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Visualization: Applicability and effects on communication in nursing homes

Master's thesis

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Abstract

There is an increasing demand on elderly care in Sweden as a result of an aging population. Previous research has shown that efforts to improve communication in nursing homes both can increase the quality of care and also reduce operational costs. In production and service industries, visual communication has successfully been used as means to improve communication. However, it has not yet been utilized in nursing homes to greater extent. This thesis investigates if and how visualization can be used in order to improve nursing homes' internal communication.

The purpose of this thesis is answered by applying theories developed from a literature study to the result of a single case study of a municipal nursing home. The findings were triangulated with action research, in which visual communication aids were implemented at the nursing home.

The literature study resulted in the development of a framework for categorizing visual communication. The framework consists of four different communication areas, *Identification, Information, Instruction* and *Intention*, in which visualization can be useful. In order to objectively evaluate if recommended changes would improve communication or not, a method for evaluating communication from a Lean perspective by identifying wastes is presented. This evaluation method also helped in identifying improvement areas in communication which needs attention.

From the case study, 18 work related communication purposes could be identified which then were categorized in the framework of the four visualization areas. The evaluation of these 18 identified communication purposes showed that *Waiting* was the most commonly occurring waste in the nursing home's internal communication. The analysis proposes that wastes in 15 of the 18 identified communication purposes at the nursing home could be reduced by visualization. Results from action research confirmed this result for the three communication purposes addressed in the experiment, but also illuminated the importance of the implementation process.

This thesis suggests that visualization indeed can improve nursing homes' internal communication. Visualization has a direct effect on the waste *Waiting*, which was identified as the most commonly occurring waste. Further, this thesis present a framework for categorizing visual communication, which in conjunction with the Lean evaluation method can prove to be a useful tool for identifying improvement areas in internal communication.

Keywords: Internal communication, Visualization, Visual communication, Elderly care, Nursing home, Lean, Wastes in communication.

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1 Introduction

This chapter describes the background to the purpose of the thesis, as well as the research questions used to answer it. Delimitations of the thesis are also presented.

1.1 Background

Nursing homes in Sweden are an increasingly important political topic, since the share of people aged over 65 is estimated to grow with 44 percent between the years 2000 and 2050 (Bengtsson and Scott, 2011; Statistiska Centralbyrån, 2013). This increase in demand is also faced with a potential decrease in economical funds, shown by trends in political budgets (OECD, 2013; Socialstyrelsen, 2009). The need for improvements has been identified by Sweden's National Board of Health and Welfare, which offers monetary rewards to municipals improving their quality of care to elderly (Socialdepartementet, 2011). A highly successful improvement, identified by Dahlén, Strandell and Lefvert (2010), has been implemented in the nursing home Åldermannen. The nursing home managed to both reduce operational costs as well as improve quality of care to residents by improving the internal communication in the organization. Improving communication in nursing homes has also previously been shown reduces staff turnover, which is something the nursing home industry suffers from[1] (Anderson, Corazzini and McDaniel, 2004)

Communication is a difficult expression to define, which has resulted in several different definitions of the term. It nevertheless tends to be explained as messages sent between people through means triggering the human senses (Rayudu, 2010). In the past few years, several studies have revealed that organizational issues often originate in communication issues (Yankelevitch, 2014; Palmer, 2014). Organizational communication can in turn be divided into internal and external communication (Vercic, Vercic and Sriramesh, 2011). External communication is messages sent between the organization and external recipients, such as customers and suppliers, while internal communication is information shared between an organization's members. Åldermannen hence managed achieve the mentioned result by improving the communication between employees in the organization. Cohen-Mansfield (1997) and Rayudu (2010) confirms that a sufficient internal communication is an important factor for organizations' success, as it otherwise might lead to lower quality of the service and increased operational costs. Ultimately, an insufficient internal communication might also reduce employee satisfaction, cooperation ability, their productivity, and their morale (Rayudu, 2010).

A communication method used with high success in several industries is visualization, which according to Ortiz and Park (2011) can be used for positive changes in any organization where people are employed, inventory stored, and processes are used. Visualization is information being transferred visually, facilitating several possibilities of doing so. Messages can when visually communicated be shared quickly, time needed to interpret the data can be reduced, and using visualization can also help the receiver access source information. Numerous benefits can be obtained using visualization when sharing information, as the method improves the receivers' remembrance, enables them to see relations, improves their reading comprehension, and improves their problem solving abilities (Parkinson, 2012; Berger, 1972). The applicability of visualization in production industries has been thoroughly studied, and it is even one of the key components behind the success of Toyota's production system (Liker, 2004). Even though visualization successfully has been utilized in the production industry and according to Liker and Morgan (2006) somewhat in the service industry as well, little research has been conducted on how it can be used within nursing homes. With clear potential benefits of improved internal communication in nursing homes, and visualization successfully being used in other industries to improve it, the question is raised whether visualization can be used in nursing homes successfully.

Evaluating if organizational communication is sufficient is difficult, as sufficient communication can have various forms in different organizations (Rayudu, 2010). As a consequence, improvement areas in organizations' internal communication can be difficult to identify, and it can also be difficult to

[1] Gustafsson, Emma. How does communication in Rådahemmet function?. 2015. In person.

recognize if changes have led to improvements (Yankelevitch, 2014). Palmer (2014) and Yankelevitch (2014) argue that using principles from Lean manufacturing can be an efficient way to evaluate organizations' communication, both to find improvement areas but also to identify if changes have led to improvements. Using principles from Lean manufacturing in communication implies systematically analyzing if communication processes contains wasteful activities. By then reducing these wasteful activities, the internal communication can, with these principles, be considered improved (Palmer, 2014; Yankelevitch, 2014).

1.2 Purpose

To investigate if visualization can improve internal communication in nursing homes from a Lean perspective.

1.3 Research questions

In order to make the purpose more researchable, three research questions were developed. These research questions worked as guidelines of what information was needed, and answering these helped answer the purpose.

1. How can visualization affect internal communication?
2. How does internal communication function in nursing homes?
3. What problems in the internal communication in nursing homes can be identified from a Lean perspective?

1.4 Delimitations

This thesis has focused on communication within the nursing home Rådahemmet. However, only work related communication processes have been analyzed, meaning communication processes that are required for Rådahemmet to perform everyday tasks and reach long term objectives. Other communication processes such as social communication is hence not analyzed, since applying Lean too strictly to processes can have debatable effects on the psychosocial environment (Börnfelt, 2009). Communication not work related would with a Lean perspective be considered waste, but has not been analyzed due to the risk of affecting the employees' environment.

Authors of publications regarding Lean differentiate in the meaning of what Lean consists of. In this thesis, the theory of Lean was considered the principle of continuously trying to reduce wastes in processes, focusing on what the customer wants.

Due to the time frame of the thesis, no long term effects of the potential improvements in communication were analyzed. Only a few selected visualization tools were presented to Rådahemmet, as the thesis aimed to explain the potential benefits of using visualization, and not how the benefits specifically can be achieved.

2 Method

The methodology chapter describes what data was required in the research in order to answer the research questions, and finally the purpose. It also describes how this data was collected and analyzed as well as the reasoning behind this choice of research strategy and research design. Finally, the chapter is concluded with a discussion regarding quality concerns and ethics within the research.

2.1 Required data

Answering the three research questions required different data, and hence different data collection methods. The first research question required data regarding what communication is, and how visualization can affect it. This data was collected by performing an extensive analysis of previous literature about communication philosophies, as well as what visualization is and its effects.

The second research question required data of what information is shared within nursing homes and how this internal communication is managed. This data was collected by conducting a single case study. When conducting this case study, data was collected and categorized based on the purpose of the communication.

To answer the third research question, communication in the case study was analyzed using principles from Lean in order to figure out improvement areas. Answering this research question required extensive reading and understanding of Lean as a whole, as well as how to apply it to the process of communication. The required data was hence mainly acquired from previously published literature, which then was applied to the specific case.

2.2 Research strategy

Bryman and Bell (2011) describes two different approaches to the use of data; inductive, where data is collected to build new theory, or deductive, where data is collected in order to test already existing theory. Research is however seldom either one or the other, but instead usually a combination of the two approaches, where components from both are used (Bryman and Bell, 2011).

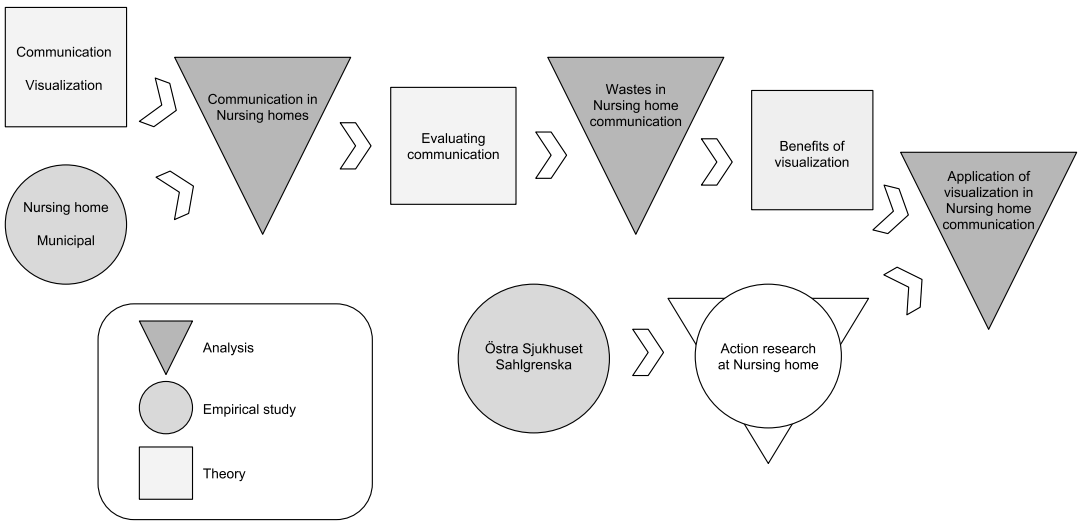

Figure 1: Iterative approach of thesis

For structural reasons this thesis firstly present the theoretical framework used, followed by the empirical studies conducted, concluded with an analysis. How data was collected and analyzed however deviates from the structural presentation of the thesis, as task within the different areas were performed iteratively. **Figure 1** illustrates how this thesis was conducted. It started with a literature study of communication and visualization, as well as a comprehensive empirical study of a nursing home's environment and how internal communication is handled. An analysis was then conducted, to

understand how communication in nursing homes functions and why. A literature study followed, where methods to evaluate communication was researched. The literature study resulted in Lean being chosen as a method for evaluating communication, as well as the preferred way to identify problematic communication areas. With Lean as evaluation method, an analysis was then conducted on the earlier collected empirical data to identify wastes in the nursing homes' communication. Along with a theoretical study of the possible benefits of visualization, as well as an empirical study at Östra sjukhuset and a conducted action research, an analysis was made to understand the applicability of visualization in nursing homes. With this analysis the purpose of this thesis was answered.

Within this thesis the aim was to create new theory; theory describing how visualization can improve internal communication within nursing homes from a Lean perspective. The research was hence mainly inductive, where the aim was to draw conclusions that create new theory. It has nonetheless featured parts from a deductive approach as well, as one could argue that the thesis tested the possibility of using theories from visualization in nursing homes to reduce wastes successfully. An example of the deductive approach found in this research was testing if successful visualization tools from the hospital Östra sjukhuset could be used in nursing homes as well. The research was, as illustrated in **Figure 1** conducted with an iterative approach, where data collection and data analysis were made concurrently, and further data was collected if necessary.

A common feature of an inductive approach is that it often requires a qualitative research strategy where subjective data is to be analyzed, as opposed to a quantitative research strategy where numbers and statistics are analyzed in a larger extent (Bryman and Bell, 2011). This was also the case in this thesis, as a qualitative research strategy was used with several research methods used to collect data. They were all however mostly of qualitative character. Bryman and Bell (2011) empathizes on the risk of collecting too much data when using a qualitative research strategy, making the analysis more time consuming to perform compared to when using a quantitative research strategy. Codifying qualitative data thereby requires the collection of data to be well planned, and research methods were hence selected with this in mind. The research was conducted using a single case study as research design, since a large sample size would lead to excessive work. A single case study was however believed to be sufficient for the research, as nursing homes' organizations are relatively regulated by municipals and the government to function similarly[2]. Implications from this are nevertheless discussed in the chapter *Quality concerns*.

2.3 Choice of context and sample

As the research strategy was of qualitative nature, and a single case study was used as a research design, the case study location was chosen to optimize the potential of gathering useful information. To also increase the transferability of the study, it was believed the study would benefit from being conducted at a municipally regulated nursing home, since most nursing homes that are municipally regulated have similar work routines[3]. A nursing home that fits within this description is Rådahemmet in the municipal of Härryda. Rådahemmet is one of seven municipally regulated nursing homes in Härryda. There are currently no private actors in this municipal even though it is an open market.

Rådahemmet's management have recently been focusing on increasing the quality of the service provided to the elderly, and want to further analyze what can be done in order to improve. Keeping in mind that Rådahemmet is continuously trying to improve, it was believed that their attitude toward change would facilitate to access necessary data.

[2] Forsgren, Tina. How Similarly Does Municipally Regulated Nursing Homes Function?. 2015. In person.
[3] Gustafsson, Emma. How does communication in Rådahemmet function?. 2015. In person.

2.4 Data collection methods

The selected areas were approached with limited previous knowledge, both regarding how nursing homes function, but also regarding communication, visualization, and Lean.

2.4.1 Literature studies

As the prior knowledge of communication, visualization, Lean, and its application in service and health care industry was limited an extensive literature study was conducted focusing on these areas. The literature study was divided into three main parts; literature regarding communication, literature regarding visualization, and literature regarding how to evaluate communication and Lean. Literature regarding communication was studied to get an understanding of the concept as a whole, and to understand how it can be categorized and analyzed. Since visualization is a way to communicate between people, a literature study was also conducted regarding this subject. When conducting this literature study, focus was on understanding how visualization can be categorized and how it can improve communication. The third part of the literature study was conducted in order to get a better understanding of Lean and how it can be used to evaluate and improve processes.

Additionally, the literature study was complemented with literature regarding elderly care for a broader picture. This consisted of information on the environment in which Rådahemmet operates. Areas such as regulations of elderly care, organizational structure, quality indicators, and market competition were reviewed as they all have a significant effect on how improvements using visualization could be made.

2.4.2 Interviews

As research method, interviews can be very helpful when gathering information that otherwise might be difficult to access from people, such as knowledge and experience (Bryman and Bell, 2011). Interviewees can express their knowledge to the interviewer and hence transform information that otherwise would be undocumented. The interview is a commonly used research method, and is usually chosen when flexibility is preferred. It does however come at a cost, as interviews often are more time consuming than other research methods and hence usually require good planning in advance (Bryman and Bell, 2011).

There are three types of interviews according to Bryman and Bell (2011); structured interviews, semi-structured interviews, and unstructured interviews. Structured interviews aim at gathering data from several people, and then using the quantity of answers to come to a conclusion. Using this interview method requires the interviewer to only ask questions that have been planned on beforehand, and hence not deviate from these questions during the interviews. Since it quantifies the answers, structured interviews are often used in quantitative research strategies. On the opposite, unstructured interviews aim at gathering data to give better understanding of a current situation, doing in-depth interviews with only a few people in order to completely understand their points of view. Using this interview method doesn't require much planning on beforehand, as the interviewer can ask questions and follow up questions in the areas of interest. These types of interviews are hence much more frequent in research with a qualitative strategy, and since the interviewee expresses all types of knowledge, data from these types of interviews are more difficult to analyze and compare. Semi-structured interviews resembles a combination of structured and unstructured interviews and aim at giving the interviewer answers regarding already planned questions, but gives the interviewer freedom to ask follow up questions to better understand the answers. Semi-structured interviews does not require interviewing several people, but can be more useful when comparing answers compared to unstructured interviews, and the data is hence easier analyzed. Both semi-structured and unstructured interviews are frequently used in research using qualitative strategy, as the interviewees are given more freedom to express their own experiences (Bryman and Bell, 2011).

Within this research a qualitative strategy was used, as quantifying data was deemed unnecessary. Both semi-structured and unstructured interviews were conducted internally and externally.

Internal interviews

Totally 18 interviews were conducted internally at Rådahemmet of both unstructured and semi-structured character, depending on the interviewee's position at the nursing home and the goal of the interview. When conducting interviews with Rådahemmet's management, unstructured interviews were conducted to gain a better understanding of the problems they were facing. These interviews were conducted with different purposes; firstly to give an understanding of what the management believed the main problems were with the nursing home's internal communication, and if any previous analysis had been made. Secondly, these interviews gave an understanding of how extensive the data collection had to be, in order to fully cover the areas where the problems originated. By gaining this understanding the research became more limited and a more detailed data collection plan could be developed. Main focus during these unstructured interviews was hence on receiving the management's view of the internal communication at Rådahemmet. These unstructured interviews with management also gave information which other interviews were based on, both internally and externally, and were conducted early in the research.

Interviews were also conducted with the employees directly responsible for handling the elderly in the nursing homes. These interviews were semi-structured and conducted with employees with different levels of experience, age, and responsibilities. The semi-structured interviews focused on specific issues relevant for categorizing communication in Rådahemmet, but still allowed the interviewees to discuss different aspects of the topics. When conducting these semi-structured interviews, an interview guide was used where predetermined questions were formulated in a specific order. The selection of interviewees was based on the opinions from the management on which employee could give the required information, and was hence not random. Raworth et al. (2010) states that a randomized sample of interviewees is not a prerequisite for conducting semi-structured interviews, meaning that successful results can be obtained with a non-random sample. When conducting the interviews, focus was on obtaining information regarding how communication in Rådahemmet functions. The interviews were then codified both during and after the interviews to obtain and remember as much useful information as possible.

