse from the municipality of Hjørring revolves around making citizens take ownership in relation to their enrollment in the TeleCare North COPD initiative. The activity system can be viewed on the following page →

TOOLS:
OPENTELE SYSTEM
PHONE
TIME
ENCOURAGEMENT
PROFESSIONAL ASSESSMENT

SUBJECT:
PRIMARY NURSE

OBJECT:
CITIZENS TAKE OWNERSHIP

OUTCOME:
CITIZENS ARE COPING WITH THEIR
CONDITION ON THEIR OWN
INITIATIVE

RULES:
PROFESSIONAL ASSESSMENT
ALARMS IN OPENTELE
CITIZENS PREMISES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZENS

DIVISION OF LABOUR:
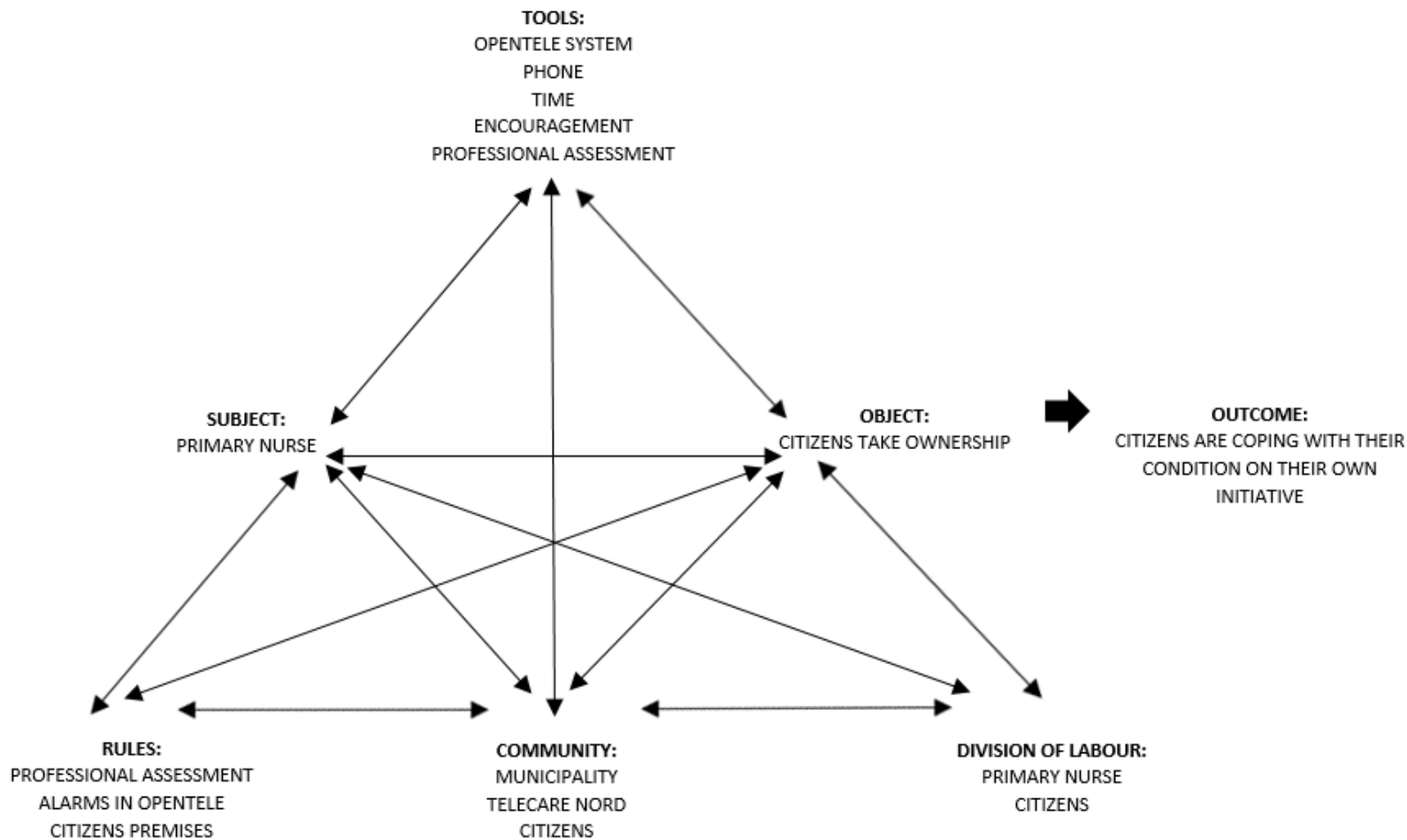PRIMARY NURSE
CITIZENS

Figure 26: Activity system on making citizens take ownership

The primary nurse is the **subject** of the activity visualized in figure 26, as she is responsible for initiate and nurture the driving forces behind the activity. The **object** of the activity is as mentioned to make citizens enrolled in the initiative take ownership in regard to making them gain as much as possible from participating. The notions addressing this objective are; 'Greater quality of life', 'Citizens take ownership', 'The citizen as the center' and 'Citizens decide on their own to participate'.

The **tools** the nurse can make use of (both physical and non-physical) are the OpenTele System, Phone, Time and encouragement. The notions addressing the use of tools are f.x; 'Professional assessment (alarms)', 'More time per citizen', 'The long haul (indulge citizens)', 'Guidance/supervision', 'Encourage citizens' and 'Takes time to familiarize citizens with concept'. We assess that there is an interplay between how the physical tools of the activity such as the OpenTele system and the nurse's phone are tools for facilitating the implementation of the non-physical tools such as her professional assessment, encouragement in relation to guidance/supervision of the individual citizen and her knowledge on time being an important factor in indulging the citizens in the initiative to the best of their abilities. The **rules** influencing how the nurse can carry out the activity are primarily founded in the how she allows her professional assessment to influence her abilities. The technological functionalities are also of importance in regard to what factors the nurse initially is to react upon. Finally, the citizens premises are also rules that the nurse needs to take into consideration, as her flexibility is depending on the citizens willingness to participate. The notions on this activity element are f.x; 'Professional assessment (alarms)', 'Flexibility towards citizens' and 'The citizen as the center'. The **community** influencing the nurse's activity of making citizen take ownership consists of the municipality, TeleCare North and the enrolled citizens. The notions targeting this element are f.x.; 'Flexibility towards citizens', 'TM is a specialized field' and 'The citizen as the center'.

It is our assessment that like in the previously introduced activity system the nurse experiences that the local set-up of the TeleCare North COPD initiative allows her to have a certain level of flexibility in relation to how she carries out the activity. TeleCare Nords function as actor in the community elements is to ensure that the standards of the initiative are met, also limiting the nurse in how she approach the activity. In our assessment, the citizens are also important actors regarding the community element, as their terms of coorporation are crucial for how the activity can play out. The **division of labour** in this specific activity is between the nurse and the citizen. The nurse and the citizen depend on each other's contributions in carrying out the activity, as the nurse is responsible for delivering the expert assessment of the citizens measurements, and the citizens are responsible for making them. None would be possible with the other. The notions on this are f.x.; 'Professional assessment (alarms)', 'Guidance/supervision' and 'Citizens decide on their own to participate'.

The **outcome** of the activity is for the nurse to enable the citizens to cope with their condition on their own initiative. Our assessment of the interplay between the elements of the activity is that the activity has no contradictions and the nurse is able to make citizens take ownership on the premises of the activity elements.

3.1.1.3 PREVENTING AGGRAVATION

The third sub-activity of the primary nurse in the municipality of Hjørring that we will analyze with Engeströms activity system revolves around the preventing aggravation and thereby minimizing hospitalizations in regard to decrease worsening in citizens symptoms. The activity system is visualized on the following page. This activity holds contradictions, which will be explained after each element has been introduced →
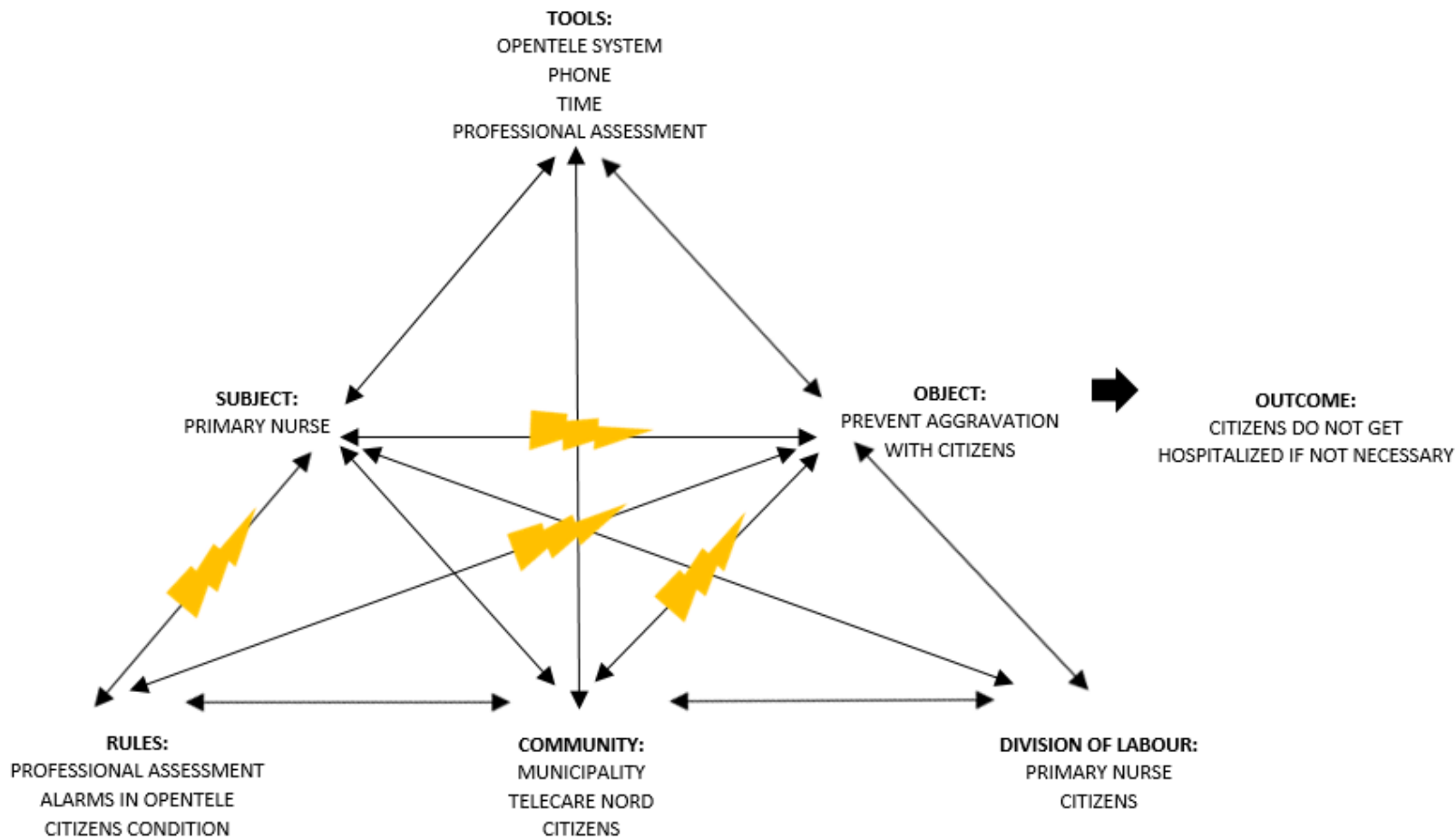
Figure 27: Activity system on preventing aggravation with citizens.

The **subject** of the activity is the primary nurse and the **object** is to prevent aggravation with the citizens in relation to help them manage their illness and symptoms. The notions targeting this objective are f.x.; 'Detect aggravation', 'Avoid Hospitalization', 'Catch disease before worsening', 'Prevent worsening in citizens illness', 'Preventive effect', 'Frequent hospital visits (before YM)' and 'Citizens should become aware of their symptoms'. It is our assessment that this objective is influenced by the efficiency-aspects of the TeleCare North COPD initiative in regard to saving money and resources in the healthcare sector. The nurse is to help the citizens understand and react on their illness before hospitalization will be the last resort.

The **tools** that the nurse has available are the OpenTele System and phone. The non-physical tools are primarily her professional assessment and time. The notions supporting this element are f.x; 'Professional assessment (alarms)', 'Call citizens with red alarm', 'Guidance/supervision' and 'More time per citizen'. We assess that the OpenTele System is the primary tool for detecting which citizen the nurse is to examine/investigate further in regard to stabilizing their symptoms. The telephonic contact is the channel for the nurse's possibilities to collect further data from the citizens on their condition and help them overcome/handle difficulties caused by their disease by guiding/supervising them on how to act. The **rules** influencing how the activity can play out is founded in the nurse's professional assessment, the premises of the functionalities of the OpenTele System and the citizen condition. The notions supporting this element are f.x; 'Professional assessment (alarms)', 'Call citizens with red alarm', 'Narrow inclusion of citizens', 'Citizens with moderate COPD could also benefit from TM' and 'Citizens should become aware of their symptoms'. The nurse primarily act on her own professional instinct and this is therefore a ruleset deposited by herself within the framework of the initiative, which is constituted by the rules of how the system is to be used, especially in regard to reacting to the alarms. Another factor when it come to the rules inherent in the activity is that the citizens condition and the criteria for being enrolled in

the initiative. The nurse express that she is assess that the initiative could be more beneficial regarding the preventive effect, if citizens with moderate COPD also was enrolled, as she finds it can be difficult to prevent aggravation in citizens with severe COPD, like the ones currently admitted in the initiative.

The community which are important in how the activity of preventing aggravation consist of the municipality, TeleCare North and the citizens themselves. As in the previous activities on the primary nurse in the municipality of Hjørring the notions targeting the community element are f.x; 'Flexibility towards citizens', 'TM is a specialized field' and 'The citizen as the center'. Like in the other activities the municipality is framing the local set-up of the TeleCare North COPD initiative. TeleCare North is the expert TM expert and unit, framing the more general initiative set-ups. Lastly, the citizens also have an important role community wise, as the initiative is highly pending on the citizens premises for participating. The **division of labour** is between the nurse and the citizen, as their functions in the activity is co-depending.

As mentioned in the beginning of this section the activity of preventing aggravation with the citizens holds **contradictions**, in regard to the **object** of the activity. It is our assessment that one of these first and foremost lies between the rules influencing how the activity can be performed and the nurse as subject. As the nurse notes she finds that it can be difficult to comply with the preventive purpose of the activity, as a one of the rules (criteria) for the citizens to be enrolled is that they are in the GOLD 5 group, which is citizens with severe COPD. It is our assessment that the nurse has a wish to take action earlier in the illness if she is to help prevent worsening. Another contradiction we have noted in this activity system is between the rules and the object. This contradiction is based on the same assessment as the first one on simply might not allow for the objective of the activity to be reached. A third contradiction is between the community and the objective of the activity, as the set-up and

actors involved also influence that the objective might not be fulfilled. The fourth and final contradiction in this activity system is between the nurse as subject and the objective of preventing aggravation. We assess that nurse does not feel enabled to carry out the activity in satisfying manner in regard to her professionalism and knowledge on prevention in COPD patients, as the set-up does inhibits that this can take place.

