



UNIVERSITY OF GOTHENBURG

Managing patient-centered healthcare development in the light of cloud computing

A qualitative study of how stakeholder information sharing and communication can add value to the life of frail older adults in Sweden.

JWAN KHISRO

Master of Science Thesis in informatics

Report No. 20013:077

ISSN: 1651-4769

ABSTRACT

In a change situation characterized by growing aging populations, rising costs, decreasing resources there is a growing interest in the facilities provided by cloud computing for the development of e-Health and a patient-centered healthcare process. Though, the inter-organizational characteristics of the situation challenge management to align many technological, organizational, functional, and cultural issues. Therefore, the aim of this study was to contribute to management of patient-centered healthcare development and thus, to the good life of frail older adults. The investigation was conducted through an empirical study based on an extensive literature review. The primary data was collected from interviews with seven professionals with long experience within healthcare system, decision makers and providers. Secondary data was derived from two reports; the first report reflected the life of frail older adults and the second explained national e-health ambition in Sweden. The result showed that there are contrasting views on development of healthcare, weak communication among different levels of professional stakeholders regarding e-health and patient-centered healthcare process and little understanding of knowledge needed for dealing with the change situation and managing patient-centered healthcare development. Conclusions, however suggests that management could be enriched and find new inspiration by implementing theoretically underpinned guidelines for stakeholder information sharing and communication.

Keywords: alignment, change management, cloud computing, communication, infrastructure, IT-architecture, patient-centered healthcare, stakeholders

Supervisor: Maria Bergenstjerna

ACKNOWLEDGMENT

I am grateful for the Department of Applied Information Technology, namely Kalevi Pessi, Håkan Enquist, Thanos Magoulas, Dick Stenmark and Jonas Landgren who blessed my abilities, strength and knowledge to accomplish this thesis.

I cannot stop myself from giving special thanks to my supervisor Maria Bergenstjerna for her continuous support, guidance with encouraging attitude and motivation through this thesis work. It was really a wonderful experience to work under her supervision.

I would also like to thank the interviewees who helped me by providing me very useful information. I am really thankful to Lars Jerrestrand for his time and support in spite his busy schedule.

Finally, I extremely appreciate my great family for their continuous support and encourage.

Jwan Khisro
Gothenburg, May 24, 2013.

CONTENTS

1 INTRODUCTION	6
1.1 BACKGROUND	6
1.2 PROBLEM DISCUSSION	7
1.3 AIMS AND RESEARCH QUESTIONS	8
1.4 DELIMITATION	8
1.5 DISPOSITION	9
2 METHODOLOGICAL APPROACH	10
2.1 STUDY LOGIC	10
2.2 CHOICE OF METHODOLOGY	10
2.3 LITERATURE STUDY	11
2.4 EMPIRICAL STUDY	11
2.5 COLLECTION OF DATA	12
3 THEORETICAL FRAMEWORK	14
3.1 CLOUD COMPUTING	14
3.2 STAKEHOLDERS INFORMATION SHARING AND COMMUNICATION	20
3.3 PATIENT-CENTERED HEALTHCARE PROCESS DEVELOPMENT	20
3.4 ALIGNMENT IN THE STAKEHOLDERS INFORMATION SHARING AND COMMUNICATION	23
3.5 MANAGEMENT OF A PATIENT-CENTERED HEALTHCARE PROCESS DEVELOPMENT	25
3.6 PRINCIPLES FOR MANAGEMENT OF PATIENT-CENTERED HEALTHCARE PROCESS DEVELOPMENT	29
4 EMPIRICAL STUDY	30
4.1 INITIAL FACTS ABOUT SWEDEN	30
4.2 POPULATION OF INTERVIEW	30
4.3 RESULT	31
5 ANALYSIS	38
5.1 NATURE OF THE CHANGE SITUATION	38
5.2 CLOUD COMPUTING IN HEALTHCARE	42
5.3 CLOUD COMPUTING FOR INFORMATION SHARING AND COMMUNICATION	43
5.4 KNOWLEDGE FOR MANAGEMENT OF PATIENT-CENTERED HEALTHCARE PROCESS DEVELOPMENT	47
6 DISCUSSION	49
6.1 CLARIFYING THE NATURE OF THE CHANGE SITUATION	49
6.2 CHANGE SITUATION AFFECTS ON STAKEHOLDER'S VIEWS OF INFORMATION SHARING AND COMMUNICATION	50
6.3 CHANGE SITUATION AFFECTS ON COMMUNICATION CONTRIBUTION TO MANAGEMENT OF DEVELOPMENT	53
7 CONCLUSIONS	54
8 BIBLIOGRAPHY	55
APPENDIX A: INTERVIEW GUIDE	60
APPENDIX B: ACRONYMS	62
APPENDIX C: LETTER TO RESPONDENTS	63