External interviews

Interviews were conducted with external parties in order to increase the knowledge regarding the topics in the research questions, and to give the researchers a better understanding of what previous research has been made in the area. These interviews were conducted with people with experience from using visualization in health care to understand how to implement visualization tools, and what the effects have been. Discussions whether implementation of visualization tools have improved the work environment for the employees and the effects on the health care were also held. Two interviews were conducted with representatives from Östra sjukhuset, a hospital in Gothenburg that in recent years has started using visualization tools more frequently to communicate. As the interviews aimed to give information about topics in the specific fields of visualization, but also at giving the researchers a general understanding of the environment, the interviews conducted were semi-structured. With semi-structured interviews the specific fields could be discussed, yet still give the interviewees a freedom to deviate from the fields when needed (Bryman and Bell, 2011).

An external interview was also held with Tina Forsgren, Operations Manager of Health and Social care in Härryda to find out how similarly nursing homes in other municipalities function. Information from this interview gave a basis for how transparent the results from the single case study at Rådahemmet is, and how the results can be applied to other nursing homes.

2.4.3 Focus groups

In addition to the unstructured and semi-structured interviews a focus group discussion was held. A focus group is a qualitative data collection technique which is useful for obtaining information about employees' needs and attitudes (Kitzinger, 1995). Focus groups let the interviewers explore how employees behave in situations, and not only to directly answer questions. A discussion between participants can also provide information such as how employees interact, how they communicate, their vocabulary, and how they prioritize. Knowledge of group dynamics and everyday language can

provide a dimension of understanding not accessible by regular interviews (Kitzinger, 1995). In focus groups opened ended questions are preferable to enable group discussion, possibly generating new angles which otherwise might easily be overlooked. The Affinity and Interrelationship Method (AIM) was used to trigger discussion in Rådahemmet regarding what usually causes complaints from the elderly. The AIM is a problem solving tool used to analyze complex situations to receive a better understanding of them, especially when qualitative data is to be analyzed (Alänge, 2009). Using the AIM means working in a structured way to jointly figure out root causes to problems, and enables all participants to express their concerns regarding the problems. This focus group then gave basis for further information required to be collected, which then was collected using more interviews and observations.

2.4.4 Observations

To understand how employees at Rådahemmet operate, structured observations were conducted. When conducting structured observations, researchers use techniques to systematically observe behavior of specific people (Bryman and Bell, 2011). During these types of observations, Bryman and Bell (2011) argues for the importance of choosing a recording technique in order to easily codify and analyze the data. They also mention that there can be several issues regarding reliability and validity when conducting structured observations, as observed people for instance tend to behave in a different way than their usual behavior. Observations were however used to understand how employees communicate in weekly and monthly meetings and in shift changes. Documentation was conducted both during and after the observations to answer how certain information was shared.

Observations were also made at Östra sjukhuset, a part of Sahlgrenska University Hospital in Gothenburg, to see how the health care industry uses visualization as a way to improve communication.

2.4.5 Action research

To test the applicability of using standardized visualization tools, as well as to investigate Rådahemmet's ability to adjust to change, a small action research was conducted as a data collection method. An action research builds on the collaboration between management and researchers to jointly implement a potential solution to a problem, to test if positive results can be achieved (Bryman and Bell, 2011). The action research was conducted in the end of the case study, when problem areas had been identified at Rådahemmet. A more detailed description of how the action research was conducted is described in *4.5.1 Performing the action research*.

2.5 Quality concerns and ethical considerations

As the research has a qualitative strategy and use a non-probability sampling, there are a number of qualitative concerns that had to be considered. Kitto, Chesters, and Grbich (2008), as well as Bryman and Bell (2011) states that the quality of a qualitative research can depend on four factors, namely internal- and external reliability, as well as internal- and external validity. Reliability of a study concerns how well the study can be replicated, and if the members of a research agree upon different opinions. Validity on the other hand has to do with how well the research can be generalized and adapted to other areas. Lincoln and Guba (1985) however argue that reliability and validity easier can be analyzed when broken down into trustworthiness and authenticity, which both in turn can be broken down further. To ensure a high quality of the research when conducting a qualitative research, Kitto, Chester, and Grbich (2008) states that researchers need to continuously evaluate and work with these concerns in the data collection and data analysis, but also when stating conclusions and recommendations.

In the study at Rådahemmet, the study's transferability and credibility were the most difficult to ensure, which are part of what Lincoln and Guba (1985) called trustworthiness. Transferability is according to Lincoln and Guba (1985) similar to external validity, and hence represents how well findings can be transferred to other settings. These areas were most difficult to ensure as a single case study was made, and the results were not compared with other nursing homes. Lincoln and Guba (1985) however argue that transferability of a study is within the hands of the reader and not the

writer, and if information is usable or not for others has to do with how the reader interprets the research. In order to facilitate this for the reader a rich description of the case has been provided, with both information concerning the employees' communication but also information concerning the nursing home's environment and organizational structure. As the research was conducted at a nursing home highly affected by municipal regulations, it is believed most of the findings at Rådahemmet can be transferred to similar nursing homes[4].

Credibility on the other hand reflects internal validity, and that the environment during the time of investigation was representative for the usual state (Bryman and Bell, 2011). Since the research was conducted at a single site with a non-probability sampling for data collection, there was a risk that the credibility would be damaged since not all aspects of the research areas were represented. In order to limit the possibility of damage in credibility, both triangulations with several data collection methods as well as respondent validations were conducted.

The other parts of what Lincoln and Guba (1985) called trustworthiness are dependability and confirmability. Dependability is considered the fact that if the study would be repeated in the same environment, similar results would be achieved. This was considered high in this study, since the analysis followed a structured framework and was not dependent on the interpretation of the interviews. Confirmability is in which degree the researchers were neutral to the results and not driven by external motivation. It is difficult to decide if communication is sufficient or not, as it is a highly subjective matter. This subjectivity would be highly dependent on the researchers' opinions, but was avoided in this thesis by evaluating the communication from a Lean perspective.

During the study, a non-consequential, or principal ethical framework, was applied when conducting research. This approach emphasizes people's autonomy and nonmaleficence in their research participation (Wiles, 2013). A large focus was on informed consent and anonymity of the interviewees during the research. This framework was chosen as the intention was to create a general understanding of the environment, in order to see how and if visualization could be used to improve internal communication, rather than to expose faults in the organization.

[4] Forsgren, Tina. How Similarly Does Municipally Regulated Nursing Homes Function?. 2015. In person.

3 Theoretical framework

In this chapter the theoretical framework for this thesis is presented. This theoretical framework worked as a basis both for the empirical study and the analysis further on. Theory regarding communication is presented first, followed by theory regarding visualization, and finally theory on Lean as a way to evaluate communication.

3.1 Communication

This chapter describes findings of how to define communication, how it can be used by organizations and within elderly care, and finally how it can be analyzed.

3.1.1 What communication is

Communication is a difficult expression to define. The term communication derives from the Latin word 'communist', meaning common, which in turn has been interpreted differently by different authors (Rayudu, 2010). The expression communication has over the years been widely discussed and there is even a definition developed as early as by the Greek philosopher Aristotle over 300 years B.C (Peters, 1999). There is also a general disagreement between authors of what communication really is (Fiske, 1990). According to Fiske (1990) this is due to the expression 'communication' being multi-faceted with an absence of a universal definition. One generic way of describing communication is as the action of sorting, sending, and transmitting messages from a sender to a receiver, in order for the receiver to create an own interpretation and meaning of what the sender means (Rayudu, 2010). These messages are sent through means triggering the senses of the receiver, meaning that sound, smell, sight, taste, and touch all can be seen as fundamental ways to communicate (Rayudu, 2010).

Similar arguments of what communication really is can be seen in many other authors' definitions of communication, for instance:

Theo Haimann: "*Communication is the process of passing information and understanding from one person to another. It is the process of imparting ideas and making oneself understood by others.*" (Haimann, 1966, p.466).

Edwin B. Flippo and Gary M. Munsinger : "*Communication is the act of intercourse by words, letters, symbols or messages and is a way that one organisation member shares meaning and understanding with another.*" (Cited by Rayudu, 2010, p.3).

Keith Davis: "*Process of passing information and understanding from one person to another....*" (Davis, 1962, p.344).

Within different authors' publications of the definition of communication there are also a handful authors that have developed more specific models and frameworks trying to give a comprehensive explanation what communication exists of, and the different elements of communication. Most of these frameworks and models are based on other, previously published models, and are only slightly adjusted for a specific cause. Hence, they are often only applicable to a specific cause and are not comprehensive to all kinds of communication, due to the expression communication being too diverse for this. Fiske (1990) however state that published definitions and frameworks of communication often follows one of two different categories regarding how communication can be perceived. In the first category authors tend to perceive communication as a process, meaning that communication is analyzed as a process of transferring information from one person to the other. Authors arguing for communication to be seen as a process usually argue for the similarities between communication and other processes, meaning it can be analyzed and improved in similar ways as them. A typical example is business organizations improving communication in similar ways as their production processes, using standardized improvement tools and methodologies (Fiske, 1990; Smith and Mounter, 2005; Yankelevitch, 2014).

The other category in publications of communication perceives communication as a way to produce and exchange meanings. This category hence concerns how information and messages produce

meanings for the receiver. Authors within this category do not necessarily look at misunderstanding as a result of communication failure, but states that it occurs due to receivers creating their own meaning of the message. In other terms, looking at communication as the authors in this category usually means analyzing how different messages can be interpreted by different receivers considering their culture and background (Fiske, 1990). With both of these categorizations of published work regarding communication, the expression of communication is still subjective to whoever interprets the expression. Fiske's (1990) way of categorizing published work regarding how to analyze communication can nevertheless help identify similarities between authors' ideas.

3.1.2 Organizational communication

The effects of communication in organizations have under the past few years become more researched, and more studies have been published showing that problems in organizations can originate in communication issues (Yankelevitch, 2014; Palmer, 2014). Communication is, as mentioned, a wide expression and can have different meanings depending on the situation. Organizations acknowledging their communication issues tend to have a process perspective of communication when trying to improve it (Smith and Mounter, 2005).

Using the process categorization of communication, it becomes a wide expression for different forms of information transfer. For organizations this information transfer can nevertheless be divided into internal or external communication (Vercic, Vercic and Sriramesh, 2011). These types of communications can in turn be defined in different ways, but internal communication usually means information shared between members of an organization, while external communication typically means information shared from, and to, external parties (Vercic, Vercic and Sriramesh, 2011).

Insufficient internal communication can cause a large variety of problems for organizations, where these problems can take different forms and severity. The problems that might arise are highly dependent on the organization they arise in, and can hence not easily be categorized or described. There are however some common problems that have arisen in different organizations due to insufficient internal communication, which shows the importance of it and how it can negatively affect all parts of an organization. Rayudu (2010) states that one of the most common problems occurring within organizations, due to internal communication being insufficient, is employees misinterpreting information shared with them. The employees hence create a meaning to the information shared with them that differs from the meaning the sender has. Information being shared in this way is hence often at risk of becoming a distortion of the original information, meaning a risk that the end receiver cannot interpret the information correctly. Rayudu (2010) also states that an insufficient internal communication largely affects other important factors in the long run, such as employee satisfaction, cooperativeness, productivity, their coordination, and their morale.

According to Palmer (2014), internal communication issues are often the root cause to time wastes in organizations. He states, similar to Rayudu (2010) that an appropriate internal communication is vital for organizations, as it reduces time wasting activities for the employees as well as ensures that necessary information is spread to the correct people. Similar arguments have been made by Wheelwright and Clark (1992) who state that a sufficient communication is a pivotal factor in product and service development projects. Hence, both the daily work within organizations as well as the success of product and service improvement projects depends on a sufficient internal communication. An insufficient internal communication within organizations can thereby negatively affect not only the work, but also the work environment, and ultimately the success of the organization.

3.1.3 Communication in elderly care

Internal communication has been proven an important factor in the service sector of elderly care (Anderson, Corazzini and McDaniel, 2004; Dahlén, Strandell and Lefvert, 2010). Anderson, Corazzini and McDaniel (2004) show that insufficient internal communication is one of the main factors for a high staff turnover in nursing homes, which in turn is strongly associated with poor quality of care (Castle, Engberg and Men, 2007; Cohen-Mansfield, 1997). Dahlén, Strandell and Lefvert (2010) present an example from the Swedish nursing home 'Åldermannen' where improvements in internal

communication led to higher patient safety, reduced workload for nurses as well as reduced costs and better possibilities for future improvements. In other words, an improved internal communication in nursing homes can positively affect staff turnover, patient safety, costs, and the ability to perform improvement projects, among other areas. Each of these affected areas might in turn also affect other areas, e.g. a lower staff turnover usually results in higher employee commitment to their work, and lower costs can result in more employees and lower work demands per employee (Kommunal and Vision, 2013). Nursing homes are generally characterized by a high rate of employee turnover which also generates a high demand on effective knowledge transferring to keep cost down (Kommunal and Vision, 2013; Glebbeek and Bax, 2004).

According to Palmer (2014) communication issues tend to be a root cause to many extensive problems within organizations. Preventing and avoiding problems in industries dealing with people's health is important, as consequences of such problems can become severe (Dahlén, Strandell and Lefvert, 2010). The case of Åldermannen became an important case study for improvements in elderlies' health using improvements in communication. The subject even led to discussions at the annual patient safety conference held by the National Board of Health and Welfare (Dahlén, Strandell and Lefvert, 2010).

3.1.4 Types of communication

Within the process categorization of communication there are some commonly described ways that information transfer can be analyzed in more detail, compared to simply perceiving it as a process. A regular way to look at information transfer is to analyze the information flow direction. If the information strictly is provided from management to employees, the communication direction is considered downstream, and the opposite is considered upstream (Lumsdon, 1975; Wheelwright and Clark, 1992). Communication between employees on the same level are thereby similarly called vertical communication. There are of course combinations and alterations to the analysis of the communication direction, but the most basic way to categorize direction is nevertheless in upstream, downstream or vertical communication.

Another useful and common way to further categorize information flow in organizations is to analyze how the information is expressed i.e. if spread verbally or written (Rayudu, 2010). Communication within these categories only triggers the senses hearing and sight, which on the other hand is how most organizational messages are transferred (Rayudu, 2010). Written information can be expresses in memos and instructions, but can also take visual form such as on boards and in posters. Communication through verbal means is on the other hand spread through e.g. conversations, meetings, and lectures (Rayudu, 2010).

Organizational communication varies largely between organizations and there can be difficulties in analyzing an organization's communication based on how other organizations have done it. For organizations attempting to analyze communication, whether because of communication problems or not, it is therefore important to choose a communication analysis method that fits the objective of the analysis (Rayudu, 2010).

3.2 Visualization

This chapter describes what visual communication is, how it can be used for organizations, and in what areas visualization is commonly used as a communication mean.

3.2.1 Visual communication

Visualizing information is an old form of human communication, from cave paintings and ancient Rome's road milestones, to signal fires. Today visualization is present all around in people's everyday life, such as in warning signs and traffic lights. Visual communication is used especially in situations which may call for people's immediate attention and when a quick interpretation is required. Millions of years of visual impressions have evolved the human brain to be able to interpret different visual information simultaneously, making this process much quicker than interpretation of textual information and language, which still is processed sequentially (Parkinson, 2012). This means that much of the visualized information can be understood by just a glance while focus still can be elsewhere, like keeping track of cars in traffic.

Visual communication is however a lot more versatile than for just information which require fast processing. Words are processed by the short-term memory, meaning that textual or verbal information quickly can be forgotten if not interpreted into an image, which is directly stored in the long-term memory (Berger, 1972). This is one of the reasons why visualization is useful in education. Using a simple tool such as a graphic organizer has been shown to improve students' achievements, not only by better retention of information but also by improved reading comprehension and analytical skills (IARE, 2003).

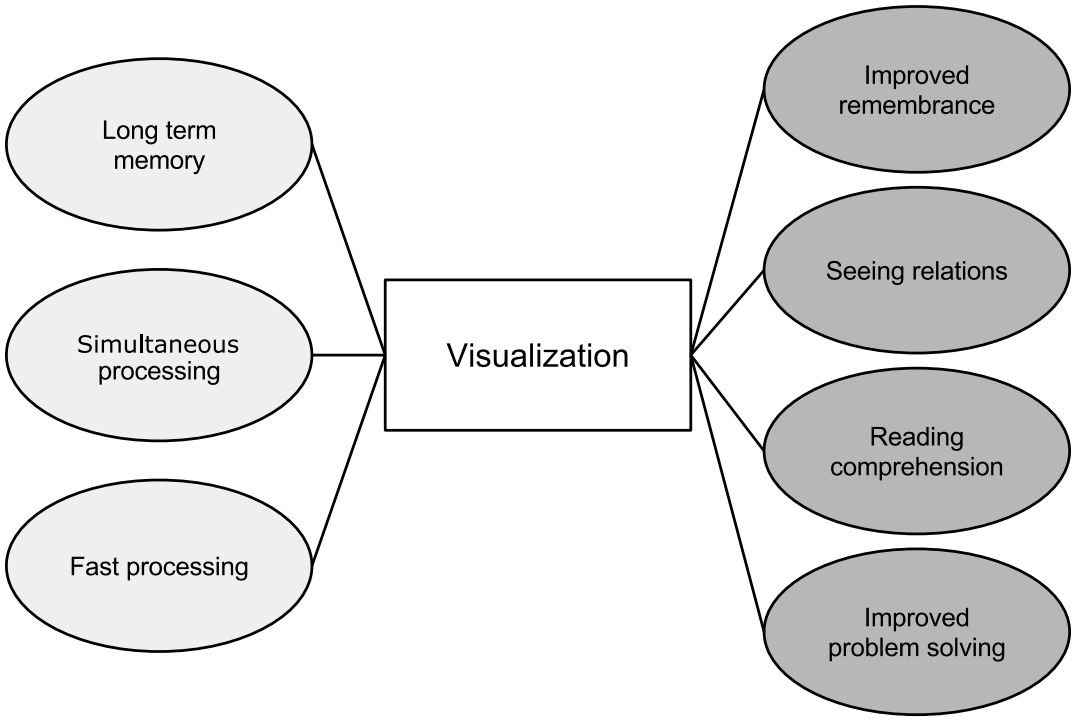

Figure 2: Graphic Organizer: Effects and benefits of visualization

The brain's ability to quickly process and memorize visual information is related to the possibility for images to carry vast amount of information (Parkinson, 2012). This can be illustrated by e.g. an aerial photograph of a city, where describing such photo with words would be somewhat problematic. A short description could be provided in order to give the reader a general understanding what the picture contains. It would however result in a somewhat different interpretation for each reader, and describing every little detail would be time consuming to say the least.