3.1.1.4 ASSESSING CITIZENS SYMPTOMS

The fourth sub-activity of the primary nurse in the municipality of Hjørring approach assessing the citizen symptoms in the auspices of the premises that initiative comprises. The activity holds contradictions as depicted in the figure on the following page, and will be explained after all the activity elements →

TOOLS:
OPENTELE SYSTEM
PROFESSIONAL ASSESSMENT
KNOWLEDGE ABOUT THE INDIVIDUAL CITIZEN

SUBJECT:
PRIMARY NURSE

OBJECT:
ASSESSMENT OF CITIZENS SYMPTOMS

OUTCOME:
GETTING TO KNOW THE CITIZENS CURRENT CONDITION REGARDING THE RESULTS OF THE MEASUREMENTS

RULES:
PROFESSIONAL ASSESSMENT
MEASUREMENTS IN OPENTELE
CITIZENS ASSESSMENT

COMMUNITY:
MUNICIPALITY
TELECARE NORD

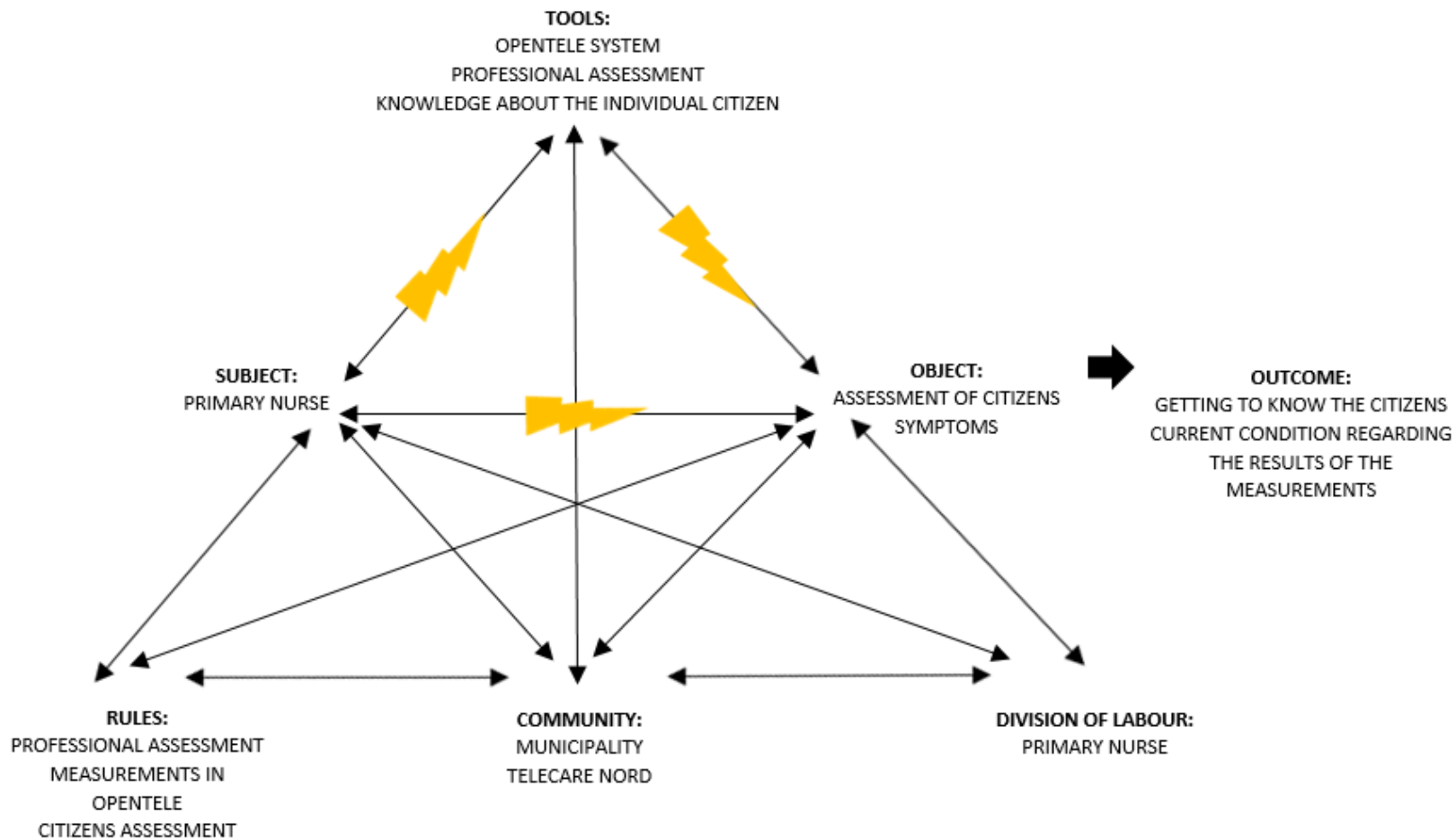**DIVISION OF LABOUR:**
PRIMARY NURSE

Figure 28: Activity system on reading assessing citizens symptoms

The **subject** of the activity is the primary nurse. The **object** is to assess citizen symptoms on the premises of the initiative, and by that it is not only meant as the nurse reading what the alarms show, but also how she interprets them in regard to the individual citizen. The notions supporting this as an objective are f.x; 'Professional assessment (alarms)', 'Call citizens with red alarm' and 'Professional discretion (alarms)'. We assess that reading alarms in OpenTele is one of the key functions in relation to the nurse initial understanding of the citizens symptoms. The **tools** she uses in the activity is the OpenTele system itself, her professional assessment and knowledge she has gain about the individual citizen from the relation they build from their contact. The notions targeting this element are f.x.; 'Professional assessment (alarms)', 'More contact with citizens', 'More contact/time with patients', 'Develop other senses than sight' and 'Professional assessment in development'. Our assessment is that the nurse's primary tool for reading the reading/interpreting the citizens alarms is her professional assessment and she supplies this perspective with her knowledge of the citizens, which she has obtained from being in contact with the citizens. The nurse feels that she is developing her senses in regard to her professionalism, as her traditional senses such as to see and feel are not usable.

The **rules** which have impact on the activity are partly founded in the nurse's professionalism regarding how she chooses to approach assessing the alarms and further investigate over the phone, the rules of when she needs to act in relation to the system (when alarms are red) and taking the citizens own assessments into account if telephonic contact is established. The **community** influencing the activity is constituted by the municipality in relation to the local set-up for the initiative and TeleCare North as expert unit. The notions on this element are as in the other her activities; 'Flexibility towards the citizen', 'TM is a specialized field' and 'The citizen as the center'. The local set-up is defining how the nurse can bring her professionalism into play in regard to her individual approach to assessing the citizens symptoms. TeleCare North supports with guidelines.

The **division of labour** does only involve the primary nurse as she in responsible for the assessment on her own, unless other healthcare professionals are involved intentionally, which lies outside the specific activity.

The contradictions of the activity that influence the outcome, which is getting to know the citizens current condition regarding the results of the measurements, are between the elements subject and tools, the elements tools and object and the elements subject and object. The first of the three contradictions do in our assessment occur due to the nurse feeling that her senses are weakened, and these are what she uses to conduct her assessment of the citizens symptoms. The technological tools do not allow for her to use her traditional senses, and she express that she must develop new senses and thereby also develop the foundation on which she bases her assessments. The second of the abovementioned contradictions between tools and object does in our assessment occur when the tools do not necessarily support the objective of the activity. However, we find that this contradiction only lies with the physical tools (systems and phone) as these do not enable her senses, but they do serve as a catalyst for her developing new senses in regard to non-physical tools such as her building up knowledge about the individual citizen. The third and final contradiction occurs between subject and object, as we assess that the in general finds it difficult to assess citizens symptoms on the basis she has, but she also expresses that this is a feeling that she is overcoming and getting used to as she develops her professional assessment by finding new approaches in sensing the citizens.

3.1.2 SUB-ACTIVITUES OF COORDINATING NURSE (HJØRRING)

The following sections will be introduced the activity analyses of the different sub-activities of the coordinating nurse working in the TeleCare North COPD initiative in the municipality of Hjørring. In the same manner as the previous analyses on the primary nurse, the sub-activities will be analyzed using Engeströms activity system.

3.1.2.1 QUALITY ASSURANCE

The first sub-activity of the coordinating nurse is how she work with quality assurance in the auspices of the initiative. The activity system on this specific activity is presented in the following page →

TOOLS:
STATISTICS FROM OPENTELE
PRIMARY NURSES FEEDBACK/OWN INSIGHT

SUBJECT:
COORDINATING NURSE

OBJECT:
QUALITY ASSURANCE

OUTCOME:
MAKING SURE THE SET-UP IS ON TRACK WITH THE INITIATIVE STANDARDS

RULES:
PROJECT ESTIMATES
MUNICIPAL SET-UP
GUIDELINES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
PRIMARY NURSES

DIVISION OF LABOUR:
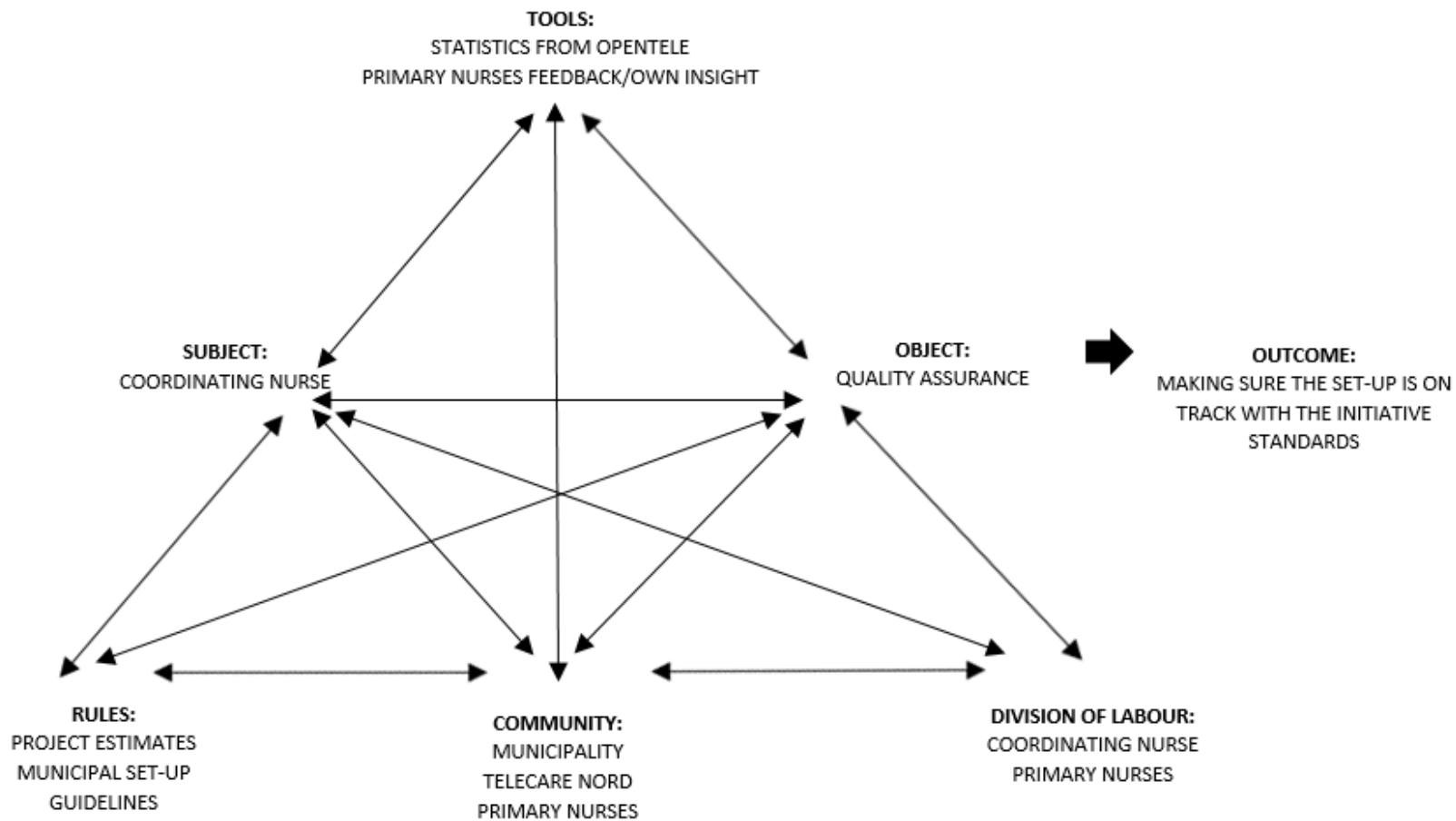COORDINATING NURSE
PRIMARY NURSES

Figure 29: Activity system on quality assurance

The **subject** of the activity is the coordinating nurse and the **object** of the activity is to oversee the initiative in her municipality in regard to securing the quality of the local set-up, and that it meets the standards. The notions targeting this are f.x.; 'Quality assurance', 'Quality assurance – are we on the track?' and 'Overlooks use of resources'.

The **tools** she can make use of (physical and non-physical) statistics from the OpenTele system and sparring with the primary nurses working in the initiative. The notions on this element are f.x; 'Draw out numbers', 'Project start-up good for input' and 'Transition was a possibility to comment on set-up'. It is our assessment that her coordination duties have be intensified in the transition phase where the initiative went from project to operation. Her coordinator-duties after roll-out is to follow up on numbers in the OpenTele system on how much time is spent on each citizen etc.

The **rules** influencing how the coordinating nurse can conduct quality assurance on the local set-up is rooted in project estimates filed by the professionals involved in the implementation, the municipal set-up and general guidelines for the initiative. The notions targeting this are f.x; 'Municipal project coordinator as guarantor', 'Nice with clearly defined target group and 'Local implementation committee'. From these notions, we assess that the coordinating nurse is advocating the interests of both the implementation committee and the staff working in the initiative. This can also be seen in the **community** element, as this is constituted by respectively the municipality, TeleCare North and the primary nurses (staff). The notions that tell she is also advocating the staffs perspective on the initiative set-up are as mentioned earlier f.x; 'Project to operation as a process of change', 'Transition was a possibility to comment on set-up' and 'Project start-up good for input'. **The division of labour** in this activity is between the coordinating nurse and the primary nurses, as she is depending on feedback from her colleagues for her to enforce their perspectives in the auspices

of the regional initiative coordinators. The outcome of the activity is that the coordinating nurse can make sure that the municipal set-up is on track with the initiative standards, while advocating the local guidelines as well.

3.1.2.1 HELPING CITIZENS ACCEPT THEIR ILLNESS

The second sub-activity of the coordinating nurse concerns how she handles helping citizens accept their chronic illness. The activity system is visualized on the following page →

TOOLS:
OPENTELE SYSTEM
PHONE
PROFESSIONAL ASSESSMENT
COMMUNICATION SKILLS/QUESTION TECHNIQUE

SUBJECT:
COORDINATING NURSE

OBJECT:
HELPING CITIZENS ACCEPT
THEIR ILLNESS

OUTCOME:
NURSE IS INSECURE WHETHER THE
CITIZENS UNDERSTAND WHAT IT
MEANS TO LIVE WITH COPD

RULES:
PROFESSIONAL ASSESSMENT
CITIZENS PREMISES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZENS

DIVISION OF LABOUR:
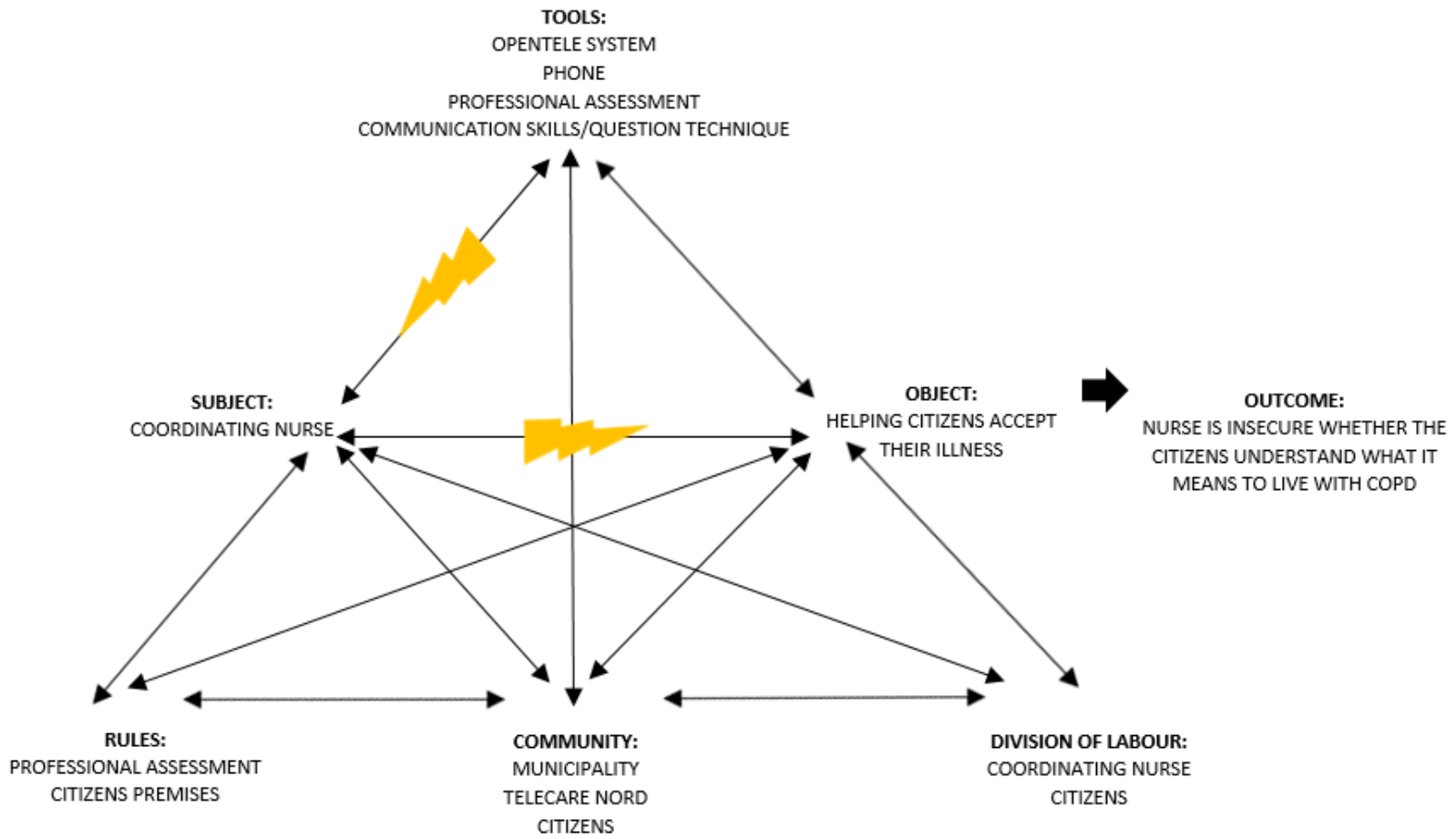COORDINATING NURSE
CITIZENS

Figure 30: Activity system on helping
citizens accept their illness

The **subject** of the activity is the coordinating nurse and the **object** of the activity is to help the enrolled citizens with accepting their chronic illness. The notions targeting this are f.x.; 'Help citizens to comprehend their illness', 'Citizens being able to take care of themselves' , 'Make citizens realize they are ill', 'Provide citizens with a foundation for recognizing their illness', 'Rehabilitation: citizens become able to handle their everyday lives', 'Help people to take care of themselves', 'Citizen as the center' and 'The citizen is more than his(her GOLD group'. The notions show that one of the activities that the coordinating sees as one of the primary, is to make citizen realize they are ill and help them to comprehend how to identify themselves when living with a chronic disease.