LIST OF FIGURES

FIGURE 2-1. ILLUSTRATING THE STUDY LOGIC.....	10
FIGURE 3-1 CLOUD COMPUTING FORMS – PUBLIC, PRIVATE AND HYBRID CLOUD. SOURCE: DENJOY (2012).	15
FIGURE 3-2 ROADMAP FOR THE DEVELOPMENT OF E-HEALTH TECHNOLOGIES. SOURCE: VAN GEMERT-PIJNEN ET AL. 2011.....	26
FIGURE 3-3 DELTA ELEMENTS OF CHANGE IN A COORDINATED DEVELOPMENT. SOURCE: ENQUIST ET AL. 2001.	27
FIGURE 6-1 CLARIFYING THE CHANGE SITUATION USING THE DELTA FRAMEWORK TO EXHIBIT SECONDARY DATA FINDINGS OF ENTERPRISE VIEWS, DEVELOPMENT GOAL AND DEVELOPMENT PROCESS.	50
FIGURE 6-2 CLARIFYING THE ALTERNATIVE VIEW OF A FUTURE PATIENT-CENTERED HEALTHCARE.	51

LIST OF TABLES

TABLE 3-1 SUMMARY OF CLOUD COMPUTING BENEFITS	16
TABLE 3-2 DOMAINS AND DIMENSIONS OF ENTERPRISE ARCHITECTURE, I.E. AND INFORMATION ENVIRONMENT	27
TABLE 3-3 DELTA PRINCIPLES FOR MANAGEMENT OF COORDINATED DEVELOPMENT	28
TABLE 3-4 PRINCIPLES FOR MANAGEMENT OF PATIENT-CENTERED HEALTHCARE PROCESS DEVELOPMENT.	29
TABLE 5-1 DEMONSTRATING THE SITUATION AT HAND IN HEALTH AND HOME CARE BY STRUCTURING HEADINGS PER CASE STUDIED IN THE REPORT ACCORDING TO THE ENTERPRISE ARCHITECTURE ALIGNMENT MODEL	38
TABLE 5-2 DEMONSTRATING THE IDEA OF USE OF FUTURE TECHNOLOGY SERVICES BY STRUCTURING OBJECTIVES FOR THE PERIOD ACCORDING TO THE ENTERPRISE ARCHITECTURE ALIGNMENT MODEL.	40
TABLE 6-1 THE POPULATION SHIFT IN AGE.....	52

1 Introduction

1.1 Background

The growth of scientific knowledge relative to source and means of controlling disease, and increase in public's acceptance of disease control as a possibility and responsibility of public health system – these two factors shaped the modern public health system (Lin 2001). When society was known about causes of disease, it tended to regard illness as inevitable, resulted in few preventive activities. As disease comprehension increased, interventions to protect health became achievable. The role of health department in enhancing community's health varies among community stakeholders, citizens and even among professional working in this field. Lin (2001) highlights the author's assertion that the applied public health intervention continues to be a vital asset, essential to health of society.