Since visual descriptions can help people remember information long-term, as well as can give a common interpretation among receivers, visual aids can be an effective way to give instructions (Weber, 2014). As an example, the production company Metcam reduced their production errors by 86 percent after starting using visual instructions on their assembly line, and are now trying to expand the usage areas of visual instructions (Computer Weekly News, 2011). The brain's function to memorize images much better than text is useful especially for learning as previously mentioned, which in turn hence could be used as a way to teach how work tasks should be performed (Parkinson, 2012).

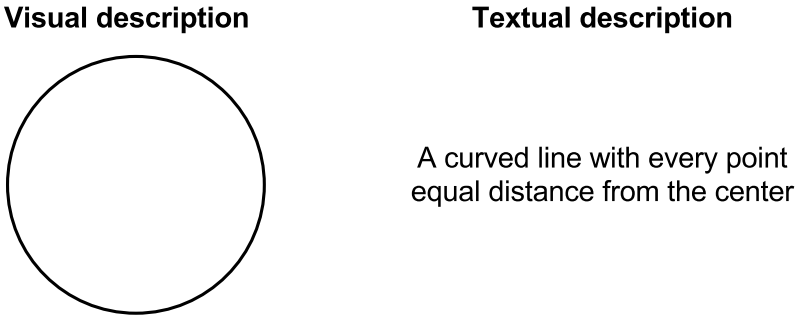

Figure 3: Visual description. Adopted from Parkinson, M. (2012)

With the brain being capable of receiving information in much larger extent from visual aids compared to from textual information, there is also a risk of sending too much information through visualization. This makes it hard for the receivers to know what information is useful, and can hence create confusion, the risk of interpreting information in wrong ways, and eventually make wrong decisions (Bresciani and Eppler, 2008). A typical example of sharing too much information visually was seen in flight cockpits during the early 1990's, where more and more unnecessary technical information was being shared with the pilots through visualization (Weinstein and Wickens, 1992). Reducing unnecessary information and only visualizing the important information to the pilots led to less confusion and easier access to the correct information (Weinstein and Wickens, 1992). Bresciani and Eppler (2008) show in their literature review regarding the risks of visualization that there are many risks that have to be considered when using visual communication. Examples of risks they present are; the risk of over-simplifying problems and solutions, the risk of sharing redundant information, the risk of sharing misleading information, and the risk of sharing unclear information. It is hence of high importance to consider all risks of using visual aids, in order to share correct information, and to prioritize what information to share.

3.2.2 Visual communication in organizations

According to Ortiz and Park (2011) there is an opportunity for positive change by implementing visual communication in organizations where people are employed, processes are used, and inventory is stored. This positive change can be achieved regardless of what product or service that may be produced. Most modern factories have today incorporated visual communication in their work space, with the simple objective of making things a little easier for the employees (Chaneski, 2014). Chaneski has identified three areas in which factories successfully have improved communication by using visual aids; identification of where things belong or not, instructions on how to assemble parts or operate equipment, and when sharing relevant business information. Another area where visual communication can be useful is to show intentions in the organization. Lindlöf (2014) and Greif (1991) argue for visual communication's positive effect on creating a shared understanding of both the present state of a process, but also on what the intended result should be. A shared vision of the intended future state is also important in order to align efforts, and is according to Kotter (1995) one of the key factors for successfully implementing change. The three areas identified by Chaneski (2014) together with the fourth area identified by Lindlöf (2014) and Greif (1991) form the framework for

this thesis. This framework is used both for focusing the data collection as well as provide structure for the analysis. Below, each of these four identified areas is described further.

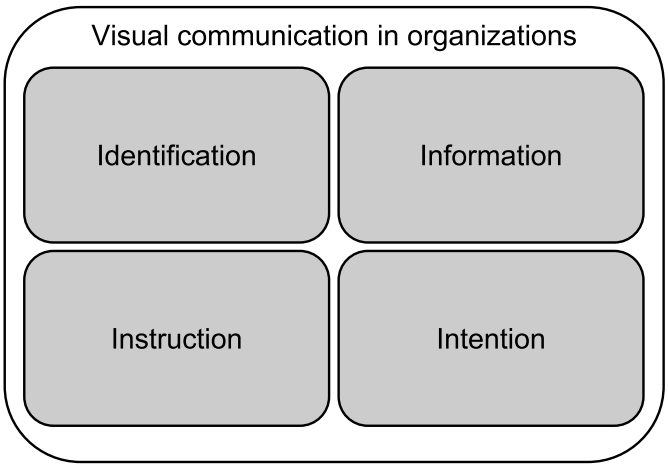

Figure 4: Four identified areas of visual communication

3.2.3 Identification

The aim with visually marking objects and their designated space in the workplace is to create an environment that communicates (Chapman, 2005). These identifications allow for interaction and a non-verbal communication between the objects and the employees. A piece of equipment forgotten in a room can, if clearly marked, communicate with the next person that it is missing from somewhere, and a clearly marked storing place communicate that an object is missing or being used by someone else. A communicating environment not only reduces the time spent on searching for the right equipment but also reduces the learning time for new employees (Chapman, 2005). In order to achieve a positive effect by identification, a key factor according to Ortiz and Park (2011) is assigning each object to a specific 'home place'. Items should be clearly visible and as surface areas are often limited, this force employees to analyze how often items are used and prioritize where they should be stored (Ortiz and Park, 2011). This often leads to the possibility of disposing unused material, which facilitates finding the right item when needed. Items are then stored closer to where they are used which reduces time spent moving objects around (Chapman, 2005).

3.2.4 Information

The main objectives for an organization by visualizing information is to create a shared understanding of how the processes work, i.e. how tasks are related, and provide feedback on their statuses (Parry and Turner, 2006). This is how visualization of information will be treated in this thesis, i.e. visualization of data and facts rather than ambiguous information. All information cannot, and should not, be communicated at the same time and place. However, communicating information that is important for the whole organization sometimes should (Ortiz and Park, 2011). Visualizing information on key performance measures of the organization can give a sense of how well the organization is doing and that every part is connected and reliant of each other. This also gives management opportunity to choose specific measures to visualize, illuminating problem areas (Ortiz and Park, 2011). Information should be visualized at the location where it is needed, e.g. on a production line where visual aids can be used to signal if help is needed so that problems can be resolved before subsequent processes are affected (Parry and Turner, 2006). Similar ideas can be used for material handling and inventory management where visual aids inform that it is time to refill or order new supply.

3.2.5 Instruction

An instruction, i.e. how a specific task should be performed will in this thesis be treated as the transferring of task specific knowledge between employees. Eppler and Burkhard (2005) separate knowledge visualization from information visualization as following:

"*Information visualization aims to explore large amounts of abstract (often numeric) data to derive new insights or simply make the stored data more accessible. Knowledge visualization, in contrast, facilitates the transfer and creation of knowledge among people by giving them richer means of expressing what they know."* (Eppler and Burkhard, 2005, Heading: The difference between knowledge and information visualization).

Visualizing instructions, as stated by Eppler and Burkhard, aims to increase the possibility for employees to share their best practice knowledge of how a process should be managed. This knowledge is to a large degree tacit knowledge, a form which is difficult to transfer by only using verbal means (Nonaka, 1991). Enriching the communication of instructions with visualization can generate both the positive effects previously described by Eppler and Burkhard (2005) of increased accessibility and faster processing, but also help to bridge the difficulties of transferring technical aspects of tacit knowledge mentioned by Nonaka (1991).

3.2.6 Intention

This thesis categorizes data and facts of the present state in an organization as information. Visualization of intention on the other hand will apply for content regarding the future state, i.e. what the organization strive for or what intends to be achieved. One usage of visualizing intention in product development is the creation of a prototype (Lindlöf, 2014). Visualizing the intended design of a product creates a better common understanding of what the end result should be, rather than just presenting the technical specifications (Lindlöf, 2014). A shared vision not only enables communication of its configuration but is also an important factor for involved parties to align their work (Kotter, 1995). However, Lindlöf (2014) also argues for another aspect, planning, where even greater effects can be achieved. Visualizing planned tasks and deadlines can help teams to organize, allocate resources, and stay focused on the end goal (Lindlöf, 2014).

3.2.7 Evaluating communication

Evaluating organizational communication is a difficult process, as sufficient organizational communication can have different forms (Rayudu, 2010). The success of communication in organizations is highly dependent on e.g. what kind of information is transferred and what the function of the information is. As an example Wheelwright and Clark (1992) state that sufficient communication within product development teams highly depend on the situation the teams are in, and what they are developing.

As mentioned previously, organizations tend to analyze their internal communication as a process when trying to improve it (Smith and Mounter, 2005). The end goal of doing so is to improve communication in similar ways as other processes have been improved in companies. A commonly used methodology for evaluating the performance of processes in general, to see where they can be improved, is by using philosophies from Lean manufacturing (Sarkar, 2007). The methodology is both used to find improvement areas, but also to investigate if implemented measures have led to improvements in the processes. Since communication is difficult to evaluate, using methodologies from Lean can lead to great success in finding and improving areas in the process of communication (Palmer, 2014; Yankelevitch, 2014). This is due to the methodologies of Lean being generic and applicable to most processes with only small adjustments. In other words; Lean is usually used as a methodology to identify problems and improve processes, but is also highly suitable to evaluate if and where the process of communication can be improved. It can then also help determine if implemented actions have improved the communication in the end.

3.3 Lean

Firstly a short description of the history of Lean, how it is used and why, is presented in this section. This is followed by a description of how Lean has been adapted into new industries.

3.3.1 History

Lean manufacturing revolutionized the production of automobiles worldwide after the principles were described by Womack et al. (1991) in their book 'The machine that changed the world'. Its core values are in reducing wastes in production as a way to improve customer value. However, there are some different opinions between authors whether how this reduction of waste is achieved (Liker, 2004). While the ideas of Lean manufacturing came from the Toyota Production System (TPS), where different tools and principles had been applied to reduce wastes in production, Lean manufacturing does not necessarily mean simply applying tools developed in TPS to processes. The ideas of Lean are often considered more generic than that, taking into consideration that waste can vary from situation to situation. Often, Lean is considered as the idea of getting the right thing to the right place in the right time, while still managing to be flexible for potential changes, and continuously focusing on reducing wastes (Liker, 2004). This idea is however still based on the origin that non-value adding processes are wastes for companies, and hence deemed unnecessary.

Using Lean requires the understanding that all processes can always be improved by reducing more waste, and that the organization hence continuously has to work with improving their processes (Liker, 2004). In other words, Lean focuses on the fact that all processes can be improved and gives an explanation to how they can be improved; using the approach that wastes in processes always can be reduced further.

Critics state that Lean can negatively affect the psychosocial environment for the employees if used too extensively (Börnfelt, 2009; Parker, 2003). Börnfelt (2009) and Parker (2003) have identified that Lean initiatives can have negative effects on employees' motivation, as a result of work tasks being standardized and employees experiencing a reduced autonomy. Liker (2004) however argues that Lean, when applied correctly, can lead to great results.

3.3.2 Wastes according to Lean

There are three types of wastes in Lean which is of main focus when working with the Lean principles in mind (Smith, 2014). These types of wastes are called *Muda*, *Mura*, and *Muri*, which are Japanese words for three different types of wastes. The origin of these wastes was, as similar to other areas of Lean, firstly identified when analyzing the TPS. They have since the recognition been developed by many researchers, claiming they can be adjusted and applied in new areas, and not only production. Many organizations trying to apply Lean to their processes mainly try to eliminate wastes in the category *Muda*, but fail to see the importance of eliminate wastes in the other two categories (Smith, 2014). The effects of having *Mura* and *Muri* in processes can often be more adverse on the productivity than *Muda*, and often be more difficult to eliminate.

<u>Muda</u>

In traditional Lean the Japanese word *Muda* is considered anything that is not adding value for the customer, both internal and external, and is hence waste. Most organizations consider *Muda* to be of main focus when improving processes using Lean (Smith, 2014). The wastes in *Muda* were initially categorized in seven types of wastes, as the categorization gives a comprehensive view of what wastes can be hidden in processes not adding value (Smith, 2014). In recent time an eighth kind of waste has often been used within *Muda*, '*Under-utilization of people*'. Each waste can differently affect different processes, and can thereby be analyzed in several ways depending on what process is under analysis. This explains why some wastes can be similar in some processes, but be different in others. Since the wastes were originally identified in the TPS they are named based on production wastes. The eight wastes have however been adapted to many other areas, for instance services, product development, construction etc. (Yankelevitch, 2014). A short explanation of the eight major wastes in *Muda* are described below, where the term 'customer' can both refer to internal- and external customers. These descriptions are based on Smith (2014) and Yankelevitch (2014).

Overproduction: The term for producing more than the customer needs. A common reason for this *Muda* is production of products and services in too large batches. This waste is considered the worst *Muda*, as it is often the reason to why other wastes within *Muda* are created.

Inventory: Inventory ties up capital in form of unfinished products, finished products, or work-in-progress. It thereby leads to a demand of storage and activities for increasing the preservation of products.

Transportation: Transportation adds no value to the products or services for the customer, and is hence considered a wasteful process. With transportation the products also bear a risk of becoming damaged, delayed, or lost in the process.

Motion: Motion is the waste inflicted on the production process itself, and should not be mistaken with transportation described above. Motion is hence usually wear and tear on the equipment, or e.g. repetitive strain injuries for workers. Motion as a waste is any movement from workers or equipment that does not add value to the product or service.

Waiting: Goods that are not processed or are in transportation are waiting, which is another non-value adding process. Waiting applies to workers waiting for products or information in the production process as well.

Over-Processing: Doing more to the product or service than what is valued by the customer is called over-processing. Since over-processing does not add any additional value to the customer it is a wasteful activity. An example of an over-processing waste is cleaning beyond what is required by the customer.

Defects (Non-Right first time): Defects leads to scrap or additional work to fix the defects. It hence leads to wasted work or even wasted products. Performing the correct action to the product or service the first time eliminates defects.

Under-Utilization of People: The final waste and the newest addition is the under-utilization of people. Employees are hired based on their competencies, but often have other competencies beside what is required for the job. Not utilizing these competencies can be considered a waste. Under-utilizing employees can damage the ability to continuously improve organizations.

Mura

The expression *Mura* is strongly connected to the term inconsistency in process flow. *Mura* is created when processes flow unevenly, requiring different capacities during different times (Yankelevitch, 2014). This variation of capacity need can result in i.e. over-staffing, or machines not being used fulltime, meaning capacity that could have been used will be lost. To handle *Mura*, Lean practitioners aim to create a steady workflow in the processes with a continuously filled capacity.

Muri

The last kind of waste in focus in Lean is called *Muri* and focuses on overburdening single steps in processes. Activities that are non-value adding based on work that is unnecessary is hence considered *Muri*, and a typical example of *Muri* is reprocessing broken products (Yankelevitch, 2014). *Muri* is however closely related to some aspects of *Muda* such as over-production, but can be helpful in some cases as another way to categorize waste according to Lean. Often *Muri* is the effect of having *Muda* in processes, and the overburdening can often be addressed by standardizing tasks to be performed in a single way (Smith, 2014). By doing so the process becomes more predictable and consistent.

3.3.3 Development of Lean into other industries

With the concept Lean being flexible and applicable to different processes, the philosophies of eliminating wastes has in recent times become more used in service industries. Terms and concepts like Lean Health care, Lean Product Development, and Lean Construction have become trendy, applying the principles found in Lean manufacturing to new areas (Liker and Morgan, 2006). A

typical example of this is within health care, where research has shown that Lean applied correctly can improve both the quality of care and efficiency (Kim et al., 2006). Even though principles from Lean applied to services uses the ideas of eliminating wastes and continuously improving all processes, the wastes had to be adjusted to fit the service sector more correctly (Sarkar, 2007). The wastes searched for when applying Lean principles to services might hence have different titles compared to the original ones, even though they are based on them.

The adaptation of Lean manufacturing into the service industry shows that there is a large flexibility in using the principles of Lean in new areas, but it also shows the importance of adjusting the wastes correctly, so that the wastes easily can be identified in the selected processes. Still, many wastes in service industry processes can be identified using the described wastes from manufacturing.

3.3.4 Lean applied to communication

As mentioned, principles from Lean can be used to analyze internal communication in organizations as a process. Improving processes according to Lean is made by eliminating wastes, and can according to Yankelevitch (2014) be done with high success to internal communication. Yankelevitch (2014) states that even though the communication process has little in common with production processes, the original definitions of *Muda*, *Mura*, and *Muri* can be very helpful when searching for wastes in communication as well. These original production wastes can thereby with a small adjustment be transformed to become applicable to the process of internal communication in organizations, in order for organizations to eliminate them. According to Yankelevitch (2014) the wastes in communication after the adjustments becomes:

Muda
Muda is still categorized as anything that does not add value to the customer, internal or external, and consists of eight standardized wastes. These wastes definitions are however slightly changed.

Overproduction: Any communication resulting in too much information shared to the receiver is seen as an overproduction of information. The excessive information transferred can redirect focus away from the sender's actual intention.

Inventory: Information saved that is no longer useful is considered inventory. Not only can it confuse the receiver regarding what information is the correct, but it can also take longer time for the receiver to find necessary information.

Transportation: The process of transporting information through more recipients than needed adds no value to the customer and is hence a waste. By doing so, the information takes longer time to reach the customer, and with a higher amount of recipients the larger the risk is of damaging the information. Since different receivers of information sometimes interpret information differently, even a small alteration to the original message can become a large misinterpretation in the end if the message travels through many recipients.

Motion: Similarly to production processes, motion of information can damage employees or equipment in the long run. As examples, handling too much information for employees can lead to them confusing information, and computers can take longer time when processing more information.