The **tools** that the nurse has available to her in carrying out the activity is OpenTele, her phone (the physical), her professional assessment and communication skills/questioning techniques (non-physical). The notions on this are f.x; 'Away from diagnosis-thinking', 'Trust gets another meaning (communication)', 'Trust changes (communication)' and 'Good at asking the right questions'. It is our assessment that the nurse relies solely on her communicative competences in this specific activity and the OpenTele system is the platform on which the nurse and citizen can work together from. The nurse's phone is an important technological tool in this activity as it establishes the more personal contact between the nurse as professional and the citizen, which in our assessment the nurse express as changing the perspective on trust.

The **rules** which has an impact on how the coordinating nurse can carry out the activity are founded in how she uses her professional assessment as a both a factual and moral pointer in helping the citizen and how the citizens accept her guidance. The notions targeting this are f.x.; 'The citizen is more than his/her GOLD group', 'Citizens need the tools to take responsibility' and 'Learn citizens to act on their symptoms'. We assess that the nurse is very aware of that though the telemedicine initiative is founded on reading and relate to measurements/numbers,

there is another important aspect to it, which is not to diminish that the contact with the citizens can accommodate more than just consulting them medically, but there are also psychological aspects of dealing with people with a chronic disease. The **community** involved in dictating the framework of the activity is as in many of the previous analyses the municipality regarding the local set-up, TeleCare North as expert unit and the citizens, as the initiative would not function outside their premises. The notions on this are f.x.; 'Nice with clearly defined target group' and 'Citizen as the center'. The **division of labour** is in our assessment between the nurse and the individual citizen, as several of the notions target that the nurse has a learning perspective on the purpose of the activity; 'Citizens being able to take care of themselves', 'Help citizens to comprehend their illness', 'Citizens need the tools to take responsibility', 'Learn citizens to act on their symptoms' and 'Provide citizens with a foundation for recognizing their illness'.

However, the **outcome** of the activity is that the nurse doubts whether she has really reached out to the citizens or not. As it can be seen in figure 30, the activity holds contradictions between the elements tools and subject and the elements subject and object. In relation to the tools – subject contradiction the nurse express during the interview, that she finds it can be difficult to trust the measurements in OpenTele. She finds that care cannot be delivered from a distance and depends on whether she is able to help the citizens help themselves. The notions on this are f.x; 'Care cannot be delivered from a distance', 'Help people to take care of themselves' and 'Doubting the validity of measurements'. The second contradiction between the subject (the nurse herself) and the object of helping citizens accept their illness occurs because the nurse is wondering whether she really can make the citizens comprehend their condition, which leads to the outcome of the activity being that the nurse has insecurities about the effect of her guidance. The notions are f.x.; 'Trust gets another meaning' and 'Have you really got them?'.

3.1.3 GENERAL PRACTICE UNDERSTANDING (HJØRRING)

To provide an overview of what we understand as the general work practice of the nurses working in the TeleCare North COPD initiative in the municipality of Hjørring, we will summarize synthesize the sub-activities of both the primary nurse and coordinating nurse as presented in the previous sections. The activities will be argued from Engeströms activity levels to provide a perspective on the cognitive structures of the activities.

The results from the data analysis methods thematic networks and contextual inquiry has given us insight in what the nurses are doing when working (explicit) and what they think they do/think when they do (tacit knowledge). It is our assessment that on the **operational level** the general practice of the nurses revolves around managing the data they read in the OpenTele system and collect new data/ensure their understanding of the data over the phone/Skype. The nurses handle both newly submitted measurements from each enrolled citizen in their municipality, as well as their history of illness. Furthermore, some of the data-oriented work in the auspices of the initiative is to monitor and report data on how they use the OpenTele system, and to document their medical decisions in municipal systems.

On the **action level,** we find that the general work practice of the nurses is very cognitively founded, as they must almost constantly approach on what they with their individual professionalism along with the local and initiative guidelines deem to be right in the specific situation. As many of the activities presented in the activity analyses show, along with the notions in the thematic networks and the sequence diagram the work practice of the nurses consist almost solely of cognitive patterns in regard to how they approach and carry out an activity. It is our assessment that the analysis show that while their activities involves many psychological aspects such as making the citizens feel secure, take ownership and accept their illness the communicative and pedagogical aspect of their profession seem to be the most relevant aspects. Whereas

medically founded/evaluating cognitive aspects of the actions they perform in the different activities seem more embedded and traditional regarding their professionalism as nurses. How the activities are approaches also relates to how the individual nurse navigates and thrive in the insecurities that might occur due to the lack of use of traditional senses. It is our assessment that the activity analyses, thematic network notions and sequence diagram show that both nurses and citizens must adapt to the new type of relation between them, as the nurses feel they are granted more time per citizen with telemedicine and are therefore able to use their medical professionalism in a more educational manner than they are used to.

3.1.3.1 USE-CONTEXT

In relation to the principles of 'The Activity Checklist' by Kaptelinin et al (1999) the influence of the technologies included in the activities of the nurses will be discussed to define how they promote or inhibit the activities from an overall use-context perspective. The technologies used in the different activities of the nurses in the municipality of Hjørring are:

- OpenTele
- Phone
- Municipal documentation systems

From the principle of **ends and means** we find that the combination of technologies in general seem to promote the nurses practice. The OpenTele system and municipal documentation system allows the nurses to ponder their individually based approach on something statistic – a starting point for further consultation. From here on it is up to the nurse in unison with the individual citizen to figure out how the consultation shall elapse. The phone/Skype is the most important tool as it enables the nurse to investigate the citizen further and on their individual premises. Over the phone the nurses can enact their self-taught professional question technique, that they adapt to each citizen as they get to know them. Some citizens mostly just have their measurements

checked and "approved" whereas the nurses activities are more operational, while other citizens seem to demand more guidance/supervision which requires the nurse to have a pedagogical/education approach.

Regarding the **social and physical aspects of the environment** principle we find that this principle can be argued from the same findings of the ends and means principle. As the social aspects of telemedicine consultation can be reduced to merely reading data and "clearing" citizens, the activities of the nurses and the tacit knowledge they provide to our study shows that there is a more complex social aspect of telemedicine which emphasizes that the nurses can comply with the psychological aspects of the communication with the citizens. The physical aspects of the contact between nurses and citizen being purely through technological channels (in most cases) can cause some difficulties in regard to the nurses having to develop new senses in order to consult citizens with different needs. However, we assess that the analyses and data on the nurses in Hjørring municipality show that this problematic is overcome by them finding their own approaches and techniques and figure out how to apply them to an almost purely technological practice environment. The **learning, cognition and articulation** principle can in relation to the general practice of the nurses in Hjørring be said to consist of them learning how to embed their cognitive pattern in relation to the specific activities they perform and also in relation to the citizen they consult. Their thoughts on how to handle specific situations and citizens are externalized by them setting these thoughts into actions and vice versa are the actions they perform internalized as to develop these on a cognitive basis (rethink, redefine etc.).

3.1.4 SUB-ACTIVITIES OF PRIMARY NURSE (FREDERIKSHAVN)

The analyses of the sub-activities of the primary nurse working with the TeleCare North COPD initiative in Frederikshavn will be presented in the following sections. The activities are analyzed in the activity system.

3.1.4.1 VIEWING CITIZENS SUBMITTED DATA

The first sub-activity of the primary nurse in the municipality of Frederikshavn concerns her viewing/reading the data submitted by the citizens in the OpenTele system. The activity system is visualized on the following page →

TOOLS:
OPENTELE
PROFESSIONAL KNOWLEDGE
DOCUMENTATIONS SYSTEM

SUBJECT:
PRIMARY NURSE

OBJECT:
VIEWING A CITIZENS
SUBMITTED DATA

OUTCOME:
ENSURING THE CITIZEN DOES NOT
NEED IMMEDIATE CARE

RULES:
PROFESSIONAL ASSESSMENT
OPENTELE GUIDELINES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN

DIVISION OF LABOUR:
PRIMARY NURSE
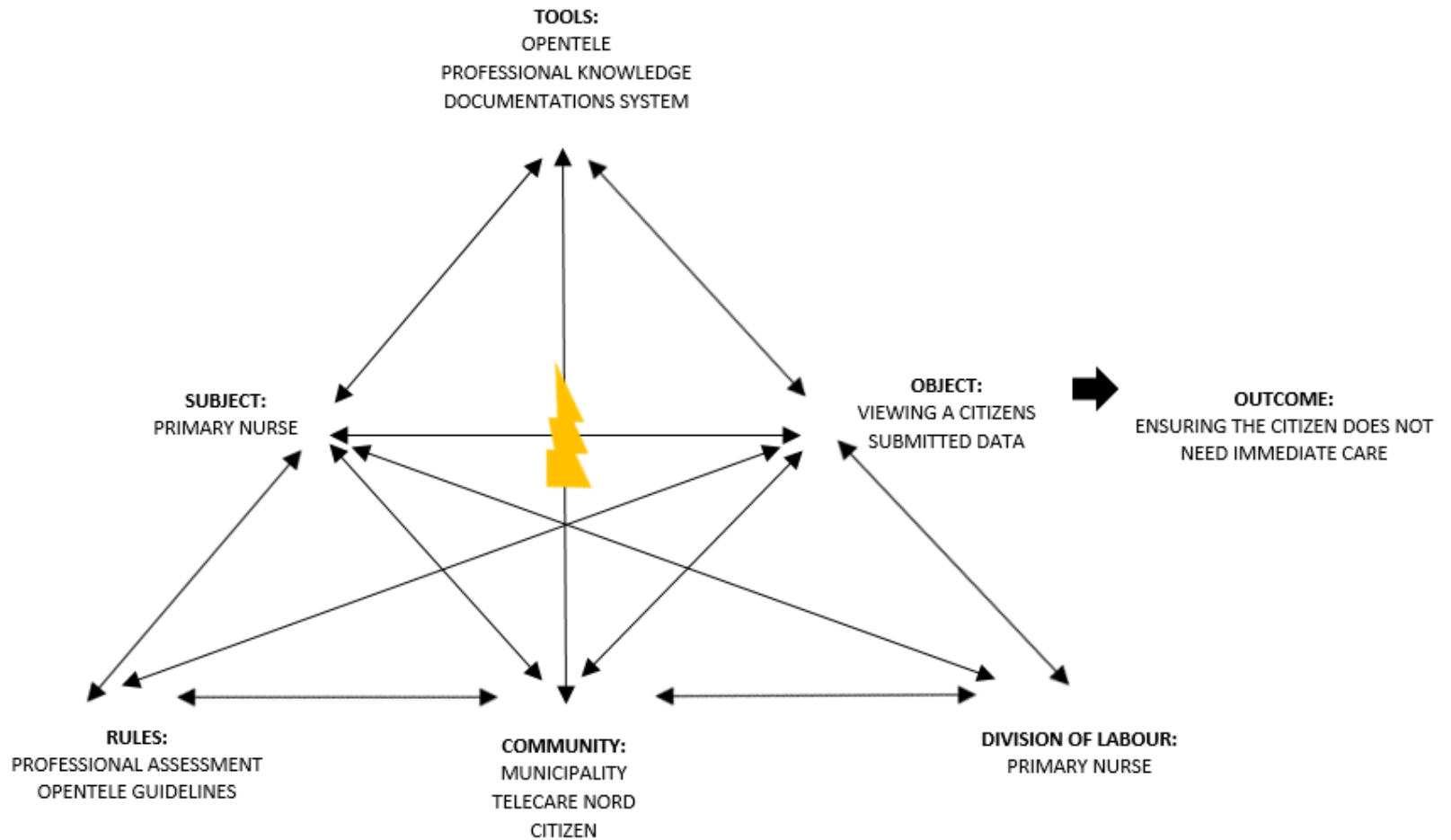
Figure 31: Activity system on viewing citizens submitted data

Viewing citizen submitted data is an activity that the primary nurse does for each of the active citizens in the TeleCare North COPD operation. Figure 31 shows the activity system. The **Subject** is the primary nurse with the **Object** of viewing and assessing the submitted data in OpenTele. From the thematic network (see figure 12) it can be seen that the notion of works tasks explains the **Outcome** of this activity is that to ensure that the citizen does not need immediate care. Immediate care is in this activity the activity of calling the citizen and finding out what necessary step the citizen should take as to ensure their well-being.

The **Tools** applied to this activity are OpenTele, Professional knowledge and the municipal documentation system. From the contextual inquiry data collected (see figure 20 and 21) it can be seen that the primary nurse uses both OpenTele and the documentations system to understand the citizen's health history. Looking at earlier submitted data or entries into the documentation system seem to create an overview that they can use to assess the need for immediate care based on their current submitted data. The **Division of labour** consists of the nurse performing the activity alone. Even though the **Community** is that of the primary nurse and the citizen, this activity does not directly include the citizen. The **Rules** of the activity is concerned with the OpenTele guidelines.

The contradiction between the tools and the community are based on the notions in the thematic network. It can be seen that a concern for the primary nurse is that of not only reading the submitted data, but also being able to know that even though certain data shows a red alarm bell in OpenTele it does not necessarily mean that the nurse will have to take action. The lifestyle choices of the citizen or current treatment is something that the nurse needs to know about as it can mean that the citizen is not in need of immediate care even though the OpenTele system shows red alarm bells for the citizen.

3.1.4.2 MAKING AN APPOINTMENT WITH A CITIZEN

The second sub-activity of the primary nurse is targeting her making an appointment with citizen, if she assesses that he/she is in need of guidance/supervision that cannot be provided satisfactory over the phone. The activity system on this sub-activity is presented on the following page →

TOOLS:
OPENTELE
PROFESSIONAL ASSESSMENT
DOCUMENTATIONS SYSTEM
SKYPE AND HEADSET
PEN AND PAPER
OUTLOOK

SUBJECT:
PRIMARY NURSE

OBJECT:
PLANNING A MEETING WITH
THE CITIZEN

OUTCOME:
IMPROVE THE CITIZENS ABILITY TO
CARE FOR THEMSELVES

RULES:
PROFESSIONAL ASSESSMENT
PATIENT SECURITY
HEALTHCARE LAW

COMMUNITY:
MUNICIPALITY (HEALTH-
CENTER)
TELECARE NORD
CITIZEN

DIVISION OF LABOUR:
PRIMARY NURSE
CITIZEN

Figure 32: Activity system on
planning a meeting with the citizen

The activity system in figure 32 is a sub activity to the activity of calling the citizen. The **Subject**, the primary nurse, have the **Object** of planning a meeting with a citizen at the healthcare center. The desired **Outcome** is that of improving the citizens ability to care for themselves. This is also emphasized in the **Division of labour** as it is the primary nurse performing the activity, but the outcome is that of making the citizen start the activity of attending the meeting and through this meeting be able to help himself or herself better. As this meeting is between the nurse and the citizen at the healthcare center, they comprise the **Community**. This activity shows the use of the healthcare center as a resource to be able to provide the citizens with additional care in the form of combining tele monitoring with the available services at the healthcare center.

The **Rules** of this activity concerns that of patient security and the healthcare law as these should always be adhered to when engaging with citizens. The **Tools** that the primary nurse uses to perform this activity consists of the OpenTele system, the documentation system, pen and paper, skype, a headset, Outlook and the nurses professional knowledge. All these tools are being used almost simultaneously as the primary nurse is talking and planning the appointment with the citizen. Outlook is used as a personal calendar and the meeting is written into this calendar. This leads to the contradiction that can be seen between the subject and the tools. It is an annoyance to the primary nurse that it is needed to work in so many different systems. The primary nurse sees it as a benefit if the different systems could be incorporated into each other, especially being able to call the citizen through the OpenTele system.