Technology is growing the connectedness of society. The citizens use the Internet Smartphone, laptop, and other communications devices to stay in-touch and connected with family, friends, and work (Carincross 1997, Rainie 2010). Society's growing level of connectedness and grade of satisfaction with online applications and data storage outcomes is in high anticipation in regards to fast and easy information access (Osterhaus 2010). Cloud computing is a computing architecture that “links computers in a grid and allows users to buy access to data and software stored on the grid or processing power that is harnessed for specific purposes by the grid of computers” (Horrigan 2008). Businesses, like Amazon and Google, have exploited in finding distributed grid computing architecture and utilize this architecture to equip services that historically have been desktop-based (Rubin, 2010). In medical settings, the cloud offers a potential to facilitate access to electronic medical records. Medical history could accelerates treatment, helps avoid complications, and even saves lives (Gottlieb et al. 2005)

Although healthcare is a market segment that has generally resisted jumping into the technology explosion taking place “in the cloud”, most of organizations are now either implementing cloud-based solution or already operating such solution. In spite of other kinds of businesses being more familiar with CC, the healthcare industry choosing CC is on the rise (Habte et al. 2012). This is also the case in Europe and in Sweden. The healthcare sector across Europe realizes the possible advantages that CC can bring, and is willing to apply it. CC can give benefits in self-service, scalability, flexibility, pay-as-you-go, and develop time-to-value of technology. However European Chief Information Officers, CIO:s realize that prior to using CC they need to identify potential challenges and risks (Piai and Duffy 2012). Sweden is well known in the entire world for its advanced healthcare system and efficient modification of healthcare IT, although it's as well shares numerous of the technological challenges faced by healthcare sector. This contains wanting for strict security and data protection, as requested by the Swedish Patient Data Act, SPDA (2008:355), and based a list of requirements for the protection of critical health information (Intel 2013).

On the healthcare sector encounters several serious problems. To cope with patient's needs, to improve life quality, patients' outlook for better and reliable care, it is progressively hard in the face of cost limitation, deficiency of healthcare professionals, and an aging community. Also, as postponements may mean the difference between life and death, credible Advanced Home Healthcare is an urgent need (LGS Innovations 2013, Young 2003). Edes (2010) adds that the increase in number of aged patients and increase of the cost of healthcare caused disquieting of healthcare financial analyst and legislation authorities. However, the rapid growth of information technologies and improvement in the healthcare system have formed the foundation for many

homecare treatments, including health investigative system, electronic medical archives, healthcare management information systems, medical check-ups, and supply chain management (Low and Chen 2012). Cloud computing facilitates the foundation of a network structure and the implementation of improved healthcare technology solutions, which allow quick and secure communications and information swap between patients, family members, and caregivers (LGS Innovations 2013).

Accessing and keeping the healthcare's information system in the cloud service seems to have many advantages. Even though there was previous research on the relationship between healthcare, IT services, and the level of care submitted to patients, just few incoming researches have examined the effects of cloud Services on the advanced home healthcare. This thesis therefore aims to investigate possible effects of cloud services on Advanced Home Healthcare information sharing and communication and its value to the life of frail older adults.

1.2 Problem discussion

Developing the accuracy and efficiency of healthcare systems is currently an appealing alternative, which is being implemented by many healthcare sectors. It is argued that decision makers benefit from CC for fiscal planning for healthcare services. From the patient side, the argument is that he/she will enjoy the better service with lower cost (AbuKhoussa and Al-Jaroodi 2012). However since the cost of healthcare services has increased dramatically lately, healthcare professionals are not trained enough to be familiar with handling the stage-of-the-arts health information technology (Osterhaus 2010).

Despite the benefits of adopting cloud services many healthcare sectors are still hesitating to apply cloud services. Therefore, e-healthcare providers are struggling to find solutions to process and provide information and services in a cost-effective, efficient, and secured manner. Security and privacy are the most critical and sensitive aspects in the healthcare domain and trust in e-health cloud by citizens, patients and professionals is not an easy way (Ejenäs 2012, Andreasson and Winge 2009). How can development of healthcare be assisted? The scope of development is an interesting starting point for investigation.