Waiting: Waiting for information to be shared is similar in the process of communication as it is for production processes. If employees need information in order to efficiently handle their work tasks, but cannot access it instantaneously, they are waiting. Waiting for information has the same effect as waiting for products in a production line; mainly the waste of employees' time which costs the organization money.

Over-Processing: Over-processing information leads to unnecessary work that adds no value to the customer. If employees are given the opportunity to interpret information freely they might interpret it as a request for unnecessary work. As an example, if the instruction handled to a painter is 'Paint the wall' the painter will probably paint the entire wall, but if areas of the wall forever will be unseen

there is a waste in painting these areas. The information ‘Paint the wall’ was over-processed, and should optimally have been interpreted as ‘Paint the wall which will be seen’. Sharing information which can be too widely interpreted can hence lead to over-processing of this information.

Defects (Non-Right first time): Defects in information lead to work being done in an incorrect way, often leading to the consequence of having to redo the work. Depending on how defect the information is and in what situation, the severity of the consequences varies.

Under-Utilization of People: Similar to other processes, not using the employees’ capabilities to the maximum is considered a waste in the process of communication. Communicating in a way that prevents using all employees’ capabilities should be avoided.

Mura

For the process of communication, *Mura* means inconsistency of the flow of information. Having inconsistency means information in different sizes are shared unanticipated, meaning that a company has to be prepared for a large information batch at any time. *Mura* in communication is typically seen in data processing companies that have to be prepared for large batches of data from e.g. their customers. Constantly being prepared for the maximum workload means being overstaffed whenever maximum workload is not required, resulting in huge wastes for organizations.

Muri

Muri in the process of communication is often represented as sharing too much information with employees, talking about issues that are not to the point, and piling ideas on top of each other during meetings. *Muri* in communication might lead to assignments not being completed or a poor execution of processes. *Muri* is difficult to differentiate from some of the wastes in *Muda* for the process of communication, but can for some organizations be useful as a way to categorize overburdening people with information.

4 Empirical framework

Information collected from literature, interviews, focus groups, observations, and action research is presented in this empirical framework. Information from literature and external interviews is presented with sources, while information regarding Rådahemmet is not, in alignment with the ethical considerations of this study.

The chapter begins with a short explanation of how elderly care functions in Sweden and the environment in which nursing homes operate. It then moves on to the specific case study at Rådahemmet, describing how the organization functions and is operated. Further on, Rådahemmet's internal communication is divided and investigated according to the four described visualization categories; *Identification*, *Information*, *Instruction*, and *Intention*. Within each visualization category, identified internal communication purposes and how they are communicated are then described.

4.1 Elderly care in Sweden

In general, elderly care in Sweden is similar to other health care service industries, with a high customer focus[5]. The elderly care is divided into home care and care through nursing homes[5]. In home care residents are serviced in their individual homes, where care providers travel to each resident when needed[5]. In nursing homes residents live in assigned apartments and are treated throughout the entire day. Elderly are treated within these two categories depending on how much help they need, where they live, and how each municipal handle their elderly residents. While some municipals allow private organizations to operate on the market, others regulate this and state that the municipals solely should organize the elderly care.

According to Bengtsson and Scott (2011) an estimated 26 percent of Sweden's population will be over 65 in 2050, compared to 18 percent in 2000. This means that the service sector of elderly care in Sweden is continuously increasing. Sweden is also one of the top spenders on elderly care of the OECD countries, second placed with 3.6 percent of GDP in 2010. However there is a trend of decrease in total spending for elderly care, -1.6 percent 2003-2007 (OECD, 2013; Socialstyrelsen, 2009). Even though this is highly dependent on the political climate, the trend that resources for elderly care are decreasing does not indicate any substantial increase in funds in the near future. The existing resources will hence have to be used more efficiently to increase quality of service, in order to meet future demands. Sweden's different political factions differ in their view on how the increase in demand on elderly care should be met, but all agree upon that improvements has to be made to ensure that everyone have access to high quality elderly care. One example of actions taken is the financial incentives that currently are being offered to local municipals for improving the care standard. This is given by the National Board of Health and Welfare (NBHW) to municipals which have successfully implemented change resulting in higher quality care standard (Socialdepartementet, 2011).

4.2 Nursing homes

Nursing homes in Härryda municipal are divided into two categories, nursing homes caring for elderly, and nursing homes caring for elderly with dementia[5]. Elderly diagnosed with dementia require a larger amount of care, which is why they usually are treated in specialized nursing homes. In regular nursing homes, elderly with physical conditions making them unable to care for themselves are treated.

The majority of the responsibility of elderly care lies with the municipals. Nursing homes are however affected by laws and regulations on a national level, and have to adjust to new laws and initiatives when implemented[5]. NBHW, since 2009, annually publish an open comparison of Sweden's nursing homes' performances in various quality indicators (Socialstyrelsen, 2014). These open comparisons are not only a mean for local governments to evaluate their elderly care, but also increases the elderlies knowledge about the different homes' performance. This increases both municipals' and residents' possibilities to put forward demands on the nursing homes.

[5] Forsgren, Tina. How Similarly Does Municipally Regulated Nursing Homes Function?. 2015. In person.

Most parts of elderly care, and hence nursing homes, are led by the municipals in Sweden. Simultaneously as the country's government political elections are held, each resident votes for municipal political factions. The political faction with majority in each municipal controls and regulates the elderly care, following the laws and regulations put forward on a national level. Residents in Sweden pay between 29 and 35 percent municipal tax on all incomes, with government taxes paid only by higher income residents (Statistiska Centralbyrån, 2015). The municipal tax money is then used by each municipal based on the political faction's annual budget, which elderly care is a part of.

Even though elderly care is regulated and controlled by each municipal there are often networks between geographically close municipals. This means that if improvements in elderly care are made in one municipal, the improvements can be shared with other municipals as there is no competition on regional level[6]. Municipals hence share information on how they operate and how to improve processes in elderly care. Even though regulations that affect elderly care are made top-down from the political factions, there have also been improvements from employees of nursing homes. According to Forsgren, there are many similarities between municipally regulated nursing homes, meaning the transferability of improvements in nursing homes is high.

4.3 Case study at Rådahemmet

The organizational structure of Rådahemmet is described in this section along with information regarding the environment it operates in and the facility layout. Information regarding the organization's communication will be presented more thoroughly in the next section.

The nursing home studied, Rådahemmet, is one of seven municipally operated nursing homes located in Härryda municipal, in Västra Götaland. There are currently no private nursing homes in this municipal. Rådahemmet is a four floor facility which provides 42 residential apartments. The approximate annual turnover is 17 million SEK and the nursing home has on average 38 permanent employees. In addition to these employees there are also nurses, a social service representative, canteen personnel, and a physiotherapist working in the facility but under different organizations.

The nursing home's organizational structure can be seen illustrated in **Figure 5**. Management at Rådahemmet consists of three positions. Head of Unit is ultimately responsible for the internal organization. Supportive to the Head of Unit is the Coordinator, which is mainly responsible over the

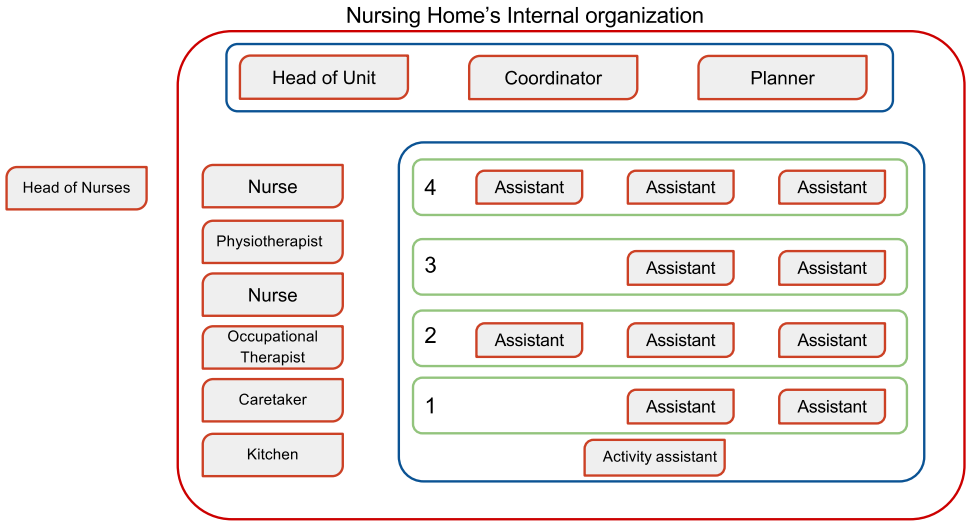

Figure 5: Rådahemmet's internal organization

[6] Forsgren, Tina. How Similarly Does Municipally Regulated Nursing Homes Function?. 2015. In person.

daily activities in Rådahemmet, and the Planner which aids with scheduling. The employees caring for the elderly (Assistants) work in three-shift, where on weekdays ten assistants work on day shift, eight on evenings, and two at night. During weekends there are usually eight working during day and evening shifts, and two during night shifts. Assistants are assigned to one of the four floors in the facility where they have their main responsibility during the shift, and have the corresponding intercom and alarm telephone. It is however not uncommon that they are scheduled with tasks on other floors, resulting in a fairly dynamic structure.

The residents at Rådahemmet are mainly elderly with high care demand, mostly from physical disabilities rather than dementia. Elderly with dementia are cared for by homes specialized in this, and residents at Rådahemmet developing dementia are recommended to transfer to these. The elderlies' dynamic health situation results in a variation of care demand over time. This leads to that some floors might have a higher workload over time than others. To level the workload, these more work demanding floors are manned with an extra assistant during day shifts.

The allocation of assistants to floors has been undergoing large changes during the last years. This is mostly due to the alarm system used in Rådahemmet. In the beginning of a work shift, all assistants collect an intercom telephone corresponding to their assigned floor. Alarms from residents are automatically transmitted to the specific floor's intercom telephones whereby assistants can answer. Variations to this structure, where floors have been grouped two-and-two and assistants allocated to both floors have been tried. The alarms from residents then reached all intercom telephones on the two floors, with the aim to reduce response time. This change was however not made permanent as assistants experienced too much disturbance from alarms ringing constantly. In the present system, alarms only reach telephones on the corresponding floor, but the intercom telephones allow for assistants to manually call other floors for assistance. The telephones are collected and returned in one of the office rooms in the personnel area at the start and end of a shift.

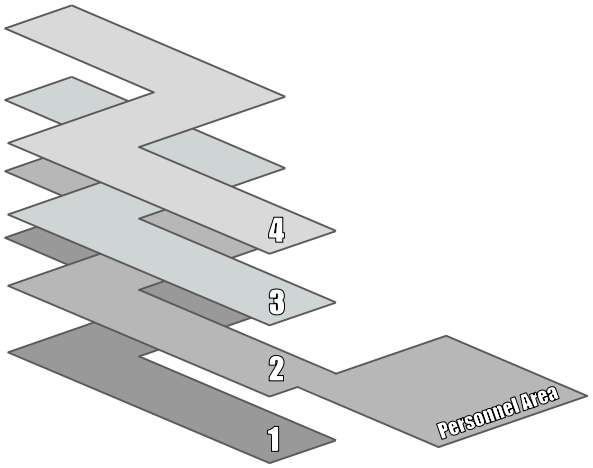

Figure 6: Rådahemmet's facility layout

The personnel area is located in an adjacent part on the second level. It contains a break room, staff kitchen, conference room, documentation room, offices, and a changing room. All employees visit the staff area at the start and end of their shift, and also occasionally during the shift. This is where morning meetings are held and where documentation is done and stored.

4.4 Communication at Rådahemmet

As an initial start of the case study a focus group discussion was held with the coordinator and assistants. The purpose for the session was to investigate what the main underlying reason for some of the problems and complaints experienced at Rådahemmet was. The Affinity Interrelation Method used during the session to guide the discussion resulted in an agreement that communication, or rather lack of communication was considered the main root cause. Additional factors in the conclusion were the many stressful situations during shifts, and lack of knowledge of responsibility.

Rådahemmet has a flat organizational structure where information flows in all directions. This information not only flows between assistants and management, but also between the other functions working in the nursing home. The communication flowchart below, **Figure 7,** illustrates that most members of the organization are required to communicate with every other member.

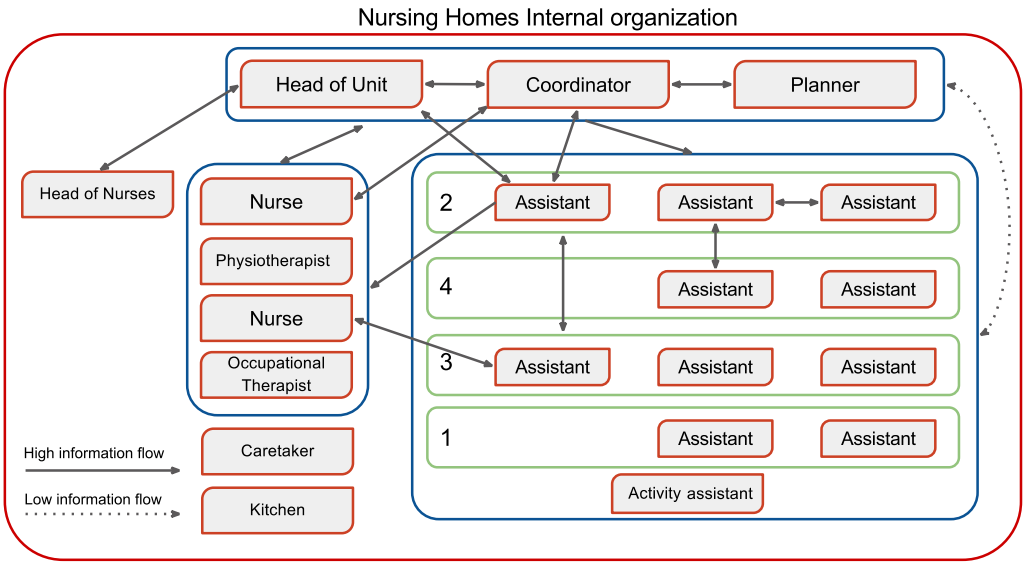

Figure 7: Rådahemmet's communication flow chart

In order to achieve this illustrated communication, a wide variety of communication means are used with usually no standardized method for reaching out to correct receiver. Management frequently uses e-mail to communicate, but some information is also communicated via notice boards and verbally at meetings or in person. Communication between assistants and external functions, such as nurses, are usually managed verbally in person, and then rely upon the individual to pass the information forward. The lack of standardized communication channels is however not perceived as problematic by the employees or has not been reflected upon to greater extent.

The direction of the communication, and who the sender and receiver are, can in some cases affect the choice of communication channel. However, as mentioned previously, similar information is often transmitted differently between times. The purpose of the communication at Rådahemmet was identified as the main factor to affect the choice of media. 18 main communication purposes were identified during interviews and observations. While these 18 communication purposes not completely describe the communication in Rådahemmet, they were considered having most influence on the organization's functionality. The identified purposes for communication and how they are handled at Rådahemmet will in the following section be comprehensively described. For structural reasons, the identified purposes have been categorized into the four areas of visualization.

4.4.1 Identification

Identification at Rådahemmet is divided into identification of objects and identification of documents, as the two parts are handled differently. Different objects and documents are identified in various ways at Rådahemmet, mainly based on the function of the object or the documents.

Objects

Objects at Rådahemmet are below divided and described as consumables and equipment, to better describe how objects currently are identified.

Consumables are the objects that are consumed and need replenishment. Only a few consumables have specific places or are currently identified in any way. There is a storage room for bandages, but otherwise each employee has to learn where to look for certain consumables, simply by asking others or from experience. For new employees this can become troublesome as they continuously have to disturb other more experienced employees with questions of where to find objects. There have been initiatives to store consumables in a more standardized way, but there are still issues. Since there is little structure on where consumables can be found, it becomes hard for employees to know if replenishments have to be made.

Equipment is considered objects that are frequently used when treating residents at Rådahemmet, but that does not require replenishment. Some equipment at Rådahemmet is identified using tags showing what the equipment is, and where it belongs. However, far from all equipment that could benefit from such identification have such tags. Often, employees have to look for equipment, such as utility carts and scales. When these objects cannot be found, employees either ask others or search again later during the day. There is no way to know if anyone else is using the equipment or where the equipment should be placed when unused. All this hence has to be learned from experience, making it hard for new employees to fully understand where to collect equipment and sometimes how to use it. One employee stated that much unnecessary time is spent looking for equipment during the day, and that it is a large time wasting.

Documents
New employees experience that there is a large amount of information and instructions to learn, both by heart but also where to find it. Instructions and information concerning specific residents have a designated space in all apartments, which is expressed to work well as the information is easy to find when needed. These documents are located in similar space in all apartments, making it easy to find in all apartments. Other, non-resident specific documents are collected in the documentation room and categorized in folders. This makes it easy for employees to know in which room to search for information, but it has also led to occasions where the information was hard to find i.e. lost in the masses. Folders in the documentation room are noticeable labeled by content but have no designated place.

4.4.2 Information

The definition of communication is often interpreted as transferring messages, or information, from one person to another. This is however not the case of the visualization area *Information* since this is, as mentioned earlier, considered the visualization of data and facts rather than ambiguous information.

Six communication purposes of this kind of information were identified at Rådahemmet and are described in more detail below.

Contact information
Contact information is regarded information on who to contact in a specific need. There are currently two types of contact information shared in Rådahemmet; contact information to relatives of the residents, and work related contact information. Contact information to relatives is updated in each resident's individual treatment plan, updated when needed and stored in each resident's living room. Each resident has an employee responsible for updating this treatment plan, and the contact information to each resident's relatives is considered well revised.