3.1.4.3 DOCUMENTING THE PROCEDURE

The third sub-activity of the primary nurse in the municipality of Frederikshavn concerns how she documents what she has spoken with a citizen about in order to create a history on the citizens relapse or progression. The activity system is visualized on the following page →

TOOLS:
OPENTELE
DOCUMENTATION SYSTEM
MEDICAL KNOWLEDGE
PEN AND PAPER

SUBJECT:
PRIMARY NURSE

OBJECT:
DOCUMENTING THE
PROCEDURE

OUTCOME:
INCREASED PATIENT SECURITY
AND FOUNDATION FOR CROSS-
SECTORAL COORPORATION

RULES:
PROFESSIONAL ASSESSMENT
PATIENT SECURITY
HEALTHCARE LAW

COMMUNITY:
MUNICIPALITY (HEALTH-
CENTER)
TELECARE NORD
HOME-CARE NURSES
PHYSISIANS (GPS)

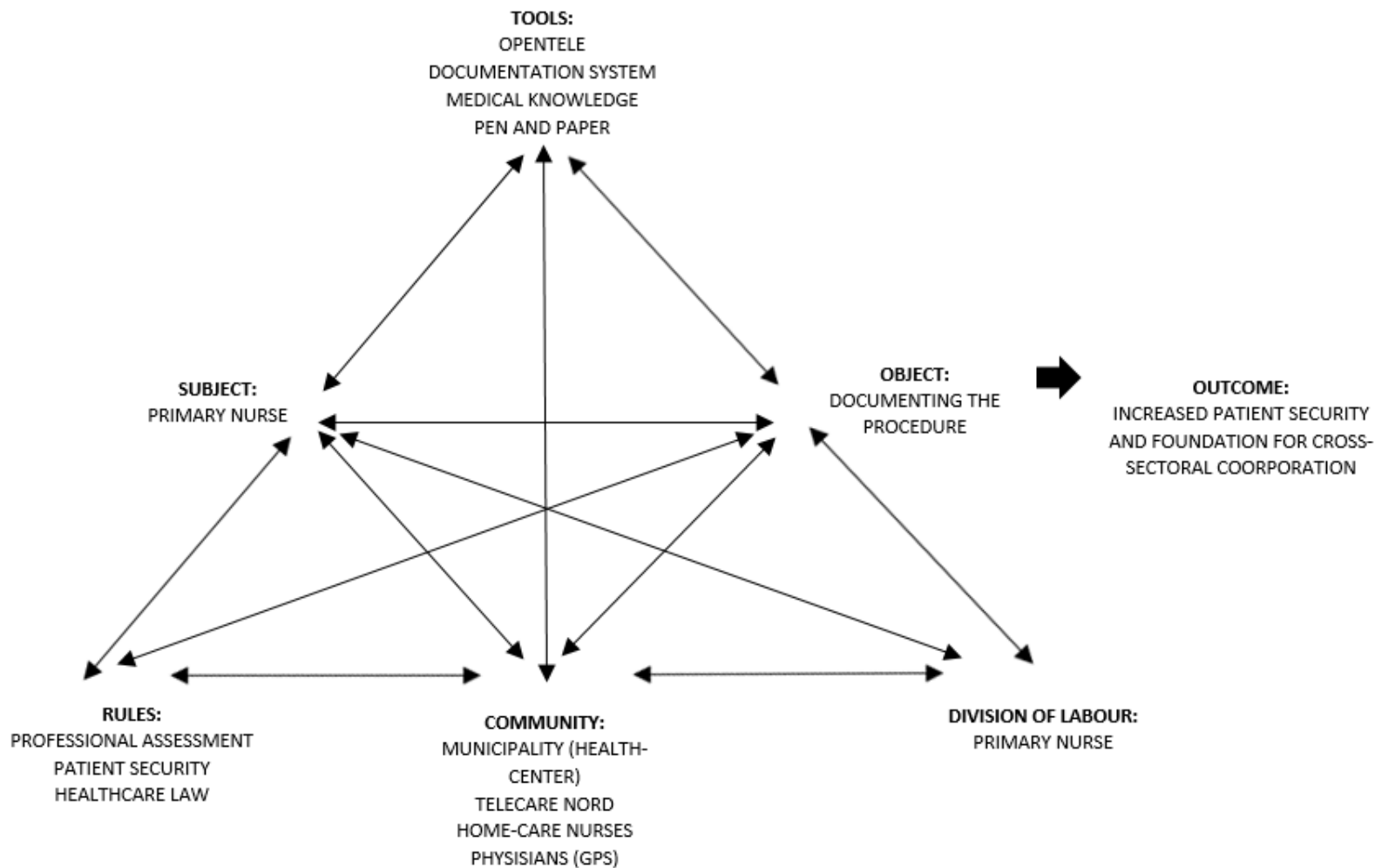**DIVISION OF LABOUR:**
PRIMARY NURSE

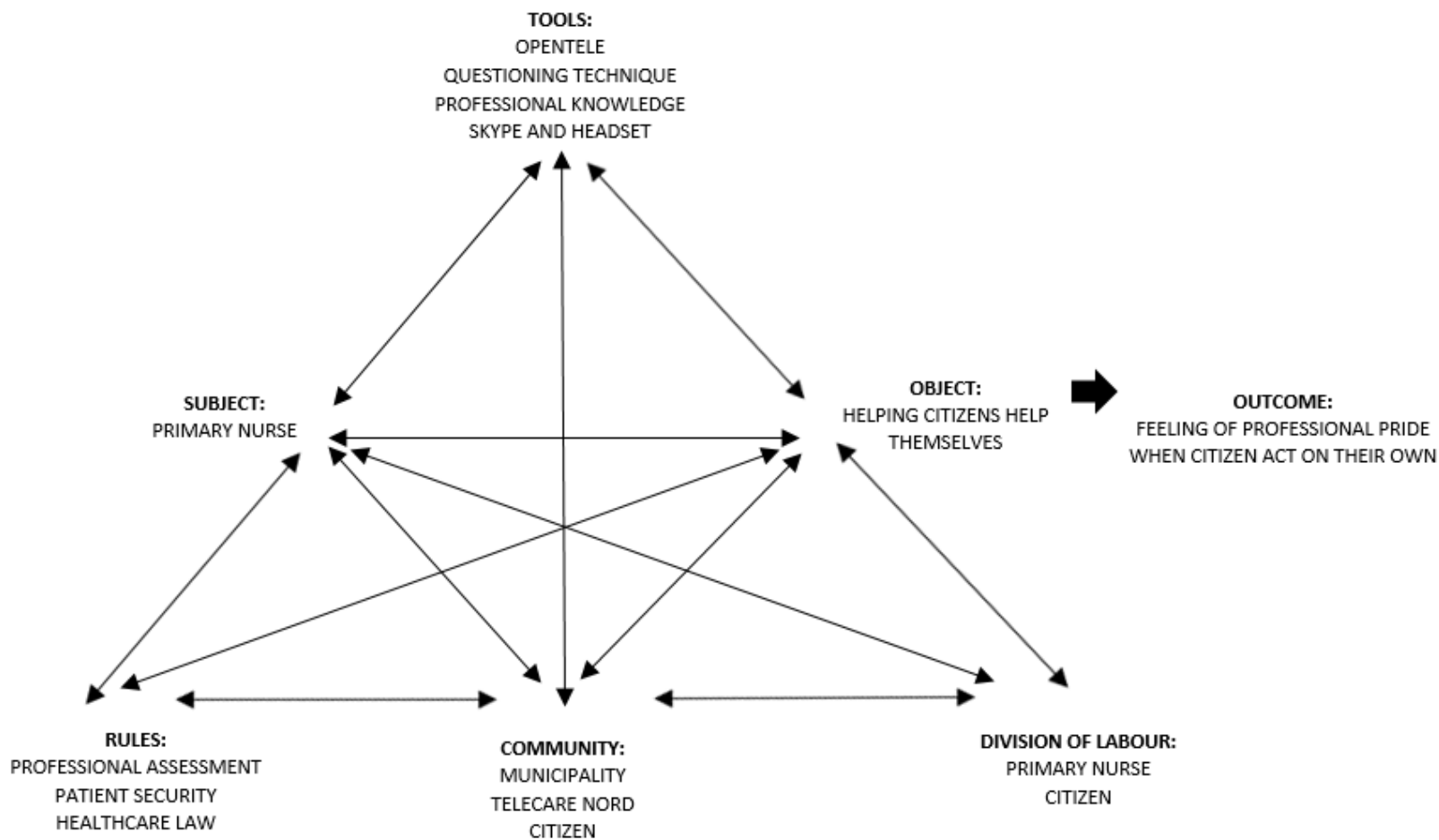**Figure 33:** Activity system on documenting
the procedure

The **Subject** the primary nurse documents the procedure, the **Object**, after each conversation with a citizen. While this activity is done to adhere to the healthcare law and patient security, the **rules**, it has the **outcomes** of patient security and helps intersectoral cooperation. The activity system can be seen in figure 33. The intersectoral cooperation can be seen in the contextual inquiry data (see section 2.5.2) as the primary nurse uses the data from the documentation system to obtain information about the citizen. This information can come from other healthcare sectors as they all use the same municipal documentation system. As to document in the documentation system the primary nurse uses OpenTele as to view the citizen submitted data, pen and paper where notes are taken during the conversation with the citizen, the professional knowledge the primary uses as to assess what to write in the municipal documentation system. These are the **Tools** for this activity. The **Community** consists of the citizen, the physician and homecare nurses who also interact with the citizen and therefore inserts data into the municipal documentation system.

Division of labour is the primary nurse documenting the procedure. There are no contradictions in this activity system.

3.1.4.4 HELPING CITIZENS TO HELP THEMSELVES

The fourth sub-activity targets how the primary nurse helps citizens to help themselves, by priming them to develop their knowhow and general compliance in relation to their illness. The activity system is as shown on the following page →

TOOLS:
OPENTELE
QUESTIONING TECHNIQUE
PROFESSIONAL KNOWLEDGE
SKYPE AND HEADSET

SUBJECT:
PRIMARY NURSE

OBJECT:
HELPING CITIZENS HELP
THEMSELVES

OUTCOME:
FEELING OF PROFESSIONAL PRIDE
WHEN CITIZEN ACT ON THEIR OWN

RULES:
PROFESSIONAL ASSESSMENT
PATIENT SECURITY
HEALTHCARE LAW

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN

DIVISION OF LABOUR:
PRIMARY NURSE
CITIZEN

Figure 34: Activity on helping
citizens help themselves

In figure 34 activity the activity of the primary nurse, **Subject**, help citizen help themselves, **Object**, can be seen. This activity is from the perspective of the primary nurse the purpose of the TeleCare North operations. This is made clear in the interview (see appendix 4) and can be seen as having several notions in the thematic network (See figure 12). The primary nurse, during the interview, describes that the desired **outcome** of citizens being able to help themselves provides the nurse with a feeling of pride. As this activity depends on the willingness of the individual citizen, **Community**, the primary nurse only achieves the desired outcome when the citizen makes it visible that they are able to help themselves. This also leads to the **Division of labour** including both the primary nurse and the citizen. The desired outcome is not attained if the citizen does not participate.

The **Tools** used in this activity are the professional knowledge of the primary nurse, skype and a headset as a mean to call the citizen, OpenTele as a mean to view the citizens health progression and lastly questioning technique to understand the health state of the citizen and to engage them in self-help. The notions in the thematic network also highlight the importance of respecting the citizen and realizing that they often know when they are getting worse. By being a good detective and respecting the citizen it becomes possible for the primary nurse to help them help themselves. The **Rules** of the activity are those of ensuring patient security and the healthcare law.

3.1.4.5 ASSESSING THE CITIZENS HEALTH STATE

The fifth sub-activity of the primary nurse concerns how she assesses the citizens health state. The activity system is visualized on the following page →

TOOLS:
OPENTELE
QUESTIONING TECHNIQUE
PROFESSIONAL KNOWLEDGE
SKYPE AND HEADSET
DOCUMENTATION SYSTEM
PEN AND PAPER

SUBJECT:
PRIMARY NURSE

OBJECT:
ASSESSING THE CITIZENS
HEALTH STATE

OUTCOME:
BEING ABLE TO PROVIDE CARE
ADVICE AND HELP CITIZENS HELP
THEMSELVES

RULES:
PROFESSIONAL ASSESSMENT
PATIENT SECURITY
HEALTHCARE LAW

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN

DIVISION OF LABOUR:
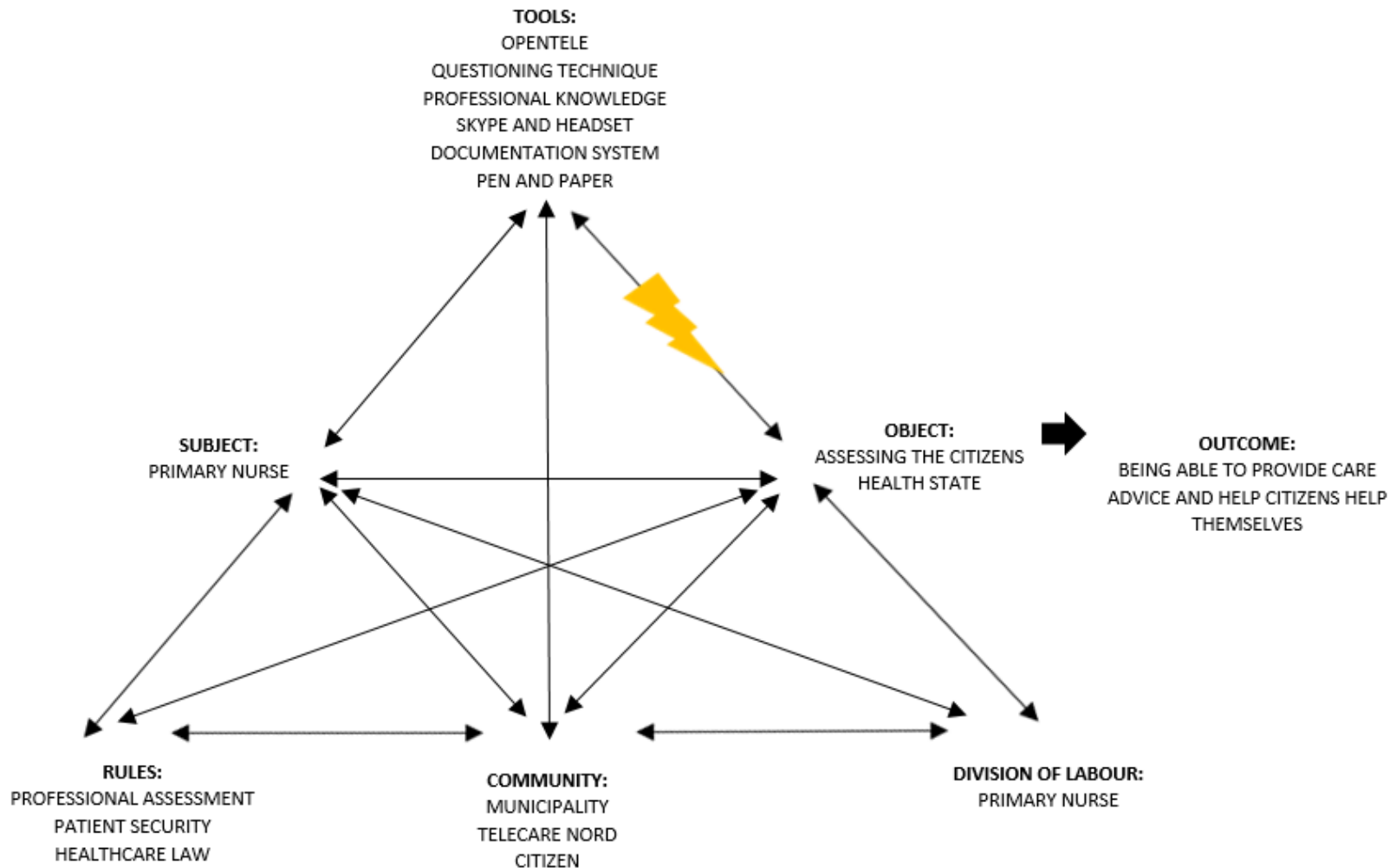PRIMARY NURSE

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Figure 35: Activity system on
assessing the citizens' health state

Figure 35 show the activity system for the primary nurse, **Subject**, gaining an understanding of the health state of the citizen, **Object**, as to be able to provide the citizen with the right advice for them to help themselves – the **Outcome**. To do this, the primary nurse uses the data in OpenTele and the documentation system. Furthermore, the primary nurse use Skype and a headset to converse with the citizen and uses an in-depth questioning technique to understand the citizens health state. The primary nurse also takes handwritten notes during the conversation. All this **Tools** are used to reach the object of the activity. It is here that the primary nurse has a contradiction in the activity system. Not having the opportunity to see the citizens while assessing their health state makes it hard to do the activity. While we can see in the thematic network (See figure 12) that there are a notion describing that it is not a problem to not be able to see the citizens there are also a notion describing the difficulties of not being able to see the citizen. This contradiction both in the notions and in the activity system is somewhat negated by the **division of labour** as the primary

nurse have, through experience in the TeleCare North operations, have developed the before mentioned questioning technique which helps the nurse in the, as the primary nurse describes it, *detective work*. The **rules** consist of adhering to patient security and to the health care law. As the activity centers on the primary nurse and the citizen, the citizen comprises the **Community**.

3.1.5 SUB-ACTIVITIES OF COORDINATOR (FREDERIKSHAVN)

The following section will present the activity analysis of the coordinator affiliated with the TeleCare North COPD initiative in the municipality of Frederikshavn.