Development can be limited to issues of information technology. The scope is then about building an infrastructure and understanding issues of the human interface. However, it becomes clear that this development scope could benefit from a broader view. Van Gemert-Pijnen et al. (2011) argue that one of the major problems in e-health technology development is ignoring the relationship between technology, human characteristics, and socioeconomic environment.

When development is limited to an organization and its business, developers will consider socioeconomic issues. The scope is then about building information systems that can contribute to organizational success and value creation. Development thus, has an intra-organizational focus. Checkland (1985) however argues that organizations are fuzzy systems and that developers therefore should involve owners, actors and clients in a development process dialog in order to reach a common development goal.

Development can have an even broader scope spanning across many organizations. Thus, development is characterized as having an inter-organizational scope that calls for the involvement of several owners, actors and clients in order to have a broad under-standing of their views on development goals and means. However, as complexity increases so do uncertainty and thus, the need for guidance in the development process (Enquist et al. 2001).

The situation for healthcare in the world is affecting many people, patients, their families, decision makers and medical and care staff. We therefore argue that the development is neither merely limited to issues of infrastructures, nor limited to information sharing and communication in one organization. Rather, the inter-organizational characteristics of the situation challenge management to align many technological, organizational, functional, and cultural issues. It challenges management knowledge and understanding of the situation as a whole (Magoulas and Pessi 1998). This thesis therefore aims at deepening knowledge and understanding for managing development of a patient-centered healthcare process.

1.3 Aims and research questions

In a change situation characterized by growing aging populations, rising costs, decreasing resources there is a growing interest in the facilities provided by CC for the development of e-Health and a patient-centered healthcare process. Thus, the common aim of this study is to contribute to the good life of frail older adults and to management of patient-centered healthcare development by inquiring:

- How can stakeholders information sharing and communication add value to the life of frail older adults?
- How can the imminent management of patient-centered healthcare process development be supported?

This study thus aims to explore the affect of stakeholders information sharing and communication on management of patient-centered healthcare process development by investigating the following sub-questions:

1. What is the nature of the change situation?
2. What are the stakeholder's views on information sharing and communication?
3. What knowledge is supporting management of patient-centered healthcare process development?

1.4 Delimitation

Sweden has its own laws regulating healthcare and social welfare for instance *Hälso- och sjukvårdslagen*. There is also a law to ensure healthcare quality. In that respect laws, according to Checkland (1985) are constraints in the development process as they define important boundaries to the system being developed. This study recognizes these laws and their importance to healthcare. However, the field of information systems does not deal with issues of law. Therefore issues of laws are not included in this study.

1.5 Disposition

The dissertation is split into six chapters beginning with an overview, which spells out what the reader can expect to find in each chapter. Also included are figures and tables, which have been added for illustration and better understanding.

Chapter 1: Introduction

The first chapter starts with a background of the selected topic, develops a problem area; draws the aims, originates the research questions, delimits the scope, and finishes with the outline of study.

Chapter 2: Methodological Approach

This chapter presents a method chosen for study, selected literature, description of research approach and strategy. It also discusses choice of interview population. The matter of validity and reliability is also considered.

Chapter 2: Theoretical Framework

This chapter presents the theoretical basis for the study. It includes theories about cloud computing, e-health services and role of cloud computing in e-health, management of development and principles for management.

Chapter 4: Empirical Study

The chapter starts with background information, history, and the current position of the interviewees. The interview questions is about cloud computing, the role of cloud computing in home healthcare and the effect of decision-making, cost, privacy and security issues.

Chapter 5: Analysis

This chapter presents the analysis of study and connects the findings from empirical study with the frame of reference.

Chapter 6: Discussion

In this chapter we clarify and discuss the findings in order to fulfill the study aim and come to a conclusion.

Chapter 7: Conclusions

This chapter gives a short summary and concludes the study based on the analysis and discussion.

Chapter 8: Bibliography

This chapter contains the list of all referenced articles, books, reports, white-papers and web-sites used during the completion of the research thesis.

2 Methodological Approach

This chapter explains the approaches, methodology for theoretical framework to lead technical discussion.