Work related contact information on the other hand is currently communicated in different ways depending on who is to be contacted. Information regarding who to contact can be found in residents' individual treatment plans, in quality specifications regarding work tasks, in Rådahemmet's digital system (Treserva), as well as in various documents in the documentation room. There is hence no systemized way for employees to figure out where all contact information is gathered, whether it's important contact information such as to specific doctors, or information to e.g. the company responsible for transportation of the elderly. Employees have, during interviews, expressed concerns regarding the time and effort it takes to sometimes find correct contact information, as there often is too much information to search through. During observations it also became clear that some contact information is incorrect and obsolete.

Task schedule
The employees' task schedules are considered *Information* and not *Instruction* as it deals with what to do, and not how to do it.

Each employee is, at the start of their shift, handed a printed task schedule of what work tasks they are supposed to perform during the day. In this task schedule, information regarding what to do, as well as how long each work task should take, is written. The system of having printed task schedules with this

information is a municipally regulated action, meaning that all nursing homes in Härryda have to use it. The system to share this kind of information has been received differently. The employees tend to like the system of being handed their work tasks in the beginning of the shift, as they then know what to do during the day. Some employees however, together with the management, express belief that this printed task schedule provides a false belief that all necessary responsibilities are expressed. While some employees use the printed task schedule as a guideline for the work day, as it should be used, some tend to follow it in a strict manner. By following it too strictly Rådahemmet's management believes that some of the core responsibilities when treating the residents may in the end be forgotten. Since the initiative is a municipally regulated action, there is nevertheless a requirement to use it, meaning it cannot be removed. However, there is potential for changing what information is shared in each printed task schedule.

Even though each individual is handed their daily task schedule in the start of the shift, there is no systematic way to figure out what other employees are working with. Employees' schedules are not shown to others, and there is no way for employees to know if anyone has a stressful work day, unless they specifically ask for help. Some more experienced employees state that they, with their experience, can tell if other employees are having a stressful work day as long as everyone shares information regarding their scheduled work tasks. There is nonetheless no systematic way of doing so, and not all employees have this experience either.

Residents' dynamic health situation

Since the health situation for many residents in Rådahemmet tends to change relatively frequently, there is a need to communicate these changes efficiently. At Rådahemmet, changes in residents' health situation are documented in the digital system Treserva. Information from nurses or doctors regarding specific residents is shared verbally to an assistant who then is responsible for updating the information in Treserva. When information has been published in Treserva, the information sender then also puts a mark by the resident's name in a specific folder. At the start of a shift, all other employees must check this folder to make sure no new information has been shared regarding the residents. If any long term changes are to be made, the employee responsible for updating the resident's individual treatment plan updates it. When asked about this system used to share the dynamic health situation of the residents, most employees agree that it works well. One employee however mentioned that there have been cases when employees have forgotten to put a mark in residents' names in the folder, resulting in information not reaching others. The effects of forgetting to share this kind of information have never resulted in any danger for the residents, but it is not risk free.

Daily work force / Work teams

At Rådahemmet, each employee collects an intercom telephone at the start of their shift, and each employee is then responsible to write their name and which floor they are working on, on a whiteboard. By doing so, employees can see who they are working together with during their shift, and how to contact each other if necessary. During observations it became clear that the employees tend to write their name on the board and then directly head to their assigned floor, making it impossible for the first employees who write their names down to notice who they are working with. It hence becomes difficult for them to know who to contact if they need help, unless they go back to the whiteboard. It also became clear that it can be difficult for employees to know who has been working with the residents in the earlier shifts.

When employees become ill and cannot be replaced in time, other employees working on the same floor has to cover up for the work tasks missed out. Information regarding sick employees is shared during morning meetings from the coordinator to the employees on the same floor. During the morning meetings this information is thereby shared with employees on other floors as well, but during other shift changes this information is hence not shared with other floors. During observations of monthly workplace meetings it became clear that this knowledge can help employees figure out if other employees are having high workloads, to enable helping them out. Since there currently is no such system, this information does not reach everybody, meaning there is little chance of figuring out that other floors are understaffed.

Irregular deviations from task schedule

During the weekdays there are often irregular deviations from the employees' handed task schedules. When employees experience deviations from their task schedules they try to make up for the delays later during the work shifts. If they cannot make up for the delays, this information should be shared with the Head of Unit, making it possible to schedule the next shift to perform these work tasks. There is however no standardized way for employees to share this information to the management, as different employees shares this information differently. While some employees tend to send this information via e-mail, some talk to the Head of Unit face to face. There have also been cases where employees have forgotten to share the information with the Head of Unit, or that they felt the missed work tasks were not important enough to bother anyone with the information.

A way to avoid deviations in the task schedule is for the employees to receive help from others when needed. At Rådahemmet employees use the intercom telephones to call other employees directly when help is needed. This is however often used excessively, as employees complain that their telephones are ringing constantly. Since there is no other way to receive help than to ask for it directly, employees sometimes ignore their telephones as they prioritize their own task schedule. During a monthly workplace meeting, one employee stated that not knowing which employees have stressful task schedules results in unnecessary calls.

Complaints and errors

Information regarding complaints from residents or their relatives is shared differently in Rådahemmet, based on the severity of the errors made. Small complaints are often shared directly between residents' relatives and the employee responsible for the error. Information regarding more severe complaints is however often shared during morning meetings or monthly workplace meetings. Sometimes this information reaches all the employees, but sometimes it only reaches the ones who made errors, or the Head of Unit. There is no easy way for employees to know what complaints have arrived to Rådahemmet or what previous errors have been made, other than errors that concerns the residents' safety which is logged in Treserva.

Recurring complaints are written in a weekly published letter, shared with all the employees. An example of a recurring problem that hasn't been solved is the faulty usage of the laundry machines, resulting in damage of the residents' clothes. Instead of using a systematic way to share ideas of how to solve the problem, the complaints are written in the weekly published letters and damaged clothing is hung in the meeting room as a reminder of the errors.

In the interviews, some employees show insecurities of how to act when an error is identified in work tasks. While some employees would directly tell the employee responsible for the error, other employees state that they would keep quiet about the error if there is no risk of affecting elderly's health, to avoid conflicts in the work place.

4.4.3 Instruction

Instruction is considered transferring of task specific knowledge between employees. *Instruction* is divided into responsibilities, work tasks, specific work tasks for individual residents, doctors' prescriptions, best practice transferring, and meal routines.

Responsibilities

Responsibilities of the employees are considered what each employee is responsible for, and in charge of when working at Rådahemmet, and should describe why they are required to perform certain work tasks. It is not the same as each individual's work tasks, as this is considered another kind of information. The responsibilities of the employees are currently communicated in different ways at Rådahemmet, depending on what responsibilities are being communicated. From interviews, it became clear that different employees interpret their responsibilities differently. Many of the assistants perceive the responsibilities as simply performing their work tasks, and anything not explicitly expressed is hence considered beyond their responsibilities.

Some employees however state that there are some common responsibilities beyond their written work tasks, but that these currently are tacit or difficult to find. They state that most employees know what they are responsible for when working at Rådahemmet, but that it takes time and experience to figure them all out. A typical example stated by one employee is the responsibility to treat each resident with similar respect and to avoid favoritism. This responsibility can be found written in Rådahemmet's quality specification and in their dignity guarantee along with other responsibilities, available in the documentation room. There is altogether a high insecurity between employees regarding what their responsibilities are, and where they can access information regarding them. Some of these responsibilities are expressed in written form but not learned by everyone, and some are tacit and needs specification. Some of these responsibilities are also taught in a one day educational day held for new employees.

Work tasks

How a work task should be performed is documented in what Rådahemmet collectively calls quality specifications. These consist of three subparts: *Instructions*, *Quality*, and *Dignity*. *Instructions* contain a bullet list of a step by step description of subtasks which all should be carried out in order to complete the full task. *Quality* explains to the reader why said tasks affect the quality at Rådahemmet. *Dignity* connects the task to the residents' dignity guarantee. It thereby not only informs the reader on how the task should be performed, but also aims to explain the importance of it being performed correctly.

The quality specifications are kept in folders which are stored in the documentation room. Employees have expressed during interviews that there are comprehensive instructions of work tasks. Uncertainties that may arise during work can usually be resolved by reading the quality specification of that task, and finding the right quality specification in the folders is considered easy thanks to indexing. Management has however expresses concerns that the routines are not always followed, leading to complaints and affecting the quality in care.

It has appeared from both interviews and observations that there usually is little time to read specific routines when uncertainties arise. Employees state that this is mainly due to the long distance between the storage of the instructions and where the uncertainty occurs. This makes it inconvenient to find the quality specifications, and therefore most employees instead ask a colleague for assistance or perform the task to the best of their ability.

Specific work tasks for individual residents

In addition to the quality specification, each resident have their own individual treatment plan. The quality specifications are general routines for Rådahemmet, while the individual treatment plans are a collection of instructions specified for each resident. These include instructions related to e.g. hygiene, meals and medication. Each individual treatment plan is formulated by an assigned employee together with the resident, and is based on the resident's wishes on how they want everyday activities and doctor's ordinations carried out. The individual treatment plans are written in consent with the residents and are available to consult employees, elderly, and relatives in the residents' rooms at all times. The assigned employee (called contact man) is responsible for keeping the individual treatment plan up to date with all changes in medication and residents' desires. Even if no changes have been made, the individual treatment plan is reviewed together with the resident once a year in order to assure it meets their needs and requirements.

Employees are generally content with the use of individual treatment plans. The treatment plans makes it easier for employees who are assigned work tasks at residents they have not been in contact with before or know their routines by heart. As these instructions are available in the residents' rooms they are considered easily accessible and are often consulted first when assistants enter residents' apartments. Changes in the individual treatment plans are made by the contact man and are communicated via Treserva.

Doctors' prescriptions
Instructions regarding new medication for residents have a systematic way to be shared, as the information is considered very important. Each resident has an individual medication document describing how they should be medicated. When changes are made in medication through a doctor's prescription the information is first written in Treserva by an assistant, and then changed in the resident's folder. The contact man is responsible for updating this folder as well as the individual treatment plan. The system for sharing information regarding changes in medication through doctors' prescriptions is considered highly functional by the employees, and no severe errors have been made due to it. One employee however stated that there have been some problems when medicine brands have changed names and the medication's name in the residents' individual folders haven't been updated accordingly.

Best practice transferring
In general, employees at Rådahemmet rely on the quality specifications and the individual treatment plans to be describing best practice. It has however been stated during interviews that this might not always be sufficient, as some tips or techniques might be difficult to describe in text, and quality specifications might hence not always be optimized.

The communication of best practice on how to perform work tasks in the best way is mainly done under the first days for new employees, when shown how to perform tasks. After the first introduction days there is no standardized procedure for employees to share their techniques or learn from others. During interviews, employees described that there is a possibility to observe how others work when working in pairs. This is however only the case at work intensive tasks, and it is also unusual to comment on others' techniques, especially toward more experienced employees.

Meal routines
Meal routines are handled with a designated card system. Each resident have their own meal card which contains information on their food preferences, instructions of nutrient requirements, and allergies. When residents arrive to the dining area, employees take the corresponding meal card and portion the meal trays according the instructions. After the tray is portioned, the card is placed in a corresponding box. This allows employees to quickly see which residents have received their meal, ensuring that no one is forgotten. This system was introduced a few years ago, and is perceived well-functioning by employees. Newer staff members have an easy time understanding how it works, and the system reduces the risk of confusion during meals.

4.4.4 Intention

Intention describes the intended future states and communication needed to achieve this. *Intention* is divided into changes in instructions, goals and visions of Rådahemmet, and change projects.

Changes in instructions
At Rådahemmet it is not uncommon that new routines are introduced or old routines are changed. When a change project is deemed needed or directives change from the municipal, a new routine is set up or an old one is updated. Changes in routines and the quality specifications are always communicated verbally on morning and monthly workplace meetings. Additionally, the new routine is also displayed on a notice board together with the most recently changed routines. For employees not attending morning meetings, and hence working later shifts, this information is mainly communicated verbally between employees, but they can also check the routine notice board.

Changes that affect specific residents and changes in individual treatment plans should always be reported in Treserva. It should also directly be incorporated in the instructions in the individual treatment plan folder which is located in the residents' apartment.

Goals and visions
Goals and visions of Rådahemmet are displayed on the wall in the conference room. The goals are formulated by the municipal according to state directives. It is however up to each nursing home to determine and formulate how these should be reached. By Rådahemmet, this is done in team exercises

during a reflection day, which is held once a year. Even though employees are participating in developing the method for reaching the goals, there is generally little knowledge of them. It is also something not discussed in meetings if not specifically on meeting agenda. The conference room where goals and visions are located is not the most frequently visited room and is almost solemnly used for larger staff meetings.

Change projects

Rådahemmet has an environment which is very open to change. Employees frequently come with ideas which might improve the organization and inform about problems that need attention. The management is also constantly trying to improve identified problem areas and follow up on incoming complaints. They are open for trying most ideas for a period of time, to then evaluate the effects. The decision for implementing a change can be taken at any of the scheduled meetings and is then usually evaluated at the larger monthly workplace meetings.

There is some inconsistency in how change projects are communicated, especially for ongoing projects. If a decision to try an idea is taken on a weekly meeting or at a morning meeting, this information is then shared verbally to the rest of the work force through the employees who attended the meeting. Larger projects are often additionally communicated through the weekly e-mail from management. This information does not seem to reach out to everyone as there is some confusion among employees on what changes that are being tried at the moment, and which employees are responsible for implementing them. After a change has been evaluated, which is usually done at monthly workplace meetings, one of two scenarios occur. If the change is deemed successful a new routine or quality specification is written and put on display in the office room. If the change did not create an improvement the project is simply terminated with no further action or documentation.

4.5 Action Research

As a way to test the possibility of using visualization in elderly care, a small action research was conducted. The action research was conducted by implementing a visual board as aid to help in problem areas identified from interviews and observations. There were two main investigations made with the implementation; to investigate if visualization tools found in other service areas could be helpful for communication in elderly care, and to test employees' attitude toward visual communication. A positive answer to the first investigation would mean that elderly care might benefit from many other visualization tools found in other industries, and that there might not be a need for large adjustments of these tools to fit elderly care. A negative answer could on the other hand mean the opposite, that there is a requirement to greatly adapt visual tools to fit elderly care specifically. The second investigation was conducted to get an understanding of how future recommendations to Rådahemmet could be influenced by the resistance to change, from the employees.

4.5.1 Performing the action research

The two visualization areas, *Information* and *Intention* were chosen for the action research as communication purposes were identified as problematic in these areas during the empirical study. External interviews suggested that the communication of these purposes could be improved by utilizing a visual board.

The visual board was implemented in the location where morning meetings are held and consisted of two parts. The upper part displayed visual *Information* of which employees work during shifts, to create knowledge regarding whom to contact on each floor if necessary. It also showed information regarding activities during the day, and what would happen at Rådahemmet. The coordinator was also be able to mark which floors had the most stressful days, and if any employee was absent, to enable for others to potentially help if necessary.

The lower part displayed visual *Intention*, and was a systematic way to analyze problems at Rådahemmet to enable change. It enabled employees' potential to together work toward identifying problems and to discuss if change was needed to solve them. A designated employee would then be assigned responsibility for implementing the change, following a structured way to perform it.

While the upper part of the visual board was updated daily from Rådahemmet's coordinator, the lower part required ideas and updates from the employees themselves.

Figure 8: Implemented visual board

4.5.2 The results

During two weeks after the implementation of the visual board, observations were sporadically conducted to analyze how it was used. An interview was then conducted with an employee to validate the information received during the observations. The upper part of the visual board was continuously updated by the coordinator, and the information was conceived as positive, both during observations and during the interview. One employee said during the observations:

"*It gives good and quick information regarding what is going on at Rådahemmet, what will happen during the day, and who I'll be working together with*."

Generally, the upper part was considered a positive change and had a large function in spreading information at Rådahemmet. Therefore, the results were positive toward the ability to use visual tools successfully used in other industries, and that these tools might not need a large adaptation to fit nursing homes.

The lower part of the visual board was however only updated once by an employee, who then updated all parts of the board. Instructions about how the board functions were shared with the employees, but the effort required to use it was considered too large compared to the potential gain of doing so. The results from this part of the board showed that Rådahemmet might be affected by resistance toward change from the employees, and that implementing changes can require planned actions.

In other words, the upper part was used frequently and received positive feedback, while the lower part was conceived as complicated, and was hence avoided as it required the employees themselves to update it. From the interview it also became clear that the employees are welcoming changes regarding using visualization as a work aid. The implemented visual board was considered a very positive change as it gave employees correct information at the start of their shifts, as well as made sure all employees received the information.

Figure 9: Visual board two weeks after implementation

4.6 Visualization at Östra sjukhuset

Two interviews were held with representatives from Östra sjukhuset regarding their work with visual communication. A field study was also conducted to get a better grasp of how visualization tools helped the employees communicate. The field study was originally planned to give information regarding how Östra sjukhuset works with sharing information in the visualization area *Information*, but it was quickly acknowledged that it could also give essential information regarding the other identified areas. The information below is a combination of information from these interviews and the field study. It starts with a short history of the visualization initiative, which is followed by how Östra sjukhuset works with each previously identified visualization area, together with managements identified benefits of doing so.

4.6.1 History of the visualization initiative

Sahlgrenska University Hospital is Gothenburg's largest hospital, and was created in 1997 when the hospitals Sahlgrenska, Östra sjukhuset, and Mölndals sjukhus were combined to function under one name. Together the three units work together to similarly treat patients in the western region of Sweden.

In 2010, Östra sjukhuset started an initiative to implement visualization to a larger extent. The hospital is divided into six treatment areas where each area works differently with visualization, as each area needs different adaptation of the visualization tools implemented. The visualization tools were implemented with two goals in mind; to help the daily work, and to help working with improvements of processes. An improvement model was developed, and both managers and employees were educated on how to follow the model. Within the model, several visualization tools are used to guide the daily work, and to trigger employees to work with improvements.

4.6.2 Identification

Östra sjukhuset are continuously working with identifying all parts that need identification. To identify what objects are and where they belong, Östra sjukhuset identifies the objects with a name tag and its home place. As an example, each utility cart is marked with its function and the home floor, i.e. 'Bedpans, Floor 2'. Important documents and notes are also marked similarly to give a quick visualization of what folders consists of. Shelves are also marked with what documentation belongs there, so employees easily can understand where to look for certain information. Newly purchased objects are also marked with their function, for employees to easily understand how to use them.