3.1.5.1 COORDINATE TCN KOL OPERATIONS

The first and only activity we assess we can target based on our data on the coordinator in Frederikshavn revolves around her work in coordinating the primary nurses, who ensure that the TCN KOL operations are function as they should. The activity system is shown on the following page →
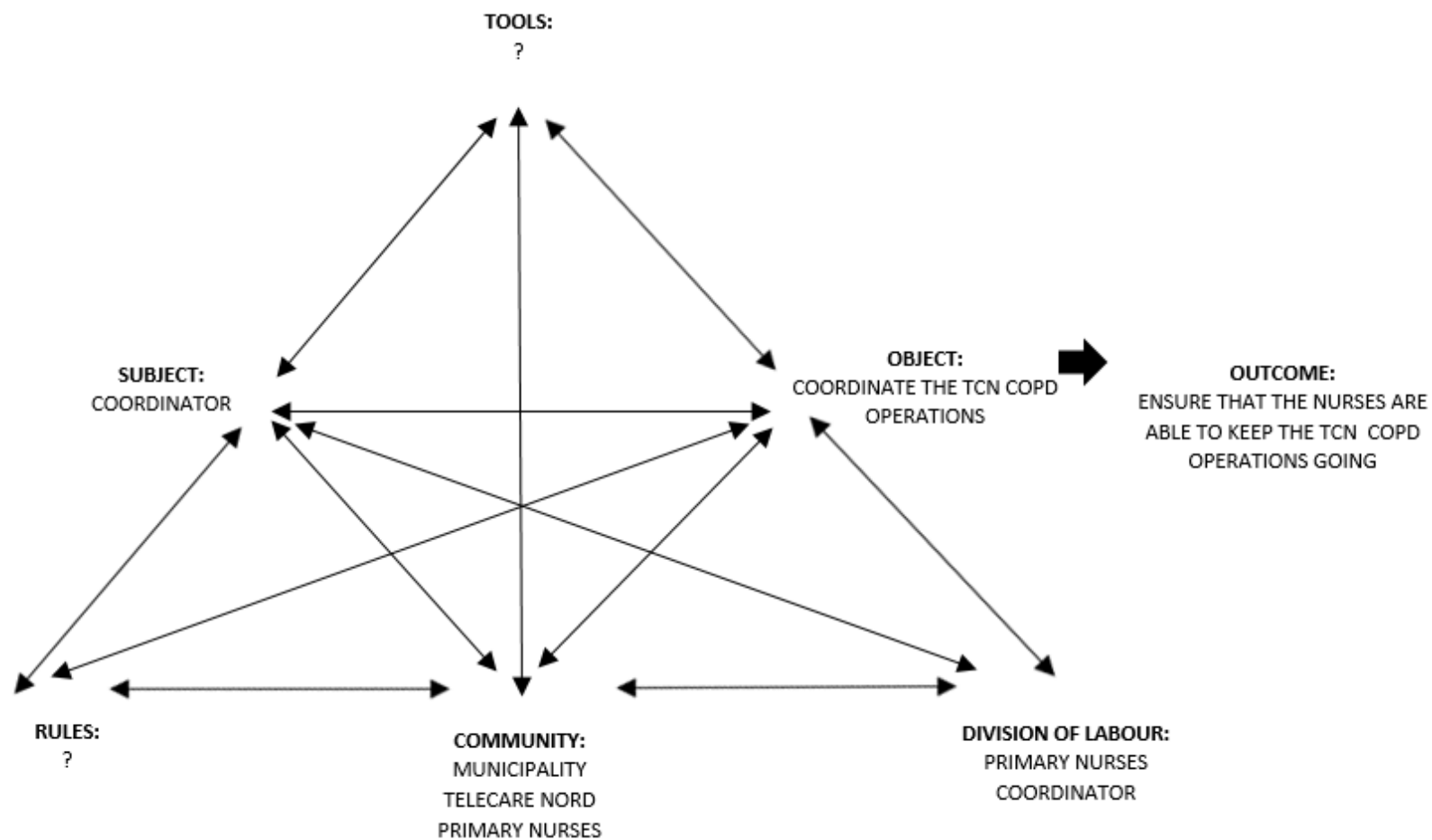
Figure 36: Activity system on coordinating the TCN COPD operations

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The activity system in figure 36 shows how the coordinator is involved in the TeleCare North COPD operations. The coordinator, **Subject**, is responsible for the coordination of the Telecare North COPD operation, **Object**, which have the **Outcome** that it is possible for the nurses to keep the operations going. The **Community** consists of the healthcare center and the nurses. The **Division of labour** consists of the coordinator giving the responsibilities for the daily operations to one of the nurses and that nurse is furthermore responsible for the communication with the TeleCare North secretariat.

In the interview conducted with the coordinator it was made clear that, her role in the operations was limited and that she trusts the nurses to keep the operations on the right track. During the interview (see appendix 5), we did not investigate what her other work tasks might consist of as we were only interested in the work practice that directly relates to the operations. The **Rules** and **Tools** have no input in this activity system and this stems from the fact that we were not able find this information.

3.1.6 GENERAL PRACTICE UNDERSTANDING (FREDERIKSHAVN)

While the interviews, contextual inquiry, thematic networks and activity systems provides a look into the work practice of the nurses and the coordinator of the TeleCare North COPD initiative this section will provide an understanding of their overall work practice in relation to Engeströms activity levels.

Looking at the work practice of the nurses on an *operation* level, it can be seen that it revolves around knowing how to use the different ICT systems. This being navigating the OpenTele system, the municipal documentation system and being able to use skype as to contact the citizens. In operating the OpenTele system it can be observed that choosing to notify the citizen that data have been looked at happens without question. The system does provide the opportunity to not notify the citizen that data have been looked at. This is most likely linked to the notion of

"Citizens need support/contact (see figure 13) and the notion of "Citizens become engaged when they see that there is follow-up on their results" (see figure 12). Furthermore, it can be seen from the contextual inquiry data (See figure 20 and 21) that taking notes with pen and paper while conversing with the citizens seems to happen automatically.

From an *action* level perspective, the practice revolves around looking at the citizens submitted data, the citizens medical history as can be seen in OpenTele and the municipal documentation system and using professional knowledge as to determine what course should be taken for each citizen. While it can be seen in the activity system concerning *viewing citizen submitted data*, that there is a contradiction concerning the ability to use the ICT systems as to determine the health state of the citizen, it can also be seen through the thematic networks that the nurses have adapted through using "detective" work and in-depth question techniques to determine the health state of the citizens.

The actions the nurses take also shows that it is not only the viewing of submitted data that is in focus, but it is also communicating with the citizens as to make it possible for them to care for themselves and to understand their health state. This means that the division of labor often concerns both the nurses and the citizen. While the nurses provide care, it is in the form of providing means for the citizens to help themselves.

As the activity systems provides information regarding the different activities that takes place in the practice, from an overall perspective it can be seen that the work practice of the nurses always centers around the citizens. The fact that the coordinator trusts the nurses to be self-sufficient in running the practice, it should be noted that the work practice in Frederikshavn (Sæby) uses the healthcare center as a mean to provide additional care. This is visible in the activity system concerning planning a meeting with a citizen. As the nurse sees an opportunity to make the citizen better at caring for himself or herself, the nurse invites the citizen to the healthcare center and

uses the resources at the healthcare center available to the citizen. This activity shows an advantage in not just seeing the practice of telemedicine as a singular operation, but as a springboard for the provision of additional care.

3.1.6.1 USE-CONTEXT

The overall practice of the nurses in the TeleCare North COPD operations in the municipality of Frederikshavn, shows that while it revolves around ICT systems, the main focus of the nurses lies in the relationship with the citizens. The OpenTele system provides the means for being able to make estimates of the health state of the citizen in question. The amount of different ICT systems used annoys the nurses and removes focus from what the nurses see as the main objective of the TeleCare North operations, providing care and help to self-help for citizens with COPD.

This section has the aim of using three principles of the activity checklist (Kaptelinin et al., 1999), **Means and Ends**, **Social and** **physical aspects of the environment** and **Learning, Cognition and Articulation**, to understand if the technology used by the nurses hinder or helps in performing the activities of their work practice.

The technology used in the work practice of the nurses in the TeleCare North COPD operations in the municipality of Frederikshavn are:

- **OpenTele**
- **Municipal documentation system**
- **Skype**

When looking at these ICT systems in relation the principle of **Means and Ends** it can be seen, through the activity systems, that each of the ICT systems are represented. Each of the systems facilitates the possibility for the nurses to be able to assess the health state of the citizens and help the citizens them help themselves. OpenTele makes it possible for the nurse to obtain information regarding the citizens health state, but as can be seen from the contradictions in the activity systems, the

information as presented in OpenTele only gives the nurse a hint of their health state. The system in itself does not provide the means for the nurse to reach the desired outcome of activities in the practice. The municipal documentation system provides the nurses with information regarding the patient, written by other healthcare personnel, both colleagues and from other organizations. This system does provide information on citizens earlier health state, which does facilitate activities in the work practice. Skype facilitate the activity of calling the citizen, which in turn makes it possible for the nurse to assess the current health state of the citizen. The nurse does not use skype as to see the citizen, and it can be seen from the thematic network that not being able to see the citizen can make it hard for the nurse to assess the citizens' health state. As the system does have the functionality of video conference, it is in this section not seen as the ICT system constraining the activity. It is through the combination of the three ICT systems that they can be viewed as a facilitator for the nurses practice.

In regard to the principle of **Social and physical aspects of the environment** the ICT systems provides the ability to create the social structures that forms the relationship between the nurses and the citizens. Furthermore, the systems provides a mean to work cross-sectoral which helps the nurses as health information on citizens shared.

The **Learning, Cognition and Articulation** principle comes into play when seeing the contradiction in the activity system about the nurse having a hard time assessing the citizens based on the data from OpenTele and the municipal documentation system. Because of this contradiction between the nurses and the ICT systems, the nurses have become "detectives" and uses in-depth questioning techniques to assess the health state of the citizen.

The overall practice of the nurses in the TeleCare North COPD operations in the municipality of Frederikshavn, shows that while it revolves around ICT systems, the main focus of the nurses lies in the relationship with the citizens. The OpenTele system provides the means for being able to make estimates of

the health state of the citizen in question. The amount of different ICT systems used annoys the nurses and removes focus from what the nurses see as the main objective of the TeleCare North operations, providing care and help to self-help for citizens with COPD.
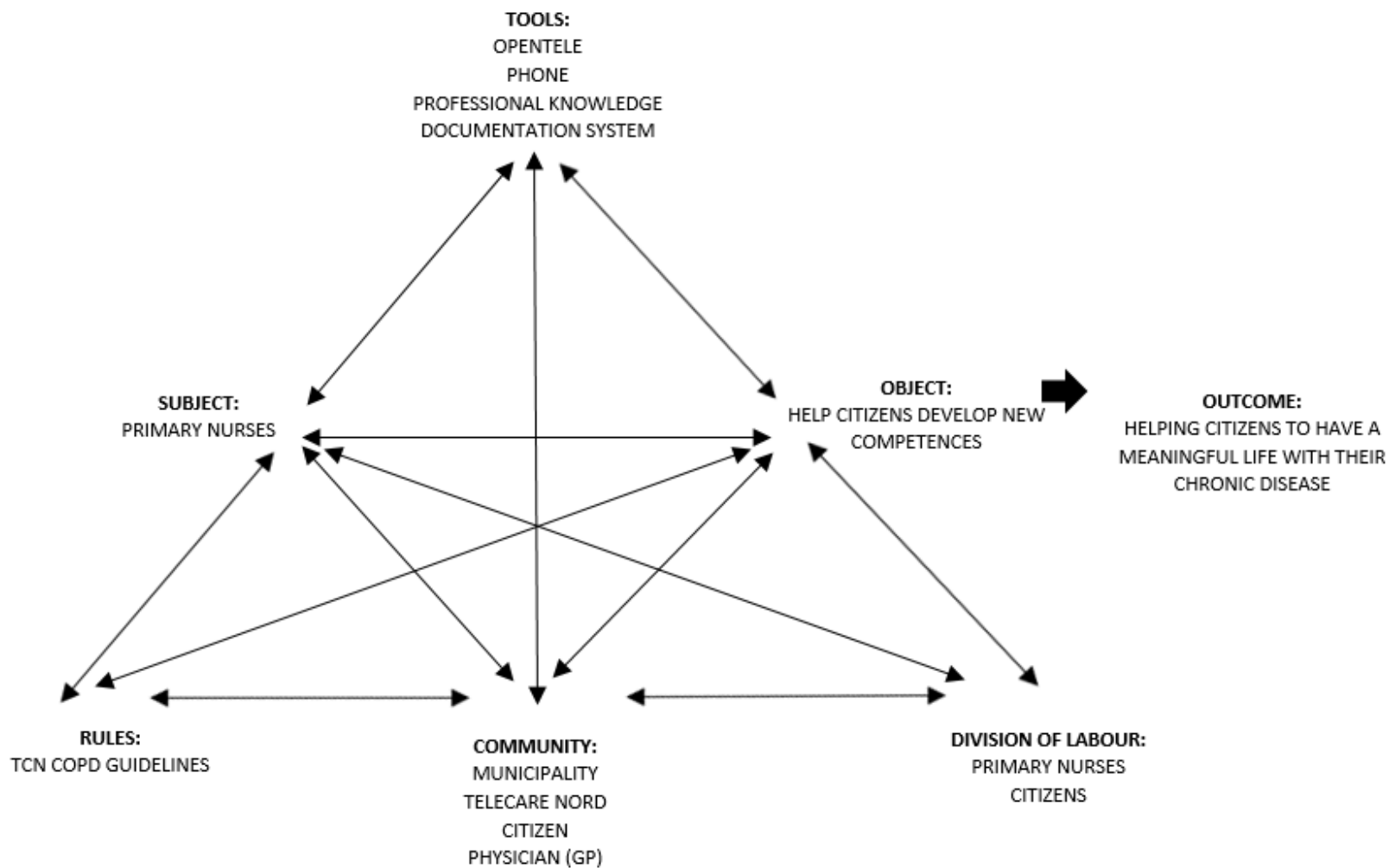
3.1.7 SUB-ACTIVITIES OF PRIMARY NURSES (AALBORG)

The analyses of the sub-activities of the four primary nurses we had as our research participants the municipality of Aalborg, will be presented in the following sections. As the data for these analyses are based the thematic network on the focus group interview we conducted, the analyses represent an understanding of the activities of all four nurses, as their individual answers were not treated individually.

3.1.7.1 HELPING CITIZENS DEVELOP NEW COMPETENCES

The first sub-activity analysis on the focus group of the primary nurses targets how they work with helping citizens enrolled in the TeleCare North COPD initiative to develop new competences

in regard to managing their disease. The activity system of this analysis is shown on the following page →

TOOLS:
OPENTELE
PHONE
PROFESSIONAL KNOWLEDGE
DOCUMENTATION SYSTEM

SUBJECT:
PRIMARY NURSES

OBJECT:
HELP CITIZENS DEVELOP NEW
COMPETENCES

OUTCOME:
HELPING CITIZENS TO HAVE A
MEANINGFUL LIFE WITH THEIR
CHRONIC DISEASE

RULES:
TCN COPD GUIDELINES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN
PHYSICIAN (GP)

DIVISION OF LABOUR:
PRIMARY NURSES
CITIZENS

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Figure 37: Activity system on helping
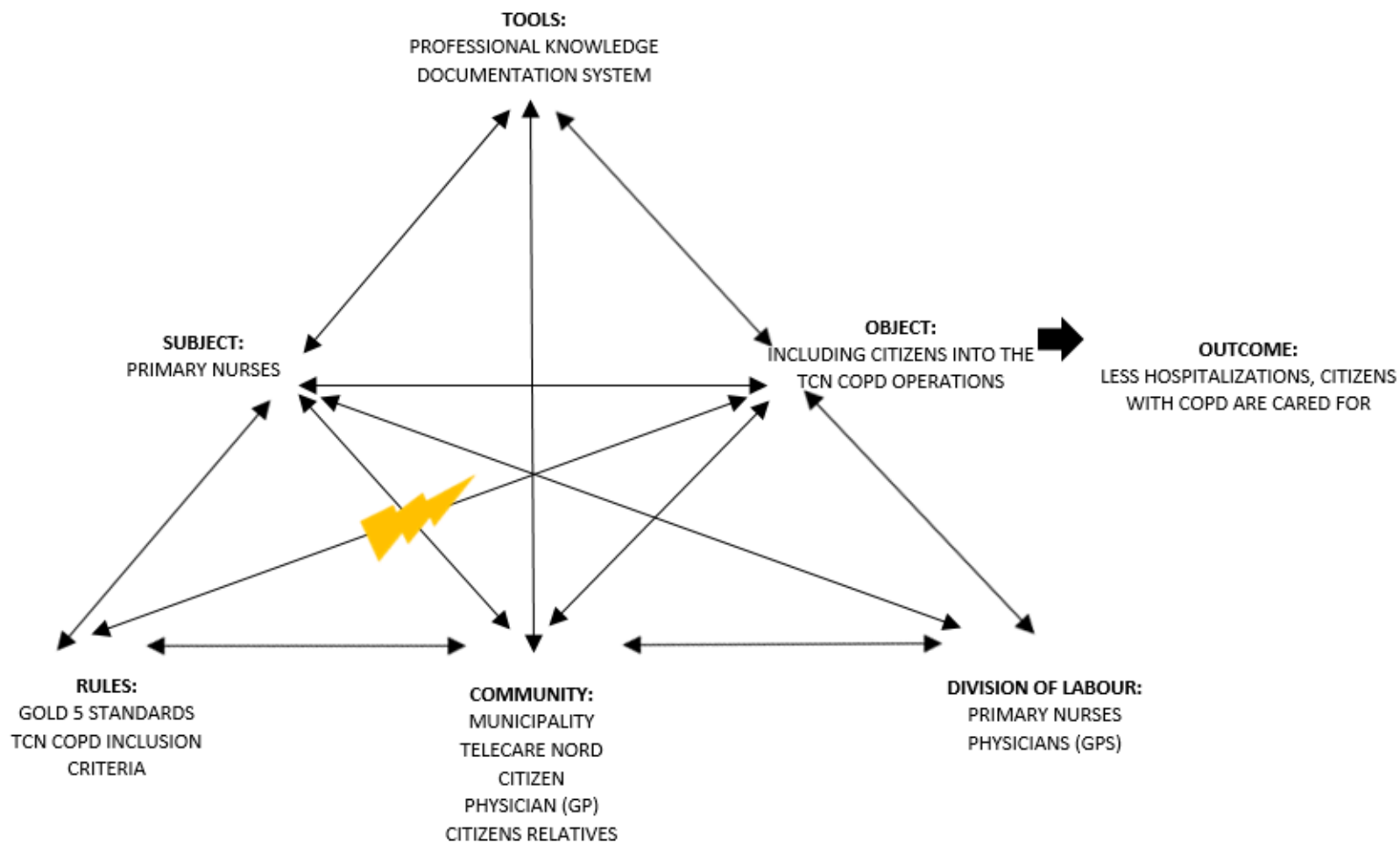citizens develop new competences

The activity system in figure 37 shows the Primary nurse is, **Subject**, in the activity of helping the citizen develop new competences in regard to their chronic disease, **Object**. The desired **Outcome** of this activity is that of helping the citizen to have a meaningful life with COPD. When looking at the thematic network (See figure 14) it can be seen that this activity is what the nurses, see as the primary goal of the TeleCare North COPD operations. The notion of "preventing hospitalizations" (see figure 14) also relates to the outcome of this activity as it is the hope of the nurses, that if the citizen is better able to care for themselves it also means that they will be hospitalized less. As to be able to perform this activity, the nurses uses the OpenTele system, the telephone, the municipal documentation system and their professional knowledge – **Tools**. Using these tools the primary nurse is able to understand the health state of the citizen and thereby provide the best guidance as for them to best be able to live with COPD. This includes newly submitted data as well as previously submitted data and the notes written in the municipal documentation system. As a citizens health is not only

the concern of the primary nurse, but also the citizen and his or hers physician, they all are a part of the **Community**. Furthermore, the healthcare center is a part of the community if the citizen is taking part in rehabilitation or otherwise have a connection to the healthcare center.