Östra sjukhuset has worked with measures to visually identify objects and information for much longer than the initiative, as identifications are relatively easy to implement. There is however an agreement between employees that the effects of using identification measures usually outweighs the efforts. By doing so, it becomes much easier to understand when objects are being used, where to find them, and where to look for information. In general, the effects have been less confusion regarding where to find objects, and less time looking for information. There is also less individual interpretation of what e.g. objects are and how they function, meaning that the identification measures have helped reduce misinterpretations.

4.6.3 Information

Sharing relevant information to employees was one of the main focuses when the initiative was implemented. Relevant information regarding how well different areas are functioning in the hospital is being visualized using data. Östra sjukhuset also uses visual boards to show which employees are working during the day and on what floors. Additionally, they visualize information regarding patients under treatment, to further give easy access to the patients' conditions.

Using visualization to share information, employees feel that its effect mostly is a reduction in time to gather necessary information. Most of the information needed to e.g. figure out whom to contact, to understand how well the treatment area is functioning, or what the patients' health conditions are, can

be gathered instantly from a visual board. The information is then also gathered in a specific place, making it easier for employees to know where to access certain information.

4.6.4 Instruction

Visual instructions at Östra sjukhuset are not frequently used, as no need for it has been identified. Some visual instructions can however be found in tasks that not involve patient treatment, but they are very scarce. No evaluation of how visual instructions have benefitted Östra sjukhuset has therefore been made by the interviewed employees.

4.6.5 Intention

The other intention when implementing the initiative was to benefit improvement projects, and to achieve positive change. Visual improvement boards are being used to trigger ideas from employees and to decide if actions are needed to handle problems.

By using visual improvement boards, Östra sjukhuset's management has detected a reduction in complaints from the employees as they easily can express concerns and problems on these boards. When employees identify a problem, the former way of handling it was to express this problem to the management, or to individually find a solution to it. The visual improvement boards have enabled a more team based approach to working with problems, as employees more freely express ideas and potential solutions to problems identified by others. When using visual improvement boards, the entire team's potential is used to enable improvements.

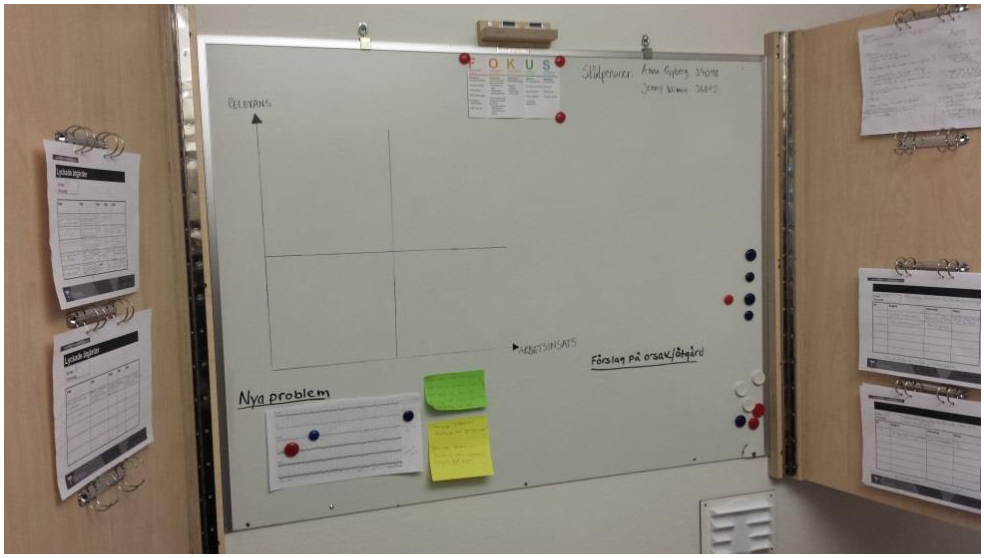

Figure 10: Visual improvement board at Östra sjukhuset

5 Analysis

The analysis of the empirical framework is presented in this chapter. The analysis follows the structure of the four identified areas where visualization potentially could improve communication. Each identified communication purpose is presented, along with the identified wastes within them. An analysis of the potential of using visualization within each communication purpose to reduce the wastes is then conducted and presented. An analysis of the potential disadvantages, and potential creation of wastes using visualization, is also presented where it could be identified. Each of the four visualization areas are concluded with a visual table to illustrate the arguments made in the analysis, with a conclusion regarding where visualization could improve communication in Rådahemmet, and how.

5.1 Identification

From the empirical framework it became clear that some problems are arising in Rådahemmet due to lack of identification on both objects and documents. While some objects and documents are visually identified, far from all that could benefit from such visual identification are. As Chapman (2005) states, the goal with using visualization to identify objects and their designated space is to create an environment that communicates by itself, reducing the need for other communication. By not using visual identification efficiently in all three identified communication purposes, communication wastes have been created in Rådahemmet.

Objects

Objects are divided into consumables and equipment, as seen in the empirical framework.

Consumables

There is an expressed concern from the employees at Rådahemmet that consumables often are difficult to find, and much time is spent looking for information regarding where they are stored. While some consumables are stored in specific places, some are not, making it difficult for new employees to learn where to look for them. The management at Rådahemmet has identified this as a problem and has initiated a project to systematically store consumables in designated places. The time spent looking for information regarding where consumables are stored is what Yankelevitch (2014) argues is the waste *Waiting* in communication, as the information is not accessed instantaneously. Employees have to search for the information themselves, or wait for others to share this information.

In Rådahemmet, some consumables are visually identified with a visually presented home place. A home place is, as stated by Ortiz and Park (2011) a key factor in order to achieve a positive effect by identification. By visually presenting the home place for e.g. bandages, Rådahemmet has reduced the need for communication between employees regarding where to find them. This has in turn reduced the total time spent searching for bandages, which is in line with the potential positive effects with visualization according to Chapman (2005). However, it became clear that not all consumables are visually identified and have a home place, even though many positive effects have been achieved by using it elsewhere.

Using visual identification can, as mentioned, reduce this time spent looking for information by e.g. using a visual home place for all consumables. This has already been done for bandages, and can potentially also be done for the other consumables with similar success. If visually identifying more consumables, Rådahemmet should nevertheless consider not simply visually identifying all consumables, since a risk with visualization is sharing redundant information leading to the waste *Overproduction* of information (Bresciani and Eppler, 2008; Yankelevitch, 2014).

Equipment

Similar to consumables, employees state that they spend unnecessary time each day searching for equipment, as they lack information of where it is stored. This is the communication waste *Waiting*, as the information is inaccessible at the needed time (Yankelevitch, 2014). Some equipment, such as utility carts and scales are often assigned to specific floors but stored on others. It becomes unclear for the employees if equipment therefore is missing or currently being used by someone else.

Some equipment is currently visually identified in Rådahemmet, but far from all equipment that could benefit from it. Chapman (2005) states that using visual identification can create an environment that communicates by itself, and that equipment with clear visual identification can communicate with people that it is stored in wrong locations or is currently being used. Visualizing using home places for equipment as well as using clear identification tags for equipment, expressing where the home place is, could therefore be beneficial to reduce this identified waste.

Documents

Documents are mostly stored in a specific documentation room along with older, outdated documents. Employees have expressed concerns about the time needed to find specific documents, but that when finding the correct document, information is usually up to date. Storing information in locations different from where it is useful is the communication waste *Waiting*, as the information cannot be accessed instantaneously when needed (Yankelevitch, 2014). There is also an expressed problem in saving outdated information in the same documentation room as current information, making it more time consuming to find correct documents. Saving unnecessary information is according to Yankelevitch (2014) the waste of having *Inventory* of information. This inventory of information not only makes it more time consuming to find correct information, but can also create confusion for the employees as to what documents are most recently updated.

Documents in Rådahemmet are most often visually identified using tags showing what the documents consists of. As example, folders containing quality specifications are clearly marked with what quality specifications they include. Using visual identification can create an environment that communicates, and can reduce time spent searching for items (Chapman, 2005). Applying this to the documents in the documentation room using a visual home place for all documents might therefore help reduce the waste *Waiting*. To reduce this waste to the fullest, documents' home places should be as close to their application as possible (Chapman, 2005). Rådahemmet is currently using this method on documents used for specific residents which are stored with visualized home places in all apartments, making the documents easily accessible. Since surface areas often are limited, using visualization often forces employees to analyze and prioritize how items should be stored (Ortiz and Park, 2011). Using visual home places for all documents could hence help prioritize what documents to visualize, and lead to Rådahemmet reducing their *Inventory* of unnecessary documents.

Table 1: Analysis of Identification

Identification			
Purpose	**Present state at RH**	**Identified wastes**	**Visualization**
Consumables	• Identification on a few consumables • Project to mark and assign place for consumables started but not completed • Employees spend time looking for consumables every day	• Waiting: Information about where consumables are stored is not shared instantaneously. Employees have to search themselves or wait for others to share information.	• Home place
Equipment	• Identification on some equipment • Employees spend time looking for equipment every day • Unclear if equipment are misplaced or are being used when missing	• Waiting: Information about if equipment is being used is not shared between employees. Employees don't know if equipment is being used or where to place objects.	• Home place • Clear identification labels
Documents	• Documents and folders don't have specific locations in the documentation room • Contents of folders and documents are somewhat identified • Not all documents are up to date	• Waiting: Information is not shared instantly when needed. • Inventory: Outdated and unnecessary documents can confuse the employees and makes finding right information more time consuming.	• Home place

5.2 Information

Little information is currently visualized in Rådahemmet, and most information is shared through several channels of media. As Parry and Turner (2006) states, the main objective of visualizing information is to create a shared understanding of how the processes work, i.e. how tasks are related, and provide feedback on their statuses. Only a few communication processes in Rådahemmet would benefit from using visualization of information. The most part of communication issues are instead rooted in the different opinions between employees of how to communicate with each other.

Contact information

Empirical studies of Rådahemmet showed that contact information is organized in different ways, depending on who the contact information concerns. While contact information to relatives is shared on the location where it is needed, work related contact information is shared in different ways. Work related contact information is hence more difficult to obtain according to the employees. Since this information cannot be accessed when needed, it is the communication waste *Waiting* (Yankelevitch, 2014). There have also been times where the contact information has been incorrect. Spreading incorrect information is what Yankelevitch (2014) identifies as the communication waste *Defects*. Identifying waste within the communication of contact information to relatives is however more difficult, as the process is considered working properly by the employees. This area was hence not prioritized; even though Liker (2004) states that all processes always can be improved further.

Parry and Turner (2006) states that information should be visualized where it is needed. Visualizing work related contact information where needed could hence be of use for reducing the waste *Waiting*, and can also prevent *Defects* as the information is continuously seen by employees. Visualizing all work related contact information could however easily be considered excessive and redundant, as this information is not frequently needed. With visualization there is a risk of sharing redundant information according to Bresciani and Eppler (2008), which could lead to the creation of *Overproduction* in communication (Yankelevitch, 2014). Visualization of this information could thus easily make the process of communicating contact information more wasteful than before. Using the visualization of *Identification*, as described in *Documents* could instead be an option for reducing the wastes in this communication process. By doing so, the information would still be shared in folders, but the folders would be visualized and stored in a home place, located close to where the information is needed.

Task schedule

The task schedule is a municipally regulated initiative, meaning that Rådahemmet cannot remove this process entirely. They can however somewhat change it to show further necessary information. There are different opinions between employees whether this system is functioning well and how to use it. Most employees however follow it strictly, making sure not to deviate from the schedule. Communicating scheduled tasks to employees on a detailed level could potentially limit the employees to only use some of their abilities, according to some of the more experienced employees. This feature is the communication waste *Under-utilization of people*, where the employees are strictly told what to do (Yankelevitch, 2014). The employees are then not able to help others, as there is no communication between employees of what other tasks, beyond the scheduled tasks, that has to be done. There is also little ability to know when other employees need help, since the current communication system of scheduled tasks not enables it. Furthermore, there is no systematic way for employees to know what tasks others are currently performing. Not having important information when needed creates the communication waste *Waiting* (Yankelevitch, 2014).

According to Parry and Turner (2006) information should be visualized where needed, and can lead to a shared understanding of how processes work. These ideas of visualization would be ideal to reduce the identified wastes within the task schedule. Visualization could both give an understanding of how other employees' schedules look, but also be used to illustrate relevant information quickly when needed. Rådahemmet could hence use visualization effectively within this communication purpose, and visualize scheduled work tasks that affect everybody, as well as visualize scheduled floors and employees workload.

Residents' dynamic health situation

Information regarding residents' dynamic health situation is shared through several recipients at Rådahemmet, making it at risk of the communication waste Yankelevitch (2014) categorizes as *Transportation*. Information that travels through several recipients risk becoming flawed, as different people might interpret the information differently (Yankelevitch 2014). In Rådahemmet, the communication system used for this purpose is however considered well-functioning. There are also no identified application areas of visualization that would lead to a general decrease in wastes in this communication purpose. Residents' dynamic health situation could be visualized and daily updated, but the workload of doing so for all residents would potentially be much larger than the eliminated wastes of doing so. Ortiz and Park (2011) argue that not all information needs to be visualized, and that there is an important need to prioritize what information to visualize, avoiding sharing excessive information.

Daily work force

Information regarding which employees are working during the day can in some extent be seen on a whiteboard in the back-office, as employees have to sign when collecting intercom telephones. Most employees however tend to write their name on this whiteboard, but not register what other employees they are working together with. When employees need information on who they are working with, the information is often not available instantaneously as they have to walk to the back-office. This wasteful activity is a consequence of the waste in communication *Waiting* (Yankelevitch, 2014). Information regarding absent employees are shared verbally, but not to everyone and in a non-standardized way. When an employee suddenly becomes sick and cannot be replaced in time, the other employees working on the same floor have to cover the entire workload of the absent employee. There is no systematic way for employees working on other floors to access information regarding absent employees, to potentially help the remaining employees on that floor. To access this information, employees have to ask the management, which is another sign of the waste *Waiting* for information. This system also disables employees to access information regarding how they can help others, which is the communication waste *Under-utilization of people* (Yankelevitch, 2014).

While the information regarding daily work force is currently somewhat visualized, there is a need to improve the process, and making sure each employee knows about the daily work force. Information should, when visualized, be shown in the location it is needed (Parry and Turner, 2006). This is currently not the case, and Rådahemmet should instead try to make this information more accessible to reduce *Waiting*. Parry and Turner (2006) also state that visualizing information can lead to a shared understanding of the processes, which could be useful for reducing the waste *Under-utilization of people*. If information regarding floors with high workload is shared visually and is easy to access for employees, this could potentially enable them to easier help each other and lead to less variation in workload between employees.

The conducted action research confirmed that the waste *Waiting*, as well as the waste *Under-utilization* of people could be reduced using visualization in this communication purpose.

Irregular deviations in task schedule

When employees at Rådahemmet deviate from their handed task schedule, they inform management about this in different ways, as a standardized way of doing so is lacking. How they inform management depends on the potential effects the deviations might have, as well as the accessibility of management at the time. Information shared in a non-standardized way is at risk of being over-processed, leading to differences in interpretation of the information (Yankelevitch, 2014). Hence, the communication regarding irregular deviations in task schedules could potentially be affected by the waste *Over-processing*. Information is also shared through management before reaching affected employees, which is wasteful in form of *Transportation* (Yankelevitch, 2014)

Some employees expressed that they sometimes not share such information to management, leading to work being done in an incorrect way. This is what Yankelevitch (2014) categorizes as the communication waste *Defects* as defected information leads to work being done in an incorrect way.

The effects of having *Defects* in communication regarding what residents have been treated or not could potentially be severe. Parry and Turner (2006) states that visualization can help give a shared understanding of how processes work and give feedback on their statuses. Having this ability to give feedback on deviations in task schedule could reduce both *Over-processing* as well as *Transportation*, as employees can give information directly to other employees in a standardized way. The mentioned *Defects* in communication are the result of employees not considering information to be important enough to communicate, and not a result of the communication mean.

Complaints and errors

Complaints and errors are in Rådahemmet shared to different people, in different ways, based on the perceived importance of the errors or complaints. There is no systematic way for employees to know what errors have been made in the past and what complaints are being handled. There is a considerable inconsistency in the flow of information from management to employees regarding the complaints making it difficult for the employees to sometimes handle all the complaints they receive. Yankelevitch (2014) identified inconsistency in the flow of information as communicational *Mura*. Since not all information reaches all employees, the communication system prevents the employees to jointly solve common problems that might be root causes to the complaints and errors. Not utilizing the employees' potential due to the communication is considered the waste *Under-utilizing people* (Yankelevitch, 2014).

As Parry and Turner (2006) stated, the main objective of visualizing information is to create a shared understanding of how the processes work and to eventually provide feedback on their statuses. Ortiz and Park (2011) also stated that visualizing information can give a sense of how well the organization is doing, which could be of use for the employees when handling the inconsistency in the flow of complaints and errors. Visualization could hence be a potential waste reducer in this communication purpose. Having information regarding complaints and errors systematically visualized, as well as visualizing all ongoing projects might therefore reduce both the *Mura* identified, as well as potentially unite employees to jointly solve problems. Both the identified *Mura* as well as the waste *Under-utilization of people* could therefore be reduced using visual aids.

Table 2: Analysis of Information

Information			
Purpose	**Present state at RH**	**Identified wastes**	**Visualization**
Contact information	• Work related contact information is shared through several media and in different locations. Difficult for employees to find information needed. • Information is not always up to date	• Waiting: Can't access information directly when needed, have to find it first. • Defects: Information is not always correct.	• No clear possibility for improvement • Visualize Home place for documents
Scheduled tasks	• Different opinions on how strictly to follow the task schedule handed out • Each employee has a general understanding of what to do during the day, but has less understanding of what others do	• Under-utilization of people: Some people follow their schedules strictly, not seeing what other tasks have to be done. Little ability to know when others need help. • Waiting: Not knowing who is available and not during a shift creates time waste when trying to obtain information.	• Visualize scheduled work tasks that affect all employees • Visualize scheduled floors/employees workload
Residents' dynamic health situation	• Information is shared from nurses/doctors to an individual employee, who then shared this information with others	• Transportation: Information passing through multiple persons to reach end receiver risks getting flawed.	• No clear possibility for improvement by visualization
Daily work force	• Some information regarding the present work force is shared, but not to all • Information regarding sick leave and high workloads due to it is not shared to all.	• Waiting: Information regarding the daily work force is not shared with employees when they need it. • Under-utilization of people: Employees cannot access information of how they can help others.	• Visualize which employees work where and when
Irregular deviations in task schedule	• Shared to management from employees in different ways, depending on the deviation and accessibility of the management	• Defects: Some information is not shared with management, leading to work being done in an incorrect way. • Over-processing: Information in not shared in a standardized way, leading to potential differences in interpretation. • Transportation: Information is shared through management instead of directly to other employees.	• Visualize becomes the standardized way to inform. • Visualize missed tasks to give information directly to employees.
Complaints and errors	• Shared to different people, in different ways, based on the importance of the error/complain. • No systematic way for employees to know what errors have been made in the past, and what complaints are being handled currently.	• Mura: There is an inconsistency in the flow of information. • Under-utilization of people: All errors and complaints are not communicated to all employees, preventing the employees to jointly solve problems.	• Visualize the existent of the errors and complaints.

5.3 Instruction

As mention previously the aim for visualizing instructions is mainly to utilize visual communication's ability to transfer large amounts of information and facilitate in conveying knowledge which might be difficult to express in words. Much of the wastes identified can be reduced by the discussed *Identification* of *Documents*, rather than visualizing the documents' contents. These are mentioned in this section but focus is on how visualization can bridge communication difficulties of transferring knowledge as described in the literature study.

Responsibilities

From interviews and the observations it became clear that employees at Rådahemmet have varying perceptions of their responsibilities. One identified reason for this could be a lack of properly defined and documented responsibilities for assistants at Rådahemmet. Each employee form their own view of what responsibilities they have, which in turn is transferred to new and substitute employees during the initial training. Not having the possibility to learn from the source information, but rather verbally transferring the information between employees, creates waste in form of *Transportation* (Yankelevitch, 2014). Each recipient the information passes through risks damaging it with misinterpretations, which are then passed on. This has already happened at Rådahemmet and partially *Defect* information is now being shared.

Visualizing the responsibilities at Rådahemmet could definitely be seen as beneficial. Visualization can help with providing a common view and to communicate tacit knowledge which otherwise might be missed (Eppler and Burkhard, 2005). Creating a common understanding of everyone's' responsibility is an important factor in order for employees to not only align their work, but also to share a common ground which can be discussed and thereby developed if insufficient.

Work tasks

The work tasks at Rådahemmet are well documented in routines which are perceived as easy to understand. The documentation is however located in the documentation room, often far from where the instructions are needed. If employees would go to the documentation room every time an uncertainty arouse it would produce a large degree of the waste *Waiting*, as the instructions are not shared when needed (Yankelevitch, 2014). This is sometimes done, but in the environment they work in, situations that require immediate attention are not uncommon. If uncertainties of the routine occur in these situations, employees firstly ask if someone else knows the routine. If no one is near or can answer, the employees simply take action with the knowledge they have. This can be seen as *Defects* in the communication and results in employees potentially making the wrong decision as they might not have the right information.

Visualizing the instructions can help employees to learn and remember them (Parkinson, 2012). Knowing the routines by heart would certainly reduce waiting for information. Chapman (2005) states that visualization can help people to better remember information, which might be applicable to instructions as well. Chapman (2005) also states that due to limitation in space, organizations are often forced to prioritize which information should be visualized. This can lead to redundant information being disposed, which makes finding the right information easier. The information is also placed closer to where it is used, reducing *Waiting* for employees. If the right information is shared when it is needed there is less risk for employees making wrong decisions due to *Defect* information (Yankelevitch, 2014).

Specific work tasks for individual residents

Each resident has their own individual treatment plan, containing specific instructions on how the resident wants to be treated and what they need. These instructions are located in the residents' apartments at an assigned location. Employees experience this system to work well and find the instructions both easily accessible and understandable. These instructions are used frequently by all employees but are said to be especially useful for assistants not that familiar with the resident. It is the residents' assigned contact man who is responsible to keep these instructions up to date with residents' needs. Any changes in this treatment plan are communicated via a signal folder and through Treserva. Only on rare occasions have these not been entirely up to date which have led to confusion or errors in

care. This could be regarded as waste in form of *Defect* information. There are some potential benefits of visualization for this communication purpose; an assigned home place for the instructions at an easy to access location close to where it is needed, as well as clear visual communication making it easy to detect when changes are made. Apart from these no other direct benefits from visualization was identified, which is mostly due to the employees' satisfaction over this communication purpose's present state.

Doctors' prescriptions

Instructions from doctors regarding specific residents are, similarly to specific work tasks, located in residents' apartments. As with specific work tasks, employees find these instructions easily accessible and understandable. Changes are likewise communicated via both the signal folder and Treserva and are therefore seldom missed. One waste can however be identified in this communication process; the waste of *Transportation* (Yankelevitch, 2014). Doctors do not update instructions themselves, or signal the change. This information is often verbally communicated to an assistant who then is responsible for passing information to the resident's contact man, or to update the instructions. This may lead to misinterpretations as the information is shared through multiple employees, identified as transportation waste. Visualization could have a positive impact on reducing this identified waste but this communication channel was considered outside the scope of this research as doctors are external to the organization.

Best practice transferring

There is currently no standardized way for employees to learn or share best practice for different work tasks. The quality specifications and work task documents are supposed to describe how tasks should be performed in the best way, but employees have stated that each assistant has their own way of handling the tasks. This could possibly be a result of many tasks being difficult to describe in words and thereby leaves a lot of room for interpretation. The only structured way for employees to observe and learn from each other is during the first introduction days where a new employee follows an experienced assistant for educational purpose. However, as no shared agreement of which is the best way to perform a task exists, new employees learn differently and not always the optimal way, depending on the assistant they are following. Not getting the right, or best, instructions from the beginning can be regarded as waste in form of *Defect* of information (Yankelevitch, 2014). Additionally, Rådahemmet is also generating wastes in form of *Under-utilization of people* by not spreading the knowledge of the employees fully (Yankelevitch, 2014).

Complementing the instructions with visual descriptions can help give a common interpretation for the receivers (Weber, 2014). Visualization can be a useful method to help transferring tacit knowledge, which otherwise can be difficult to express in verbal form only (Eppler and Burkhard, 2005). Creating a shared view on how a task should be performed thereby could help reduce waste in form of *Defects* when new employees learn the instructions. It could also increase the knowledge-sharing between employees as a common interpretation of a task facilitates communication around it, and how to develop it further.

Meal routines

Instructions surrounding the residents' meal routines and nutrition information were recently changed at Rådahemmet. The system currently utilizes cards for each resident where all information needed is given. The cards are placed in boxes at the start of the canteen and when an assistant is to plate food for a resident the card is collected. When the food has been plated the instruction card is placed in a new box at the end of the canteen. These card boxes signal to the employees which residents have received food. Employees have expressed that they are content with the new system and find it easily understood, even for new employees. The meal routine system is utilizing elements from visualization both in signaling, via boxes, which quickly communicate to employees who has received food so that no one should be forgotten, as well as by the cards themselves which provide easily accessible instructions at a glance when plating the meal. No additional means of visualizing this communication have been identified as beneficial for Rådahemmet.

Table 3: Analysis of Instruction

Instruction			
Purpose	**Present state at RH**	**Identified wastes**	**Visualization**
Responsibilities	• Different perceptions of what employees' responsibilities are. • Instructions concerning responsibilities are not documented and instead taught from more experienced employees to newer.	• Transportation: Not being able to access information from the source lead to misinterpretations and spread of damaged information. • Defects: Damaged information has been spread in which have led to work not being done the correct way.	• Visualize what the employees' responsibilities are.
Work tasks	• Described well in documents stored in documentation room. • Employees do not always follow the instructions, as the instructions are stored in location where they are not used.	• Waiting: Instructions are not easy accessible when needed • Defects: Employees makes decisions without right information	• Some work task can be visualized at location where needed in order to increase accessibility.
Specific work tasks for individual residents	• Functions well, information is stored where it is used and easily understood. • On rare occasions not up to date	• Defects: On rare occasions are instructions not up to date	• No clear benefit by visualizing.
Doctors' prescriptions	• Using a structured systematic way to share these new instructions. • Shared from doctor, to employee, through documentation to other employees.	• Transportation: Unnecessary handling can damage the information	• No clear benefit by visualizing
Best practice transferring	• No standardized way. • Taught only during first days, when observing. When observing, the observer is affected only by the employees observed.	• Defect: New employees might learn "wrong" during training. • Under-utilization: Not gaining the benefits from spreading employee knowledge	• Visualize best practices to create a common understanding of how to perform tasks.
Meal routines	• Functions well, information is stored where it is used. Easily understood even for new employees.	• Under-utilization of people: Might prevent employees from using their specific knowledge about residents.	• Are presently visualized

5.4 Intention

The identified communication purposes for intended actions are three quite separate areas and the analysis shows a large variety of wastes. The aim with visualization in these purposes are however the same, namely to utilize visual communication's positive effect on creating a commonly shared vision of a future state. This is crucial for enabling employees to align their efforts and successfully achieve positive effects from changes (Kotter, 1995).

Changes in instructions

When changes are made in instructions, other than for specific residents, there is no standardized way of communicating it. Some changes are communicated in written form via e-mails or documents on notice boards, others verbally via meetings or only from one employee to another. This results in not all employees receiving the information in the same way, content wise or medium wise, which can lead to different interpretations of the information. Information is also often required to pass through multiple persons in order to reach all receivers, which according to Yankelevitch (2014) can damage the information and create waste in form of *Transportation*. There is also a risk for employees to miss crucial information of changes if it is only communicated to parts of the staff. This can in turn potentially create wastes in form of *Waiting* as the employees will not have the information instantaneously when needed.

Ortiz and Park (2011) state that information affecting the entire organization often can be beneficial to visualize. Visualizing that a change has been made at the right location will give all affected employees the information when needed and thereby would reduce waste in form of *Waiting*. Similarly, visualizing what has been changed can give employees access to the same information, reducing the risk for damaging the information during what Yankelevitch (2014) identifies as the waste *Transportation*.

Goals and visions

Rådahemmet's goals and visions are displayed on a wall in a conference room. The means to reach these are discussed and developed jointly by the employees during an annual reflection day with team exercises. From interviews and observations it became clear that no other effort was made toward communicating the goals and visions. Also, even though the goals and visions are partially visualized in the conference room this seem to have little impact on employees, as the room is not commonly used. All employees know where to find this information, but have varying knowledge of its content. This is the waste in form of *Waiting* for employees, as the information is not communicated when needed in the everyday decision making (Yankelevitch, 2014).

Parry and Turner (2006) argues that information should be visualized where it is needed in order to achieve the positive effects. At Rådahemmet the goals and visions are located out of sight from much of the daily work, which is regarded as the main factor for employees not raising too much concern of the document's content.

Change projects

Rådahemmet is a fairly change-intensive nursing home with employees constantly willing to come with ideas for improvements, and management willing to try them out. There is nevertheless no standardized process for implementing changes or for communicating what changes are currently being tried. Ongoing change projects are communicated differently, similarly to completed changes in *Changes in instructions*, but are rarely displayed before evaluation has been done. This results in employees having to remember all ongoing projects and their implications, as no information about these is easily accessible. In turn, this can create waste in form of *Motion* as employees are required to remember all information individually. *Motion* can in turn lead to confusion for the employees (Yankelevitch, 2014). As not all employees receive the information from the same source, waste in form of *Transportation* when employees pass information forward has also been identified (Yankelevitch, 2014).

Visually communicating ongoing change projects can be beneficial for many of these identified wastes. An applicable benefit of visualization is that it helps humans' abilities to remember

information better (Berger, 1972). Hence, it can help reduce risks of the waste *Motion* where employees mix up information. Another factor in which visualization could help within change projects is the ability to make information more accessible, allowing employees to quickly be informed about ongoing processes and changes (Parry and Turner, 2006). It can also help create a shared view on what is trying to be achieved, facilitating employees to align their work to this goal (Kotter, 1995).

The conducted action research gave doubtful information regarding if intended change projects should be visualized. The implemented visual board tested the applicability of visual aids in common problem solving with only little success. Even though employees responded positively to the visual board, usage still remained low after two weeks. The results from this part of the action research were regarded to be highly affected by the lack of implementation actions i.e. a plan for how the change would be implemented and educating employees of its usage.

Table 4: Analysis of Intention

Intentions			
Purpose	**Present state at RH**	**Identified wastes**	**Visualization**
Changes in instructions	• Communicated in several ways, both verbally and written • Not communicated to everyone in similar ways	• Waiting: Information concerning changes might not reach all employees. • Transportation: Multiple communication steps might damage the information.	• Visualizing changes gives everyone quick access to source information
Goals and visions	• Shared visually in the conference room • Updated jointly by the employees • Not frequently used by any employee	• Waiting: Not always communicated when needed.	• Are presently visualized, in a room not frequently visited
Change projects	• An open culture toward changes. • Information regarding changes is shared differently, depending on the change • No easy access to information regarding ongoing changes	• Transportation: Information spread through different channels can result in different interpretation. • Motion: Employees required keeping all change projects in their head which can create confusion and mix up of information.	• Visualize ongoing project and results from earlier projects

5.5 Concluding analysis

In the 18 communication purposes analyzed, *Waiting* is the waste which is most commonly occurring, identified in half of the purposes. *Waiting* is according to Yankelevitch (2014) waste created when employees cannot instantaneously access the information needed to perform a task, which results in non-value adding activity in form of unnecessary time spent on finding information. It can however also lead to other consequences than just the cost of time wasted. In a stressful situation, which is often the case in nursing homes, employees may not have time to find the needed information, but instead make decisions and act without it. This can result in other more severe consequences, e.g. quality errors in the care of elderly.

When attempting to reduce the waste *Waiting*, visualization can be beneficial. Visual communication is processed faster than verbal and thereby reduces the time needed to interpret the information (Parkinson, 2012). In order to reduce the waste *Waiting* with any significance it is however, as stated by Parry and Turner (2006), important to visualize the information where it is needed. Executing this would lead to employees receiving the information almost instantly, and thereby minimizing the waste.

The wastes *Transportation*, *Defects*, and *Under-utilization of people* are also wastes commonly occurring, identified in approximately one third of the analyzed communication purposes. Even though visualization might not have the same direct effect on reducing these as with *Waiting*, some clear benefits can be found. Visually communicating information which is currently being transferred between multiple persons would give everyone access to the source information, reducing the risk of the information being damaged during *Transportation* as stated by Yankelevitch (2014). *Defects* in communication are not solved by visualization itself as it is dependent on employees updating and communicating the right information. Visualizing this information can however help shed light on information which is flawed, as it allows everyone to access it and thereby increases the chance of errors being detected. This is also applicable for the waste of *Under-utilization of people* in e.g. problem solving. Visualizing the problem can increase the number of employees the information reach, allowing more people to give ideas for improvements, and it facilitates for cooperation in problem solving.

The wastes *Overproduction* and *Muri* were not identified in any of the analyzed communication purposes. *Overproduction* in communication is a waste created when too much information is communicated to the receiver (Yankelevitch, 2014). This was not identified as the case in in any at the analyzed communication purposes at Rådahemmet, but should be considered a risk when using visual communication. This is due to visual communication having potential to carry large amount of information, and sharing redundant information as identified by Bresciani and Eppler (2008).

The waste *Muri* is described as waste created when unnecessary information is communicated. As both data collection and analysis is based on purposes for communication i.e. what information that needs to be communicated, it was no surprise that this waste not was identified. It is however assumable that unnecessary information is communicated within most organizations. Removing unnecessary and redundant information is according to Ortiz and Park (2011) one beneficial result of visualization as the limited visualization space forces people to prioritize which information to share. This could hence help to reduce eventual *Muri* in the organization's communication. However, in this thesis's delimitation it was decided to not analyze this kind of communication due to the consideration of employees' psychosocial environment.

6 Conclusion

The purpose of this study was to investigate if visualization could improve internal communication in nursing homes from a Lean perspective. The purpose was answered using literature studies, a single case study at the nursing home Rådahemmet in the municipal Härryda, as well as with action research. Communication is a wide expression, and communication processes in organizations are thereby difficult to analyze. One identified way to approach this difficulty is to use principles from Lean to identify wastes in the communication, which is the approach used in this thesis. Actions leading to a reduction in these wastes would lead to improvements in the communication processes. The thesis process was hence to investigate if communication wastes could be identified in Rådahemmet, and be reduced using visualization as an aid for different communication purposes. Three research questions were developed to help answer the purpose, and are addressed below. These research questions not automatically answered the purpose, but rather helped identify areas where information was needed. A final analysis was then made using this information to answer the purpose.

6.1 How can visualization affect internal communication?

The first research question was answered from literature reviews regarding communication as well as the potential effects of visualization. The results showed that visualization is a frequently used communication channel itself. It can help spread information quicker compared to written information, both by increasing the accessibility of the information, but also by reducing the time needed to interpret it. It also gives receivers of information access to the source information, reducing the risk for information being misinterpreted when spread through several recipients. Visualization can furthermore help create a shared understanding of the information, as it can help explain subjects difficult to express verbally or written. Visualization can if used incorrectly also have negative effects on internal communication, as there mainly is a risk of sharing redundant information, unclear information, or misleading information.

There are four proposed areas where visualization can improve communication in organizations; *Identification*, *Information*, *Instruction,* and *Intention*. *Identification* helps give information regarding where things belong or not. *Information* is regarded as the sharing of relevant business information. *Instruction* is information regarding how to perform work tasks. *Intention* is information regarding changes and visions of future states. Within these four areas the positive effects of visualization is easily utilized to improve internal communication.