The **Division of labour** centers around the nurse, but as the outcome relies on the citizens participation, the citizen also takes part in the labour. This can also be seen in the notion "The citizens have a responsibility themselves" (See figure 14). The **Rules** of the activity is that of the TeleCare North COPD guidelines. No contradictions have been noted.

3.1.7.2 INCLUDING CITIZENS

The second sub-activity of the four primary nurses target how they include citizens in the initiative. The activity system is visualized on the following page →

TOOLS:
PROFESSIONAL KNOWLEDGE
DOCUMENTATION SYSTEM

SUBJECT:
PRIMARY NURSES

OBJECT:
INCLUDING CITIZENS INTO THE
TCN COPD OPERATIONS

OUTCOME:
LESS HOSPITALIZATIONS, CITIZENS
WITH COPD ARE CARED FOR

RULES:
GOLD 5 STANDARDS
TCN COPD INCLUSION
CRITERIA

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN
PHYSICIAN (GP)
CITIZENS RELATIVES

DIVISION OF LABOUR:
PRIMARY NURSES
PHYSICIANS (GPS)

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Figure 38: Activity system on including citizens into the TCN COPD operation

The activity of including citizens into the TeleCare North COPD operations, **Object**, is an activity that has the desired **Outcome** of lessening the amount of hospitalizations citizens with COPD have and furthermore, provides care for these citizens (see figure 14). When the primary nurse is the **Subject** of this activity, the nurse can recommend that citizens are included. This is done by informing the citizen of the operations and have them contact their own physician who can then include them – **Division of labour**. The **Rules** comprises of the TeleCare North COPD inclusion criteria which dictates that only citizen with sever COPD as described by the Gold standards are to be included. Though it can be seen from the notion under "Organization" in the thematic network (see figure 14), that special cases can occur, where citizens who do not have sever COPD can be included. This creates a contradiction between the rules and the object. This contradiction is further emphasized by the nurses believing that including citizens from all Gold groups would be much better than the current inclusion criteria (see figure 14).

The **Community** consists of the physician, the citizen, healthcare center as they all play a role in including a citizen into the operation. Furthermore, the relatives to the citizen are also part of the community as they can also become a part of the citizens' care.

3.1.7.3 REVIEWING CITIZENS SUBMITTED DATA

The primary nurses third sub-activity that will be analyzed in the framework of the activity system concerns how the nurses review the measurements citizen submit in OpenTele. The activity system is presented on the following page →
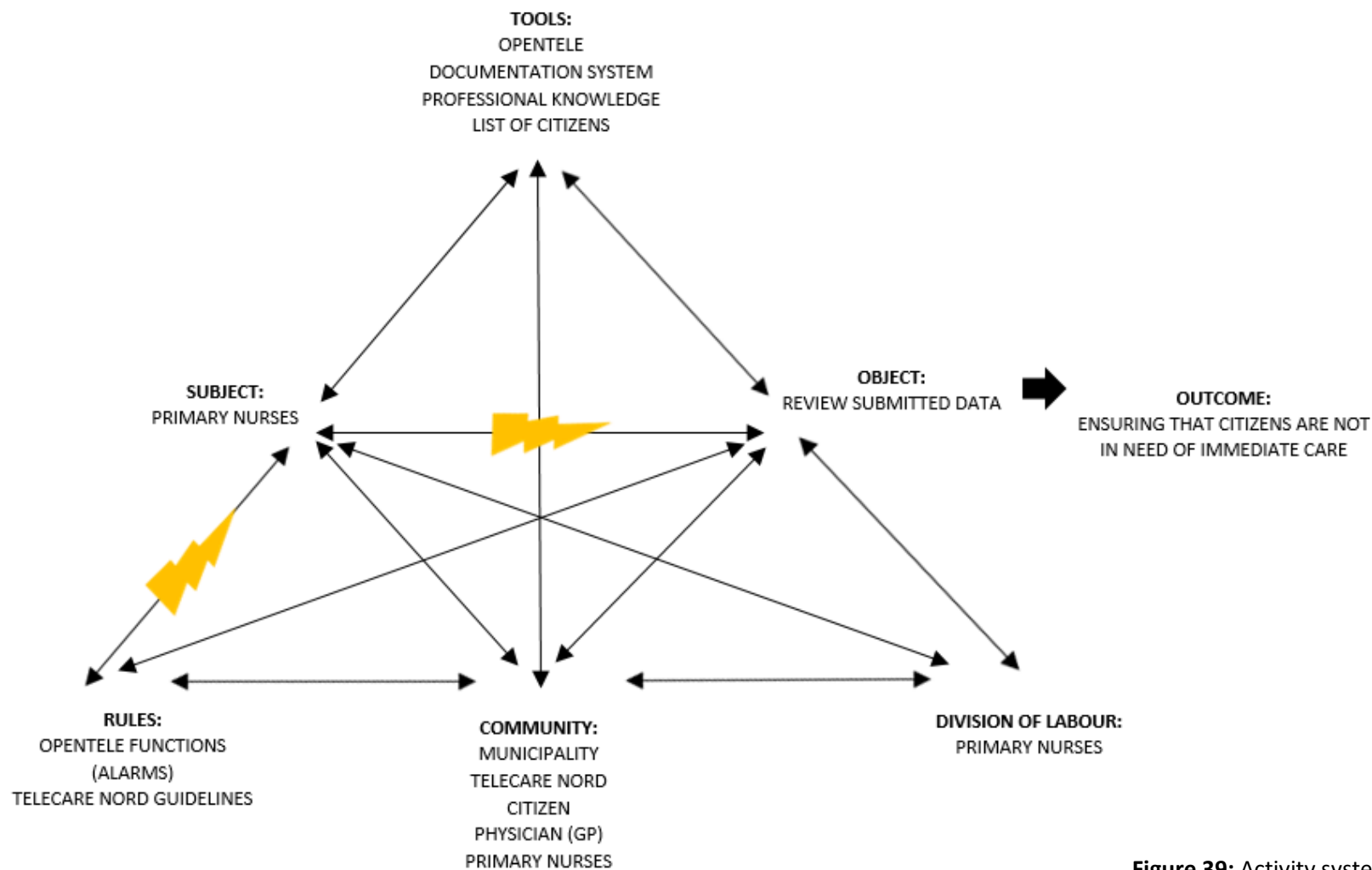
TOOLS:
OPENTELE
DOCUMENTATION SYSTEM
PROFESSIONAL KNOWLEDGE
LIST OF CITIZENS

SUBJECT:
PRIMARY NURSES

OBJECT:
REVIEW SUBMITTED DATA

OUTCOME:
ENSURING THAT CITIZENS ARE NOT
IN NEED OF IMMEDIATE CARE

RULES:
OPENTELE FUNCTIONS
(ALARMS)
TELECARE NORD GUIDELINES

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN
PHYSICIAN (GP)
PRIMARY NURSES

DIVISION OF LABOUR:
PRIMARY NURSES

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Figure 39: Activity system on
reviewing submitted data

The activity system in figure 39 shows the activity of the primary nurse, **Subject**, reviewing the data that the citizen has submitted through OpenTele. This is the **Object** of the activity. This activity is the foundation for the operations as the nurses' ability to help them care for themselves depend on the citizens submitting data through OpenTele.
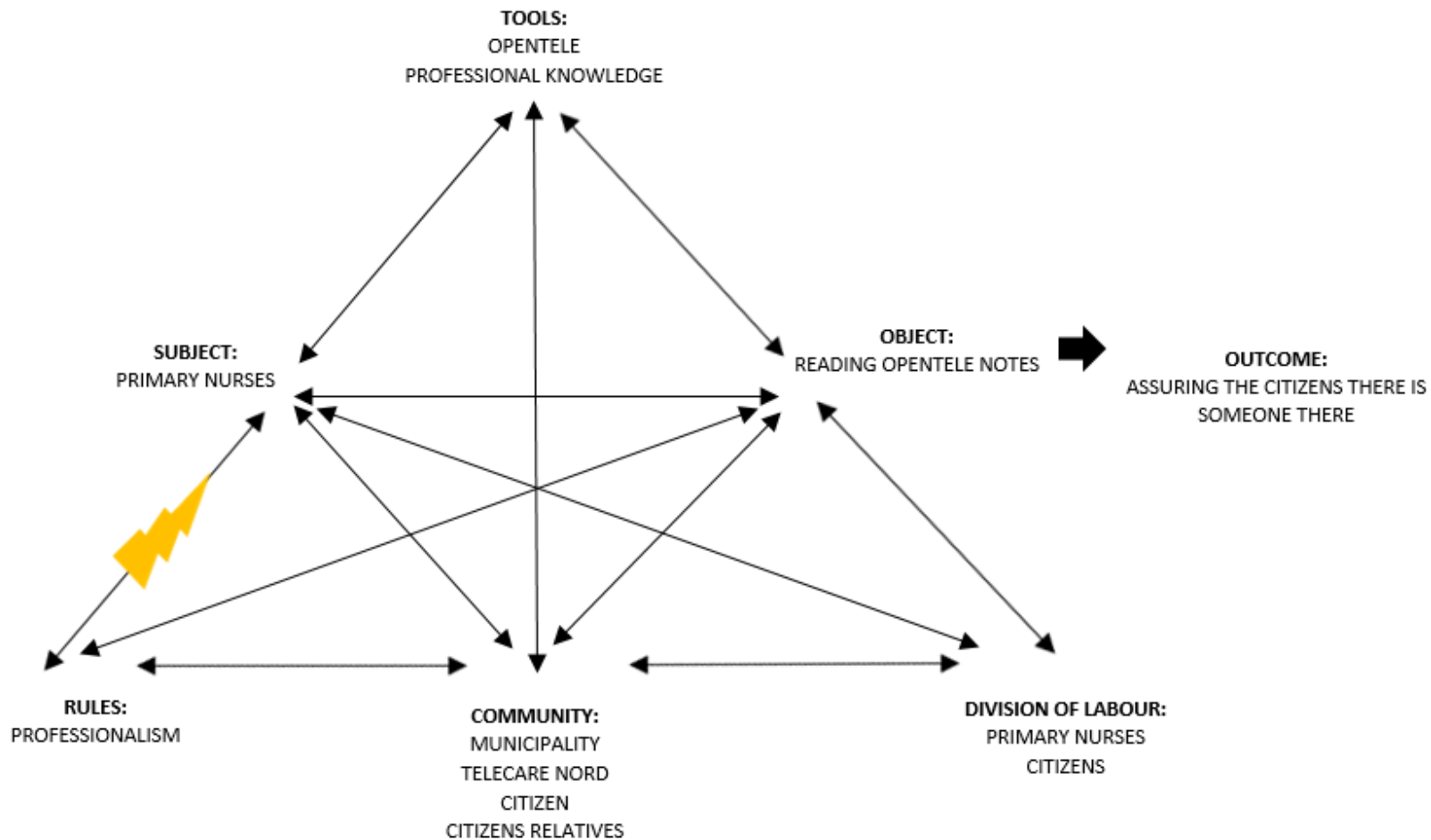
The **Outcome** of the activity is that of ensuring that the citizen is not in need of immediate care. As to be, able to perform the activity the primary nurse uses OpenTele, the municipal documentation system, professional knowledge and a printed list of all the citizens that are a part of the operations. These are the **Tools**. The printed list is a way for the nurse to have an overview of who have submitted data and when data have been processed the nurse crosses the citizen off the list. The order of which citizens' data is reviewed first is based on the alarm bells in OpenTele –The **Rules**. The color of the alarm bell has a recommended action as outlined in the TeleCare North guidelines.

The **Community** consists of the citizen, the citizens' physician and the nurses colleagues. In this activity system, there are two contradictions. The contradiction between the primary nurse and the object consists of validating the data submitted to OpenTele. During the focus group interview, (see appendix 6) it is explained that if citizens are scared of specific treatment or wants to present themselves as healthier than they are, the citizen will cheat with the data submission. As this provides a fake image of the citizen's health state, it implores the nurse to take contact to the citizen and do "detective work" (see figure 14) as to assess their actual health state.

Another contradiction is between the subject and the rules is about the alarm bells. An alarm bell might be red for a citizen even though the primary nurse is aware of why it is red and know not to react to it. This creates the issue that red alarm bells are treated differently depending on the primary nurses' knowledge of the citizen.

3.1.7.4 CHECKING NOTES IN OPENTELE

The fourth sub-activity of the primary nurses in the municipality of Aalborg targets how they work with the OpenTele chat-function in which the citizens can leave them messages and they reply. The activity system can be seen on the following page →

TOOLS:
OPENTELE
PROFESSIONAL KNOWLEDGE

SUBJECT:
PRIMARY NURSES

OBJECT:
READING OPENTELE NOTES

OUTCOME:
ASSURING THE CITIZENS THERE IS
SOMEONE THERE

RULES:
PROFESSIONALISM

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN
CITIZENS RELATIVES

DIVISION OF LABOUR:
PRIMARY NURSES
CITIZENS

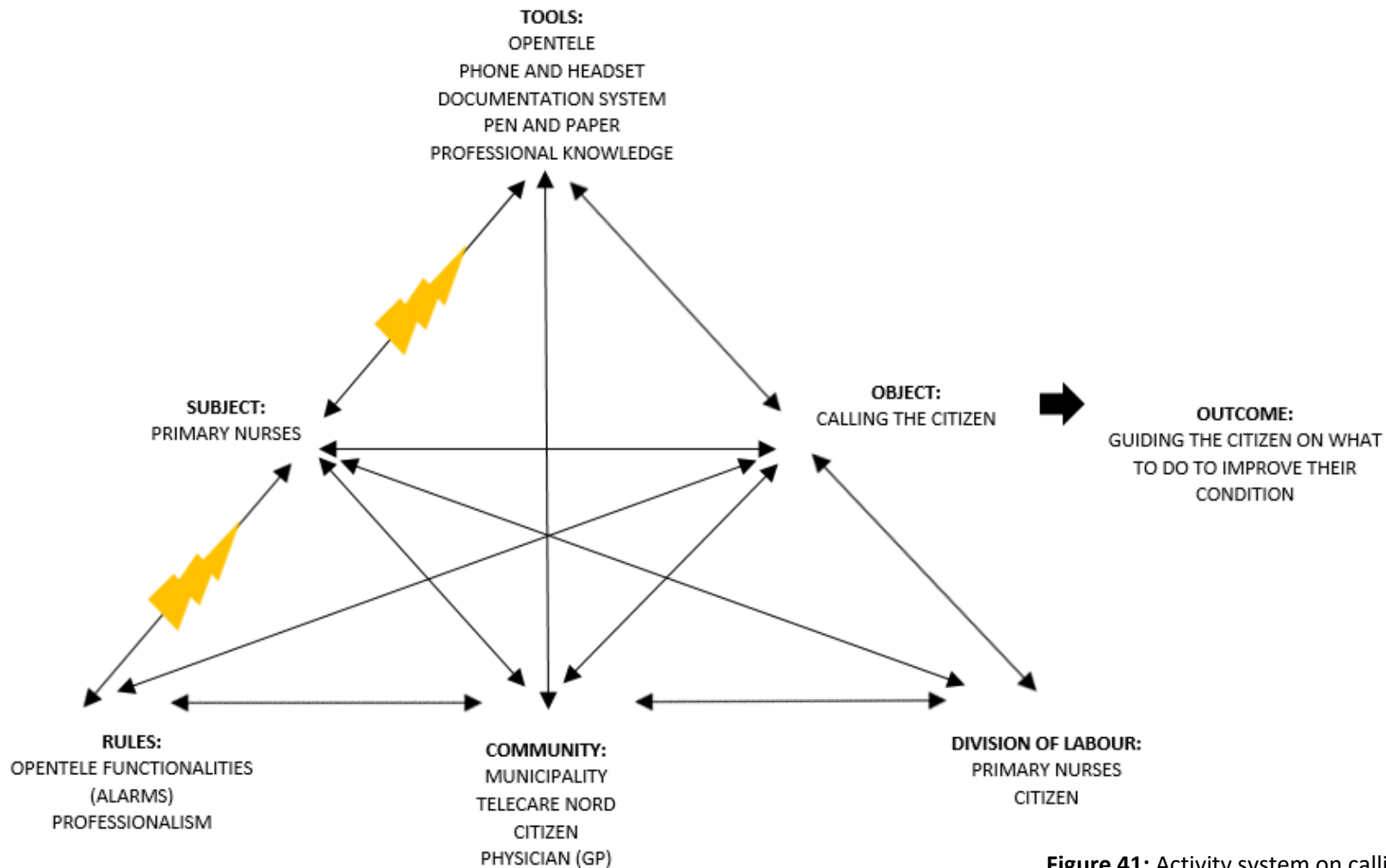**Figure 40:** Activity system on reading
OpenTele notes

In figure 40 the activity of reading notes in OpenTele, the **Object**, can be seen. The primary nurse, the **Subject**, performs the activity. The **Outcome** of the activity is that of letting the citizen know that there is someone there. The OpenTele notes do not dictate a certain way of communicating, thereby letting the citizen and the nurse communicate in the way they see appropriate. This leads to the **Rules** of the activity, which consists of professionalism. This should be understood in the way that the primary nurse should communicate in a manner that suits their role. This also leads to a contradiction between the subject and the rules. The notion of "We are not their friends" as seen in the thematic network (see figure 14) applies to this activity. As the notes in the OpenTele system does not enforce a professionalism in the nurses contact with the citizen, it is up to the nurse to apply this.