6.2 How does internal communication function in nursing homes?

The empirical study conducted at Rådahemmet showed that internal communication is a complex process within nursing homes. There are little hierarchal influences on the communication, leading to employees communicating with management freely when needed. Information is also shared through several communication channels often in both directions, from the sender to the receiver and back again. Due to the communication being shared through several channels and often unsystematically, the purpose of the communication was considered the best way to categorize the internal communication. 18 communication purposes were identified having high influence on Rådahemmet's functionality i.e. communication purposes that affect Rådahemmet's ability to perform daily and long-term tasks. These 18 communication purposes were then categorized in the four identified areas where visualization can improve communication.

Because of the nursing home industry being affected by state directives and laws as well as municipal guidelines, the 18 identified communication purposes are expected influential in similar nursing homes.

6.3 What problems in the internal communication in nursing homes can be identified from a Lean perspective?

Using Lean perspectives when evaluating internal communication in nursing homes meant investigating if wastes could be identified in the 18 communication purposes. Different wastes were found in all communication purposes. There were also some tendencies in which wastes were identified. The most frequently identified problem in the internal communication was employees not having access to necessary information when required. This problem was identified as the waste *Waiting*. Other influential communication wastes identified were unnecessary *Transportation*, *Defects*, and *Under-utilization of people*. Wastes that were identified less frequently were *Inventory*, *Over-processing*, *Motion*, and *Mura*, while *Muri* and *Overproduction* never were identified in the internal communication.

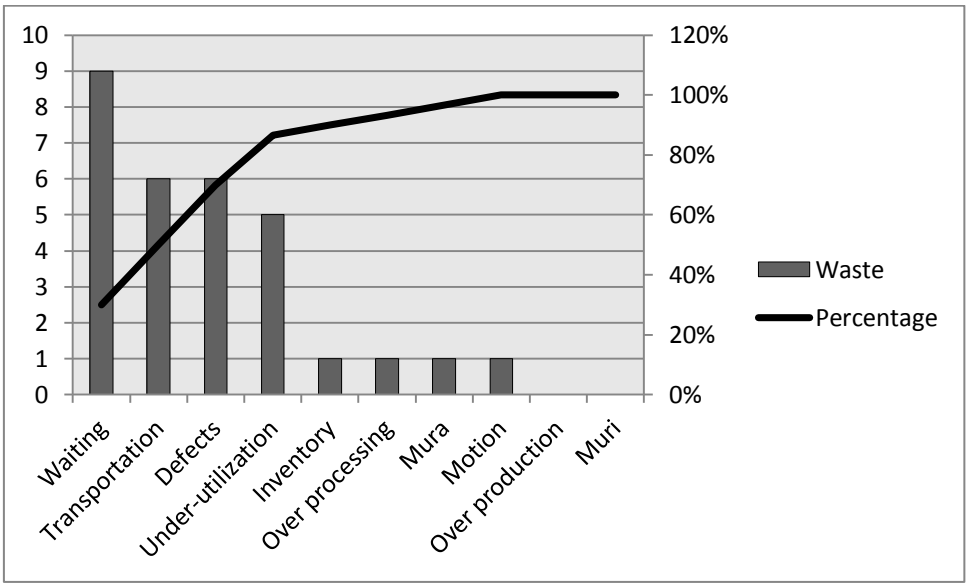

Figure 11: Pareto chart of identified wastes

6.4 Can visualization improve internal communication in nursing homes from a Lean perspective?

In this study, visualization was found having positive, potentially large, effects on the internal communication in nursing homes. This result was obtained by conducting an empirical study of Rådahemmet's internal communication and its performance.

An analysis of how visualization theoretically could improve the communication was then conducted. Findings from this analysis were triangulated with the results of an action research conducted on three communication purposes. Visualization could lead to a reduction of waste in most of the identified communication areas, and for most of the identified wastes in these. The waste *Waiting* could, with visualization, directly be reduced as information would be easier accessed when needed. Other identified wastes, such as *Transportation*, *Defects*, and *Under-utilization of people* would however not as easily be reduced using only visualization, but rather other actions combined with visualization. Visualization should hence be used in combination with other actions to fully eliminate these wastes.

It was with this analysis concluded that visualization indeed can improve internal communication in nursing homes from a Lean perspective.

7 Discussion

In this chapter the discussion is presented, which is divided into four parts. In the first part a discussion is presented regarding how the results differs or conforms to existing literature. In the second part, a discussion is presented regarding the chosen methods of the study and how the study could have been conducted differently. In the third part of the discussion, implications of this research are presented. Finally, a discussion regarding potential future research is presented.

7.1 Literature relevance

The initial literature reviews showed that little theory regarding communication in elderly care had previously been written. The case study at Åldermannen, presented by Dahlén, Strandell and Lefvert (2010), had shown that improvements in internal communication could however lead to several improvements both in operational costs and in the quality of care.

Literature could however be found regarding the communication process itself, and how it can be divided and analyzed. Literature could also be found regarding how communication has been improved both in production industries and in hospital health care. This study showed that much of the theory written for the other mentioned industries could be applied to the communication processes in elderly care as well. Even though theory regarding Lean usually has to be adapted to fit the industry, Yankelevitch (2014) argues that evaluating communication using Lean can be done in similar ways in different organizations. In this thesis Yankelevitch's definition of wastes was used with high success to evaluate Rådahemmet's communication.

Ortiz and Park (2011) stated that visual communication can help all organizations where people are employed, processes are being used, and inventory is stored. The results from this thesis conform to this statement, as visualization could have a large positive impact on communication in elderly care. However, it became clear that the success of visualization tools highly depends on the implementation of them. Nursing homes implementing visualization tools should thereby not underestimate the potential work required for a successful implementation.

7.2 Framework considerations

The empirical study was mainly based around collecting data concerning the 18 identified communication purposes. As these only included communication required for the organization to function, other communication areas have been left out. The communication not included could affect the organization and the relations between employees, and could also be analyzed based on the Lean perspective. This communication is however not work related and does not directly create value for the customer. It was considered a risk analyzing these left out communication purposes with Lean, due to the psychosocial aspects described by Börnfelt (2009). It is the authors' opinions that the chosen communication purposes reflect the most influential work related communication needed in nursing homes.

Communication is a broad subject, where different researchers have different definitions of the term. What is considered good communication is often a subjective opinion, highly dependent on the situation at hand. Evaluating communication with a Lean perspective provides both a structured and straightforward approach. Since Lean implies that all processes can be improved regardless of their current functionality, it reduces the subjectivity of whether the communication is good or not. There is also an ongoing Lean initiative in the nursing homes in Härryda municipal, making the management at Rådahemmet familiar with the Lean lingo. This can potentially facilitate them to easier embrace the findings from this thesis.

An alternative approach when conducting this thesis could have been to have greater focus on action research and experimenting with different solutions' effects. The small experimentation done in this study provided great knowledge of its effects. Performing an action research for all identified communication purposes was however not possible due to the time frame of the project. It did also, as mentioned previously, give subjective feedback of the results and could be perceived completely different in another situation.

7.3 Implications of the research

The study will potentially have implications both specifically for Rådahemmet, but also for further research.

For Rådahemmet, this study has hopefully given insight into the possibilities of using visualization as a way to improve communication. Not only can visualization help solve some of their existing problems, but it can also be used in combination with other actions to solve more severe problems. This thesis showed that visualization used in correct ways mainly can reduce time spent on searching for information in Rådahemmet, which is what Yankelevitch (2014) defined as *Waiting* for information. It can also help Rådahemmet prevent incorrect information being shared between employees and management, as well as give a systematic way to perform improvement projects. Dahlén, Strandell and Lefvert (2010) showed the long-term effects of improved communication in elderly care, which also illustrates the possible outcomes that could be achieved by Rådahemmet with an improved communication. Such possible long-term effects, specifically for Rådahemmet, were however not analyzed in this thesis.

Even though Yankelevitch (2014) presented the possibilities of using Lean as a way to evaluate communication and to find improvement areas, the findings are theoretical. This thesis has, in a more practical way, used Yankelevitch's (2014) definitions of wastes in communication and shown the possibilities of doing so. In the thesis, literature was combined to form a framework of areas where visualization could help communication. These areas were *Identification*, *Information*, *Instruction*, and *Intention*. The areas were also practically used to categorize communication in Rådahemmet, as well as to theoretically find improvement possibilities with the use of visualization. This framework was not developed with the nursing home industry in mind, and could hence potentially be used in other industries as well.

7.4 Future research

This thesis presents a framework for evaluating communication from a Lean perspective, and shows how this framework practically can be applied in a case study. The evaluation framework, combined with the categorization of visualization, was shown to provide a structured method for identifying improvement areas in an organization's internal communication. Identified wastes can, as shown by the action research, potentially be reduced with visualization. Employees also expressed that they experienced an improvement in communication due to the implemented visual tools in the action research. It could however be of interest to further investigate how reducing a communication waste can affect the perception of this reduction being an improvement or not. It could also be of interest to connect identified wastes, and how visualization can reduce it, to existing visualization tools. Such further research could potentially result in a model with great practical use, as it would be easily applicable for identifying improvement areas, as well as provide a useful tool for improvements.

Also, an analysis of the effects of improvements in communication on the nursing home environment and quality of care was regarded as outside this thesis's scope, and were hence not investigated. A thorough research on communication improvement's long term effects would therefore be of great interest to connect findings in this thesis to improvements in elderly care in general.

8 Recommendations to Rådahemmet

In this chapter specific recommendations to Rådahemmet are presented. Similarly to other parts of this thesis, the recommendations are structured according to the four identified visualization areas. The presented recommendations are based on theory regarding how visualization can help reduce wastes. Rådahemmet is recommended to mutually investigate how the following recommendations should be implemented. While some might be possible to implement directly, others might need adjustments to fit their organization, or the use of an existing visualization tool.

8.1 Identification

Within all the identified communication purposes categorized in *Identification*, employees expressed concerns of having to spend unnecessary time looking for information. For all the identified communication purposes, visualization could be used to reduce time wasted doing so, and is hence recommended. Using a home place for frequently used consumables can reduce time spent looking for them, as well as signaling to employees when replenishments are needed. Rådahemmet is also recommended to use a home place for frequently used equipment, but also to use clear identification tags on the equipment used in several locations. By doing so, the created visual environment can solve the problems of employees not knowing when equipment is being used, and where to store equipment correctly. As an example, the blood pressure meters could be stored in a home place, as illustrated in **Figure 12**. This home place would visualize if the blood pressure meters are being used, and by whom. Employees would collect blood pressure meters when needed, write their name on the whiteboard, and return them to the home place when finished.

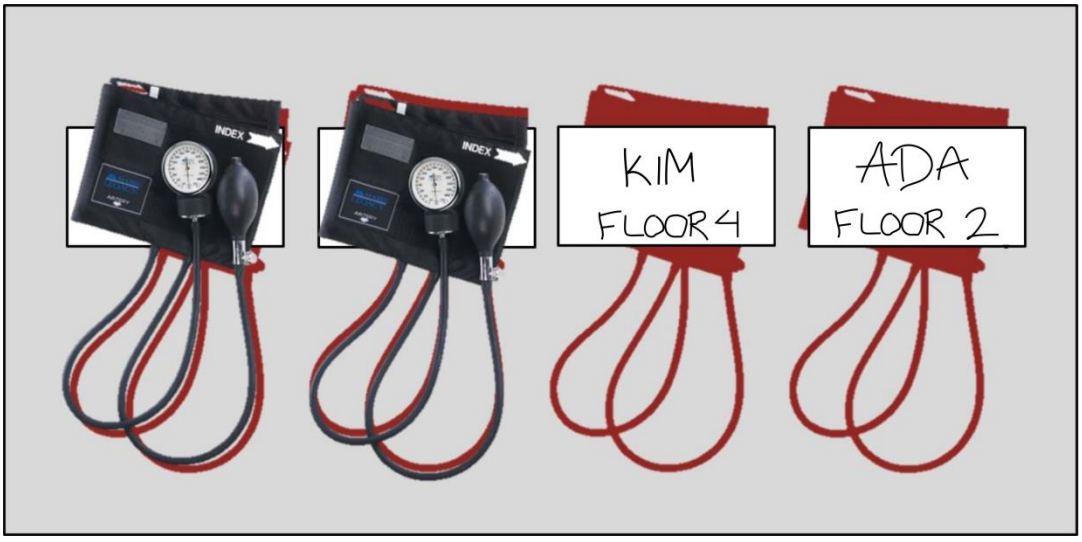

Figure 12: Home place for blood pressure meters

Most documents are currently stored in a documentation room, together with both outdated and excessive documents. Rådahemmet is recommended to visually identify home places for all folders. When doing so, Rådahemmet will automatically be forced to prioritize what folders and documents to visualize, which can result in them removing unnecessary documentation from this documentation room. Rådahemmet is also recommended to investigate if relevant documents can be assigned home places closer to their application areas, to reduce the distance to the necessary information. Rådahemmet could, in other words, benefit from visualizing this information where it is needed.

8.2 Information

More variable problems are found in *Information* compared to in *Identification*. The identified problem with Rådahemmet's contact information could be solved by storing it visually where it is needed, like for all documents as described above. The conducted action research gave information that leads to recommendations for several of the other communication purposes identified in *Information*. Results from this action research showed that visual tools for information sharing was

easily implemented and adapted by the employees. Rådahemmet is recommended to continue using the implemented visual board as a complement to the task schedule handed to employees at the start of their shift. This visual board can give vital information regarding employees' workload, as well as activities that concern all employees during the day. Similarly, this board also gives information regarding the daily work force, giving employees quick access to information on which employees to contact if needed during the day. The use of visualization when communicating regarding residents' dynamic health situation was considered a larger risk than the potential reward of it. To improve this communication, Rådahemmet is instead recommended to investigate other alternatives than visualization.

8.3 Instruction

In order to give employees a better and shared understanding of their responsibilities, Rådahemmet is recommended to communicate these visually. Visualizing the responsibilities by an illustration or displaying the documents would also force Rådahemmet's employees to collectively discuss what these responsibilities are. They would also, due to the limited space for visualization, have to prioritize which responsibilities to display. This is believed to help reduce the current confusion regarding what tasks are included in employees' responsibilities, help with prioritization of which tasks to perform in time pressured situations, and facilitate for management in discussions when deviations occur. The responsibilities could, as an example, be visualized as illustrated in **Figure 13**. Such visualization of the responsibilities would show the prioritization of responsibilities as well as what they consist of.

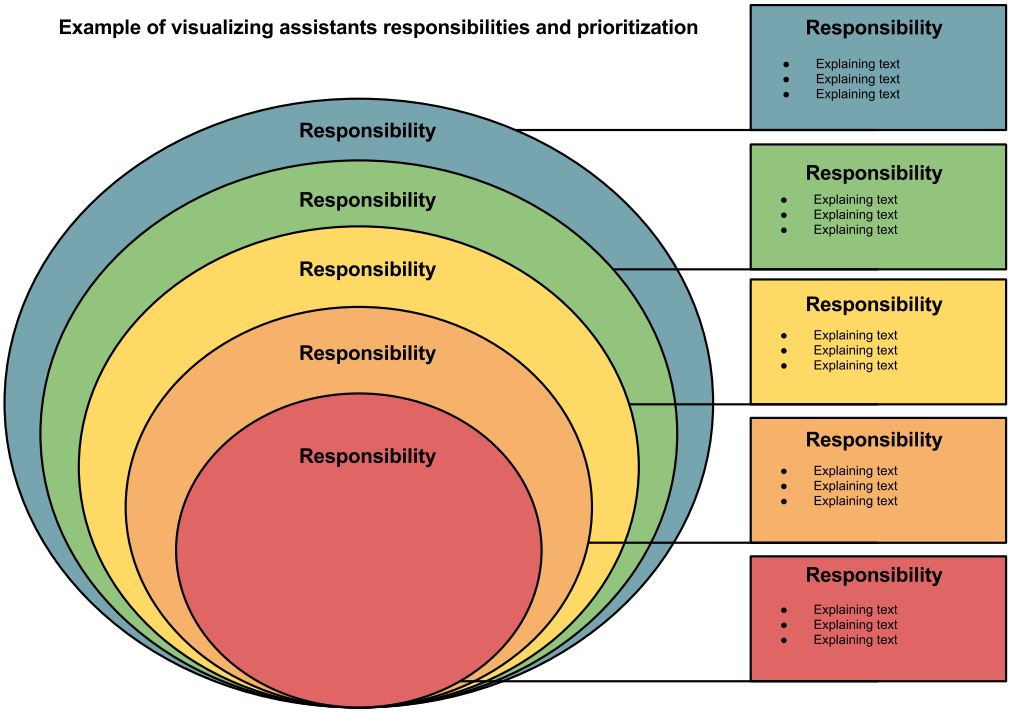

Figure 13: Visualization of responsibilities

Concerning instructions of work tasks, Rådahemmet is recommended to complement these visually. The instructions are regarded as well written and functional by employees, but employees often have different opinions on what the end result should be from these tasks. Complementing the instructions with images of the end result could reduce this uncertainty and also facilitate for discussion and development of the tasks. Additionally, instructions with illustrations or pictures of how the task should be performed could help explain aspects that can be difficult to formulate in words, and increase remembrance of the instructions. These pictures could also give employees a better shared understanding of how the tasks should be performed, and facilitate for discussions of the best way to

perform them. This could thereby increase the possibility for employees to learn, and share, best practice knowledge for performing tasks.

8.4 Intention

As mentioned in the analysis, Rådahemmet has a work environment open to changes and are continuously trying to improve. However, there is a lack of a standardized way to perform these changes. This leads to difficulties in communicating what projects are ongoing or completed, but also information on who was responsible for the project. These difficulties in turn lead to confusion and possibly missed improvement opportunities. Visualizing the change projects can help reduce these difficulties, and by providing a structured method for employees to share their ideas, more ideas can be expressed. Rådahemmet is therefore recommended to continue working with the change board implemented during the action research, and develop it further to fit these purposes.

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