The **Divison of labour** is that of the nurse reading and writing notes. As the notes are sent to a citizen and can be written by the citizen and the citizens relatives they comprise the **Community** of the activity. The **Tools** consists of the OpenTele system and the professional knowledge of the primary nurse.

3.1.7.5 CALLING THE CITIZEN

The fifth and final sub-activity based on the thematic network of the primary nurses in Aalborg targets how the approach calling the citizens when they need guidance/supervision. The activity system is shown on the following page →

TOOLS:
OPENTELE
PHONE AND HEADSET
DOCUMENTATION SYSTEM
PEN AND PAPER
PROFESSIONAL KNOWLEDGE

SUBJECT:
PRIMARY NURSES

OBJECT:
CALLING THE CITIZEN

OUTCOME:
GUIDING THE CITIZEN ON WHAT
TO DO TO IMPROVE THEIR
CONDITION

RULES:
OPENTELE FUNCTIONALITIES
(ALARMS)
PROFESSIONALISM

COMMUNITY:
MUNICIPALITY
TELECARE NORD
CITIZEN
PHYSICIAN (GP)

DIVISION OF LABOUR:
PRIMARY NURSES
CITIZEN

Figure 41: Activity system on calling
the citizen

The primary nurse, **Subject**, will call the citizen if the data submitted implies that the citizens' health have deteriorated. The activity of calling the citizen, **Object**, can be seen in figure 22 and 23. The **Outcome** is that of guiding the citizen on what to do as to improve their condition. As to notice that the citizen's health have deteriorated, the primary nurses uses OpenTele. To call the citizen the phone and headset are taken into use. While talking to the citizen, the nurse takes notes in hand about the conversation. As to ensure the nurse understands the health state of the citizen, the nurse uses professional knowledge and a questioning technique. After the call the primary nurse uses the handwritten notes to input data of their conversation and the citizens health state into the municipal documentation system. These are the **Tools** of the activity.

The contradiction of the activity is between the subject and the tools. This has to do with the questioning technique. While the tools do not let the primary nurse see the citizen, the nurses describe in the focus group interview how they have become good at doing "detective" work as to ensure they understand the health state of the citizen. It is important to note that while there is a contradiction in the activity, the nurses also mention that they do not want there to be a camera and that the telephone is a fine tool for them to understand the citizen's health state (see figure 14). While the possibility of seeing the individual, they are to care for is a central part of the nurses understanding of their practice, they have through the activity of calling the citizens, changed the practice as to be able to care for the citizens without the possibility of seeing them. They describe this shift in practice as learning to become good "detectives".

The **division of labour** consists of the nurse calling the citizen and as the outcome of the activity is for the nurse to help the citizen make a change, do something differently or simply seek care at e.g. their own physician, the citizen also takes part in this activity.

The **Community** consists of the citizen and the citizens physician. The general practitioner's role in the activity can e.g. be seen in figure 22 and 23, where the nurse wants the citizen to take

contact to their physician as the citizen's health have deteriorated. It can also be seen here, that the nurse can also contact the citizens physician, if the nurse is worried about the citizens health state.

The **Rules** of the activity consists of the OpenTele alarm bells, as these are the starting point of the nurse worrying about the citizens health state. Furthermore, professionalism is also important to adhere too. In the thematic network (see figure 14) the following notion is present: "We are not the citizens' friends calling. Stick to the case". This clearly states that it is important for the nurse to have a good relationship with the citizens as to help them, but there is a limit. This creates the contradiction between the subject and the rules.
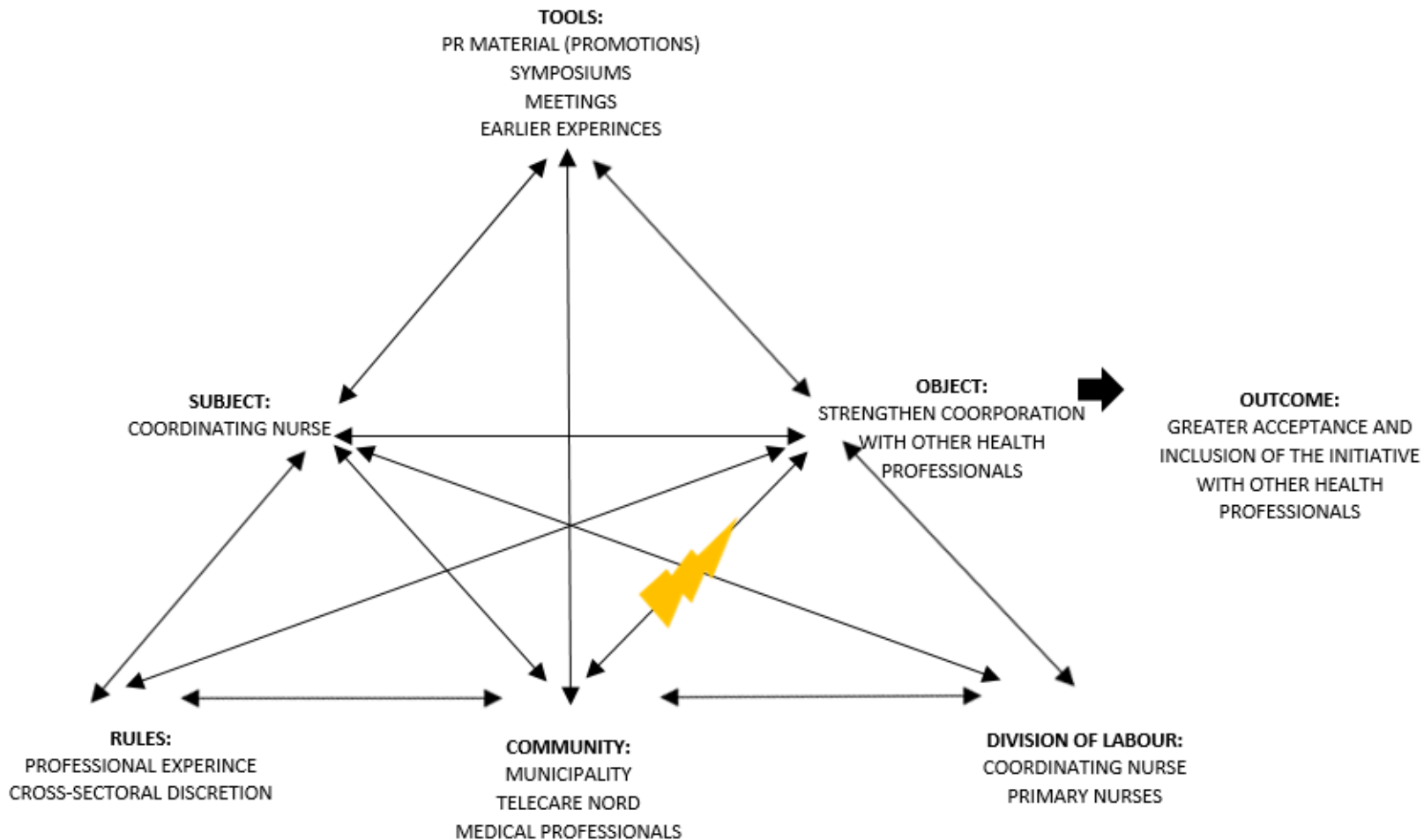
3.1.8 SUB-ACTIVITIES OF COORDINATING NURSE (AALBORG)

The following sections holds the analyses of the primary sub-activities of the coordinating nurse working in the TeleCare North COPD initiative in the municipality of Aalborg. The activities will be analyzed in the activity system in the same manner as the previously introduced sub-activities.

3.1.8.1 STRENGTHENING THE COORPORATION WITH OTHER HEALTH PROFESSIONALS

The first sub-activity of the coordinating nurse working in the TeleCare North COPD initiative in the municipality of Aalborg revolves around her working on increasing the awareness on TCN KOL in relation to strengthen the coorporation with other healthcare professionals. The figure on the activity system can be seen on the next page →

TOOLS:
PR MATERIAL (PROMOTIONS)
SYMPOSIUMS
MEETINGS
EARLIER EXPERINCES

SUBJECT:
COORDINATING NURSE

OBJECT:
STRENGTHEN COORPORATION
WITH OTHER HEALTH
PROFESSIONALS

OUTCOME:
GREATER ACCEPTANCE AND
INCLUSION OF THE INITIATIVE
WITH OTHER HEALTH
PROFESSIONALS

RULES:
PROFESSIONAL EXPERINCE
CROSS-SECTORAL DISCRETION

COMMUNITY:
MUNICIPALITY
TELECARE NORD
MEDICAL PROFESSIONALS

DIVISION OF LABOUR:
COORDINATING NURSE
PRIMARY NURSES

Figure 42: Activity system on strengthening the coorporation with other health professionals

The **subject** of the activity is the coordinating nurse. The **object** is to strengthen the coorporation with other health professionals who also have an important function regarding the success of the initiative, such as GPs and nurses working at the local hospitals. The notions on this are f.x.; 'Cross-sectoral coorporation with healthcare staff', 'Increase the awareness on TCN KOL (GPs and citizens), 'Coorporation with GPs should be solid', 'Coorporation with the hospitals so we know we can count on each other', 'Make a professional network with other health professionals' and 'Carry out the information dissemination'.

The **tools** the coordinating nurse has available in working on strengthening the coorporation with other professionals are PR and marketing material, attending symposiums, meetings with other professionals and her prior experience with the TELEKAT initiative. The notions targeting the tools are f.x; 'PR on TeleCare North COPD (Promotion)', 'Participating in symposium on TCN KOL', 'Meeting with lung-nurses 2 times a year', 'Making material for campaigns on TCN KOL', 'Draw on earlier experiences' and

'Experiences from TELEKAT was a resource'. It is our assessment that the coordinating nurse in the municipality of Aalborg is much involved with the communication aspect of TCN KOL in regard to making strategies and material on how knowledge on the initiative can be spread to the relevant people. The coordinating nurse draws on both physical tools such as PR and marketing material such as posters (see appendix 8 for an example) but also non-physical tools such personal attendance and involvement.

The **rules** affecting how the coordinating nurse can carry out the activity are primarily founded in her own professional experience as a pointer and cross-sectoral discretion in regard not to offend any of the professional target groups. The notions on this are f.x.; 'Draw on earlier experience', 'Experiences from TELEKAT was a resource' 'Difficult to coorporate with GPs', 'Problems in coorporation with GPs' and 'We do not wish to take over the GPs function'. We assess that the rules of the activity are influenced by a certain skepticism from the local GPs in regard to

telemedicine excluding them from the care of the citizen. This is something that the coordinating nurse is very aware of in relation to how she promotes the coorporation with GPs. However, her experience from working with telemedicine prior to TCN KOL grants her bigger insight in how to reach the object despite of any such obstacles. The **community** influencing the activity consist of the municipality, TeleCare Nord, medical professionals and citizens. The notions on this are f.x; 'We do not wish to take over the GPs function', 'What is it that the municipality can offer? We need to make that clear', 'ERFA-meetings strengthen our knowledge and we can share experiences' and 'ERFA meeting is a way of following up on the initiative'. As mentioned in relation to some of the previous elements that coordinating nurse needs to take into consideration both the municipal framework, the regional guidelines and practice a certain discretion in relation to other health professionals not feeling undermined by the initiative. The **division of labour** is between the coordinating nurse and the primary nurses working with the initiative. Based on the same notions as above, the coordinating nurse is responsible for different communicative rollouts, but the nurses collaborate on planning/designing the material or participating in meetings/conferences.

The **outcome** of the activity is that the coordinating nurse feels that there is a growing acceptance of the TeleCare North COPD initiative and the purpose of telemedicine in general. This is despite the reluctance that she expresses they still meet from primarily GPs, on which it has been noted; 'Difficult to coorporate with GPs' and 'To little involvement of GPs in the project phase'. This disturbance is marked in the activity system between the elements community and object.

3.1.9 GENERAL PRACTICE UNDERSTANDING (AALBORG)

As in the analyses of the nurses activities in Hjørring and Frederikshavn, we will culminate the sub-activity analyses of the nurses working in the municipality of Aalborg with our perspective on their general practice. The general practice understanding will in the same manner as in the analyses be

argued from Engeströms activity levels, to provide an overview of the practice as we have seen it performed by the nurses and how the nurses themselves have introduced us to their thinking patterns in relation to the specific activities they engage in.

On the **operational level** the data and different sub-activity analyses show that the nurses general work practice in the auspices of the telemedicine initiative is mostly founded in using the different technologies like the OpenTele system, phone/Skype and municipal documentation systems. The nurses primarily use the OpenTele system as a primer for further contact with the citizens. Both OpenTele and the municipal documentation system are used to obtain and embed knowledge on the citizens enrolled in the initiative. Furthermore, the nurses in the municipality of Aalborg are very focused/aware of the communicative aspect of the TeleCare North COPD initiative in regard to how others perceive it, whit a special emphasis on healthcare professionals. The communicative/promotional elements are in our assessment fairly determined in relation to

how they are performed; f.x. attending symposiums and meetings. Some of the nurses working in the initiative in the municipality of Aalborg are also non-technologically involved, as the home-nurses have a special outlook on the weakest citizens, as an extra element to the telemedicine treatment.

It is our assessment that a lot of the knowledge gained from the operational level needs to be reinforced on the **action level** for the nurses to be able to react on it. There are individual cognitive routines associated with almost activities in which the nurses engage. We find that from the activity analyses, thematics networks and sequence diagrams it can be argued that these routines are much alike, even though they are bound to how the individual nurse practice her professionalism. The cognitive structures revolve around how the nurses approach the citizens different needs for guidance/supervision such as helping citizens to develop their own competences and general compliance in relation to their illness, as well as handling psychological/emotional aspect of the consultation. The nurses

have to develop their senses in relation to their traditional ones (seeing, feeling, smelling) being weakened or completely inhibited by the technological set-up. Another aspect that we find important to address in relation to the results of the activity analyses and notions from thematic network is because of their more pedagogical/education approaches in helping the citizens, there is a need for them to develop a certain professional distance as to how to react to citizens emotionally, as they state, they are not the citizens friends calling. Based on the activities this emotional barrier is also coined on the individual nurse, who can develop her own professional guidelines within the initiative framework. In relation to the communicative aspects of the nurses practice on the action level, they need to think through how they present themselves and the initiative in regard to building relations with other citizens. This is founded in how they perceive the current coorporation with other healthcare professionals, which they are trying to develop by finding ways to communicate the initiative as rewarding/beneficial instead of a burden to the healthcare sector.

3.1.9.1 USE-CONTEXT

Regarding the elaborate our understanding of the technologies impact on the nurses overall practice in the TeleCare North COPD initiative the principles of 'The Activity Checklist' will be used, alike the previous analyses. The technologies included in the Aalborg nurses general practice are:

- OpenTele
- Phone
- Municipal documentation system

We find that in relation to the **ends and means** principle the technologies suit the general use-context, as the OpenTele system functions as a catalyst for the nurses to further investigate the citizens condition and thereby determines how they chose to act. It is our impression from the different sub-activity analyses, notions in thematic networks and sequence diagram, that the nurses use the phone as their primary tool for their consultation. Through the telephonic communication, the nurses are able to enact their individual professional approaches

and are within the framework of the initiative allowed much individual room in regard to how they carry out the activities. The **social and physical aspects of the environment** do in our assessment also call a certain mutability between the nurses practice on the operational level and on action level, as the operations themselves are very simple, but the action level is more complex regarding rethinking and reinventing cognitive patterns in relation to the changeability in the activities. This changeability is in our assessment embedded in the individualistic approach and in the nature of the activities themselves, as the nurses must handle each citizen differently due to their psychological/emotional. The OpenTele system does not directly support the social aspects of the environment, but is a source for the nurses to gain the information on the citizens that they need in order to take further action. The nurses phones/Skype are in our assessment the most valuable tool in relation to both the social and physical aspects of the environment as it allows for them to reach the citizens from a distance and facilitates a more detailed communicative channel

in regard to the nurses providing the citizens with guidance/supervision. However, the Aalborg nurses have another advantage as they have included the home-care nurses, who secures the initiative for the weakest citizens. In relation to the **learning, cognition and articulation principle** we find that the data and analysis results show that the limits that the technologies set for how the nurses approach the citizens are catalysts for them developing already inherent competences such as their professional question technique. Both the activity analyses of the nurses different sub-activities and the notions from the thematic network support our understanding of the nurses feeling that one of the most rewarding tools in overcoming the limitations of the technologies in regard to their senses is a detective approach and a refined question technique. It is our assessment that the learning, cognition and articulation principle is strongest in the nurses handling different citizens as they get to know how they operate/react.

3.1.10 OVERALL PRACTICE (ALL MUNICIPALITIES)

The purpose of this section is to provide an overview of what our understanding is of the nurses overall practice in relation to the findings from general practice understanding of each municipality in a comparative manner. We find it necessary to define similarities and differences to outline what aspects of the three general practices as defined in sections 3.1.3, 3.1.6 and 3.1.9 that we assess are important in understanding how the technological framework of the initiative influence the role of the nurse(s).

Figure 43 visualize how we merge the general practice defined for the nurses in each municipality (consisting of their respective sub-activities) in order to define one conjoined overall practice understanding that we assess are representative for all research participants. The main purpose of why we have chosen to study the practice of three different municipality is to increase the generalizability in our understanding of telemedicine's influence on the role of the nurse, still with respect for the individual approaches as advocated in the sub-activity analyses.
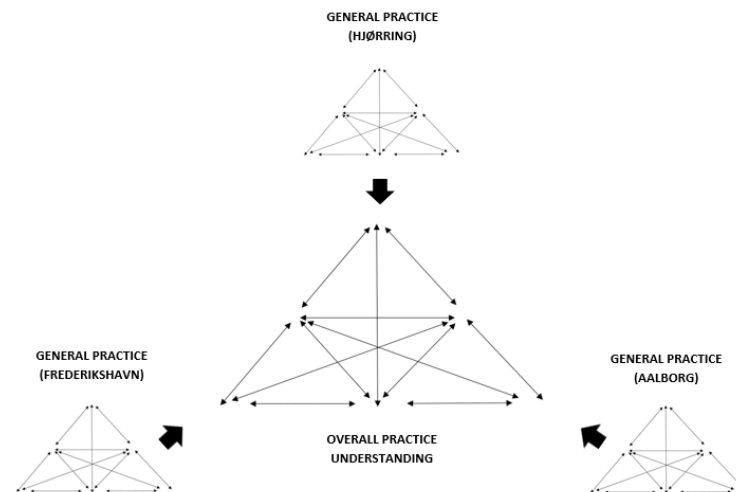
Figure 43: Elements in defining the overall practice of the nurses

On the surface the three general practices are in our assessment very alike, respectively due to the initiative guidelines that the nurses in each municipality are to follow, but also because the

technological set-up is very simple and the main activities revolve around reading data (measurements) and act upon what they find. This can be seen in comparing the aspects from the operational level from the three general practice understandings ,where the nurses all perform the same physical operations with some minor differences. In relation to the sequence diagrams we find that many of these operational differences originate from how the local set-up in each municipality prescribes the framework in which the nurse can act. Some of the nurses handle the consultation of the citizens purely over the phone, while others complement the digital contact with inviting the citizens for personal meetings if this is deemed necessary. The framework is in our understanding predominantly defined by the nurses professional affiliation in regard to working from a health-center, in home-nursing etc.

However, on the action level we find that the different general practices show that the nurses individualism also has a big influence on how they operate within their local and the initiative framework. As it can be seen in many of the previously presented sub-activities on each of the nurses understand their work and functions as being founded in guidance/supervision of the individual citizens which emphasizes that the nurses practice involves certain educational and pedagogical elements, that might be more profound than in traditional medical set-ups, due to the technology conditioning how the nurses communicate with the citizens. We find that increasing the quality of the citizens life with their condition, both by making them take ownership of their participation in the initiative and become self-aware in relation to their symptoms. Furthermore, the nurses feel a strong responsibility in relation to the preventive effect of the initiative.

The importance of the abovementioned elements in relation to defining a shared practice perspective of the nurses based on the general practice of each municipality is not only prominent from the activity analyses, but also the data matrix as presented in section 2.5.2. The matrix shows that the themes Organization,

Purpose, Professionalism and Effect are throughout themes for all or the majority of the research participants. Looking into the notions from the thematic networks targeting themes such as organization and purpose of the initiative it is our assessment that the nurses feel a deficiency in relation to the preventive aspect of the initiative, as the express that most citizen enrolled in are too ill to actually prevent aggravation, and that they would like to see citizens with moderate COPD were allowed in the initiative, as their professionalism tells them that this is where the prevention can really be implemented. In relation to themes such as professionalism and effect we find that the general practices all reveal that the link between the nurses professionalism and the effect of the telemedicine treatment seem to be of great importance as the nurses how the nurses approach the citizens and how they chose to accept this is paramount for what the citizens gain from participating. Besides from reading weekly measurements and informing the citizens about this, we find that there is a consensus of a greater good of the initiative between the nurses in relation to enhancing the citizen compliance regarding their illness. The synthetization of the different general practices, notions from thematic networks and data matrix does in our assessment give insight to a more complex practices practice on the action level, than what can be seen on the operational level. We assess that this action complexity is rooted in the professional individualism that we find is one of the main characteristics of the nurses practice. This individualism demands that nurses must develop their own approaches within the set framework, considering aspects like how to connect and communicate with the citizen, how their relation should be constituted f.x. regarding how to keep a professional distance while being involved with people who are not only physiologically but also can be psychologically vulnerable in regard to their condition. The overall practice of the nurses from the three municipalities in the TeleCare North COPD initiative can in our assessment be summarized as providing care from a supervision perspective with an emphasis on the value of and faith in professional individualism within the initiative /local framework.

4.0 DISCUSSION

4.1 OUTLINING THE REASERCH FINDINGS

The following sections contain the discussion of our findings from our data analyses and activity analyses. The elements of the discussion are outlined by our research objectives and will function as a transition for answering the problem statement of this thesis in chapter 5.0. The different findings on the research objectives will also be discussed in relation to our methodological and theoretical framework as to identify advantages and weaknesses in the different approaches and the data they have provided us with.

4.1.1 DEFINING THE LOCAL SET-UPS

After collecting data on each of three municipalities, it became clear that, they had adopted the general practice set-up from the TeleCare North COPD project. Then again, it can be argued that the more detailed practice setup is different for the three municipalities. Both the municipality of Hjørring and Frederikshavn uses have the primary nurses working at the

healthcare center, where as the municipality of Aalborg have the primary nurses working at the homecare department. While this may not seem like a big difference, the difference lies in how they met and create relations with the citizens. The primary nurse in Frederikshavn uses the resources of the healthcare center to provide additional care, which we will argue is an improvement of the practice from the perspective of the citizen. Furthermore, the rehabilitation initiatives the municipalities offer to citizens with COPD are also centered on the healthcare center, which provides a relation between the healthcare center and the citizen. This means that the healthcare center becomes the center of COPD intervention and care. Having the primary nurse working at the homecare department have the benefit of connecting the primary nurse with the homecare nurses and the citizens homes. We argue that the relation between the primary nurse and the citizen is different from the other two municipalities as the primary nurse will have a closer relation to the citizens home and thereby a more in-depth understanding of factors associated with their living facilities. We cannot and will

not conclude whether one organizational setup can be seen as better than the others, but we can argue that the different setups have different effects on the primary nurses work practice.

4.1.2 TOWARDS AN OVERALL PRACTICE

Through the different methods used for data collection and analysis we have attempted to obtain knowledge that we found could be furthered in regard to our activity theoretical approach. As mentioned in the sections on the research paradigm of this thesis the knowledge we have worked with in our practice study is founded in a tension field between individual cognition and sociocultural structures, as emphasized by our activity theoretical approach in understanding the practice of the nurses and the conditions influencing it. To be able to define an overall practice we assess is representative for all nurses we have studied in the auspices of this thesis, our research design has emphasized that the data of each nurse has been treated individually and culminated in a comparative summarization on

all findings. It is our assessment that this approach of analyzing the datasets individually with the purpose of comparing them have been a giving yet very comprehensive method, as the analytical review of each dataset has been as similar as possible to secure the basis of comparison all datasets. It has been difficult to get around the comprehensiveness of the data analyses presented from the strategy we have chosen, and to be critical towards our approach it might have been just as rewarding to summarize the data analysis by focusing more on the overall practice of each municipality from a start. However, we find that reviewing the individually based analyses provides an understanding of what elements we understand the nurses general practice from, and there is a clear coherence between what can be defined from the operational activity level and the action activity level.

Based on our methodological and theoretical approaches we assess that defining an overall practice of the nurses working in the TeleCare North COPD initiative has been possible as we have

been able to identify similarities and differences from the analyses of the different sub-activities each nurse engages in, and use these in developing an understanding of the general conditions of their activities. The themes and underlying notions of out thematic networks have been important in capturing important elements of the interview with the nurses. However, from the nature of the method we have found it difficult to put all of our findings into use in regard to the activity analyses, as much of the knowledge embedded in the networks that does not target activity, but thought patterns and opinions about different aspects of the TeleCare North COPD initiative. As we found that many of the themes and notions have been relevant in regard to defining an overall practice perspective, as many of the activities that we have treated in the analysis mainly revolves around acting on cognitive structures and patterns, with basis in the individual nurse's professional profile and competences.

As the comparative aspect of the activity analysis shows there is a unanimous understanding of the nurses functions in the initiative as well as how citizens may be approached to comply with this function. From our three general practice understandings, it is can be understood that the one of the elements of their overall practice mostly concerns providing citizens medical assessment and general advice on how to relate to their symptoms. This is what their practice in our assessment reflects on the outside, and thereby the operational level can seem very simple in regard to what physical tasks that are actually performed in their practice. The sequence diagrams made from the observation data collected during our contextual inquiry session has been a way of defining the visible elements of the activities the nurses carry out when consulting a citizen, along with what thought they have when engaging a certain activity. We find that the sequence diagrams support the simplicity of the surface of the nurses practice. However, there is another and in our assessment more important aspect of this practice that is not happening on the operational level, but on the action level, and that is the importance of pedagogical and educational elements from which the nurse approach the citizen.

This is the aspect of the practice that the beforementioned complexity is founded in, and what can make it difficult to define an overall practice understanding applicable for all the nurses studied in this the auspices of this thesis.

As it can be seen from the sub-activity analyses many of the nurses address the same topics in regard to how they guide/supervise the citizens and a competence such as their professional assessment is both an important factor in reading and understanding the citizens condition, but also in relation to investigating what the individual citizen want and need and figure out how to help them on their own premises. We find that knowledge on how to react for and with the citizens on their premises is one of the key aspects of the nurses overall practice, which is also very bound to the individual nurse. We have attempted to identify the generalizable elements of the nurses practice in section 3.1.10. We assess that from this we cannot clearly define how this practice plays out and what the rules of it are, as the practice is primarily performed from a cognitive pattern belonging to the individual nurse. In our assessment, the relation between explicit and tacit knowledge in this practice study has also highlighted that there is a strong flexibility in how the nurses act within the initiative and local framework, which is something that we initially thought would be of more established and governed by initiative policies. In our assessment, the data from our thematic network and activity analyses show that many of the nurses feel a certain liberation in working with telemedicine, as they can structure their own time in relation to each citizens specific needs and we find that this might enhance their professional satisfaction. This is also one of the aspects of our analysis that we find interesting in relation to understanding how telemedicine influence their professionalism, as it seems there is more room for the individual nurse to compose her own professional approach in working with the initiative, which we find most significant for the nurses overall practice.

4.1.3 THE TRIFL OF THE NURSING DISCIPLINE

As mentioned in the previous section on how we have approached defining an overall practice for the nurses working in the TeleCare North COPD initiative based on the nurses who we have studied, individualism is one of the key aspect of how the nurses carry out the different activities. Not saying that the nurses do not have an environment in which they spare with their co-workers, but this has not been a focus is this study as most of the activities which constitutes the practice are carried out individually, and we have not targeted the community of practice aspect in this study.

From the activity analysis and in the notions from the thematic networks we assess that certain elements of the nurses professionalism are directly triggered/furthered from the technological settings and thereby from working with telemedicine. As we have not conducted a comparative study of the difference between "traditional nursing" and "telemedicine nursing" we do not have the empirical basis for commenting on whether the nurses professionalism can be characterized differently from working in one of the two. We understand telemedicine as a branch of nursing, which implies that the nurses working with it are specialized, as nurses are in many other fields. What we find that we can state something on in regard to how the nursing discipline thrives in the technological settings of telemedicine in the auspices of the TeleCare North COPD initiative is how the nurses patterns of action are influenced and what this might imply for their professional self-perception and thereby the care they provide the citizen with.

5.0 CONCLUSION

Through our use of qualitative methods and an activity theoretical approach in understanding how the work practice of the nurses working in the TeleCare North COPD initiative is manifested one and a half year after end project period, we have obtained knowledge on several physical and non-physical elements conditioning this practice.

By studying the local set-ups for the municipalities of Hjørring, Frederikshavn and Aalborg we have found that across the three municipalities the project set-up has been continued with minor modifications regarding factors as f.x. openness towards enrollment of citizens outside the inclusion criteria. The biggest differences in the set-ups of the studied municipalities are where the telemedicine functions are placed in relation to different health areas such as the health centers or home nurses. Based on our data it can be said that the local set-ups are primarily constituted by the influences of the situation of the telemedicine functions, which also determines what professional profiles are working in the initiative and thereby what specialized knowledge the practice is founded on. In relation to the foundation of the nurses practice in the auspices of the TeleCare North COPD initiative our study shows that the activities of the nurses in the three municipalities are very similar on the operational level and mainly concerns reading and reacting to citizens submitted data in the OpenTele system. On the action level the activities of the studied nurses however seem to be bound by a professional individualistic approach, as many of the activities implies that the nurses assume a guide/supervisor role in helping the citizens. This aspect of the activities revolves around communicating with the citizens, where the nurses phone/Skype is the main channel for doing this. The activities of the nurses are therefore somewhat elevated from the framework of the main software (OpenTele) and manifests in what pedagogical/educational approach the individual nurse cognitively has developed from handling different citizens. Even though the activities and how they are carried out by the nurses is very bound by the relation between nurse and citizen and the nurse's approach we find that we have been able to identify some generalizable elements of

the analyzed activities. The objectives of the nurses activities are on an overall basis the same, and primarily targets making citizens feel secure, take ownership, comprehend and increase their compliance in relation to their illness. What factors influence how the nurses are able to carry out an activity are also generally the same and tools such as the OpenTele system, phones and more importantly the nurses professional assessment, communication and questioning techniques are throughout for all the studied nurses. The same applies to other activity factors such as rules and community as the nurses individually operates from the same initiative guidelines answering to the same groups, where we assess that the citizens have an important role in both the rules, community and division of labour in the different activities.

As we find that the above-mentioned factors are valid for the studied nurses and that it should be somewhat easy to define an overall practice from comparing how these factors influence the nurses activity, the cognitively inherent factors make the activities more complex and undefinable as most of the activity unfolds from cognitive structures that both occur in the moment when a nurse is in contact with a citizen, but also from cognitive patterns of actions that a nurse has learned in relation to specific citizens and situations. As we have found out through this practice study much of the nurses work also relies on providing the citizens with somewhat psychological assistance, as this is an aspect of the treatment that the nurses explain cannot be bypassed. When this is a one of the main elements of the nurses activities we find that a general practice for the nurses only can be founded on the more tangible elements, but we cannot outline an overall insight in how the nurses act and what they chose to act on, as both the framework of the local set-ups and the nature of the relation between nurse and citizen advocates that activities and their outcome are very situation-bound. However, we have attempted to target the most common activities and outcomes for the studied nurses, as to define a general practice for the nurses in each municipality and

thereafter an overall practice emphasizing a shared practice pattern between them.

Based on the understanding we have developed on the nurses practice in the auspices of the TeleCare North COPD initiative it is our assessment that telemedicine's influence on nursing as a discipline is most significant in relation to the enhancement of the guide/supervisor role of the nurse, which implies that nurses assume more aspects of care than what is medically/clinically rooted. As the empowerment of citizens implies that factors such as encouragement and engagement are key elements in achieving this, we assess that nursing as discipline in the auspices of telemedicine might be moving towards the definition of a new medical sector wherein the main focus is not to treat the citizens but to educate and spare with them, with the purpose of future self-management, which we also assess is one of the nurses understandings of the purpose of TeleCare North COPD. In relation to the empowerment focus, we also find that our study of the nurses suggests that the patient advocacy aspect creates

a certain disorder in the traditional perspective on power distribution and authority in medical contexts, as the nurses find that the general practitioners can be difficult to work with and perceives telemedicine as a disturbance in the allocation of work between the nurses and them. It is our assessment that this insecurity might be coined in the consultational character of the nurses functions, which also demands that the nurses working in the telemedicine initiative are engaged in advocating their own practice and justify this in relation to other medical professionals who may feel undermined by the nature of the initiative. The nurses professionalism thereby also imply that they work on caring for their relationship with indispensable professionals such as GPs and nurses working at the hospitals.

We find that the knowledge obtained on the studied nurses working in the TeleCare North COPD initiative is not only of value in relation to understanding why the outcomes of the initiatives are as they are, but also in relation to what aspects that could be considered for the coming national rollout in 2019. One

interesting question that we find can be raised what the impact of individualistic approach is. It would be interesting to research if the individualistic professional approach of the nurses has an impact on the effect and quality of telemedicine as treatment form and if patients are coping differently from the approach and role the nurse assumes. However, we find that we would need to study the individualistic aspects of the nurses practice on a deeper level as to provide a more detailed insight in the role of the nurse and that this aspect is what has been difficult to reflect from making a general practice study.

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