2.1 Study logic

In this section we describe the logic of inquiry chosen for this thesis work, se Figure 2-1 the model is used as a guiding tool, which serves the exploration and understanding of stakeholder information and communication contribution to management of the development process. The model is used in conjunction with the study aim and questions of investigation presented in Chapter 1 Introduction.

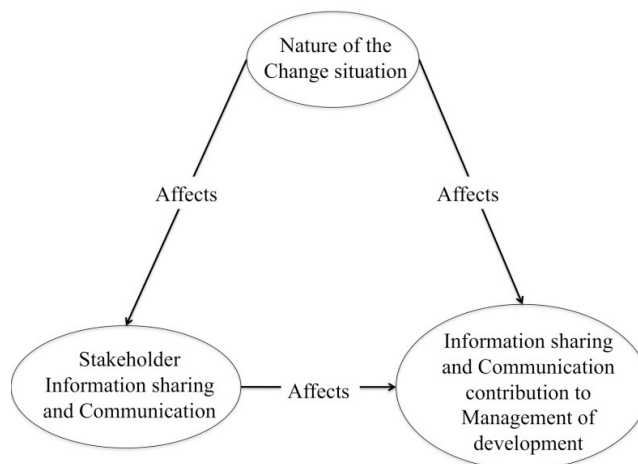


Figure 2-1. Illustrating the study logic.

We investigate how the change situation affects stakeholder information and communication. We also study how the change situation affects information sharing and communication contribution to management of patient-centered healthcare process development.

Understanding the nature of the change situation in healthcare, at present and in the future provides the possibility to grasp the scope and content of the development and to reflect on how management could be further sustained in order to add value to the life of the frail older adults in society.

The study logic is founded in the following scientific methodology.

2.2 Choice of methodology

It is generally known that there are two main ways to collect data, hard data and soft data. Hard data is a quantitative method and on the other hand soft data is a qualitative method. According to Holme and Solvange (1997) a deeper understanding in the subject can be created through qualitative study using for instance interviews for collecting data while in a quantitative study is more aimed at providing knowledge through statistical facts. Therefore, a qualitative approach has been chosen because it gives us great importance to go deeper in the topic and create more understanding and expand knowledge in this area of problem. A qualitative study allows us to do a deeper analysis, which has utmost relevance to be able to answer our question and present valid results and conclusions. If instead a quantitative approach had been selected it would be harder to develop our

thoughts and make our own conclusions, therefore a qualitative approach had been chosen (Holme and Solvang 1997).

2.3 Literature study

The study started with reading about the cloud computing, CC subject in books, scientific articles, white-papers and blogs. A magnificent amount of articles, books and scientific research papers were considered for reading while performing the literature study for the thesis. The most commonly used databases searched were university library databases, Association of Computing Machinery, ACM publications, and Google Scholars. The search of scientific articles and data was made in CC, which can be connected to home healthcare and stakeholders and supplemented with theories in soft system theory. With this starting point our theoretical framework search describes and discusses how cloud computing contribute effectively to advance home healthcare structure. Based on this theory the interview questions were structured to link the theoretical part to the empirical part.

2.4 Empirical study

The empirical portion of the study includes survey conducted in the form of interviews. The survey research is not only to conduct literature surveys, questionnaires or the interviews. These are just data collection techniques to gather data from a sample of population using some standardized methods, which are further, analyzed and discussed to produce the results. Järvinen (2004) defined a research interview as a conversation between interviewer and interviewee with the purpose of gathering certain information from the respondent. The interview can be conducted completely formalized or informal (Järvinen 2004). In our research methodology we conducted a formalized interview in which the interviewee is bound to answer our predetermined questions. In formalized interviews the interviewer tries to be neutral as much as possible and interacts with the respondents in similar way. Also, all the questions should be formulated very carefully and based on research framework (Järvinen 2004).

2.4.1 Interview question formulation

The purpose of an interview is to understand the selected area or interested area from subject point of view and to uncover the real meanings of the interviewees' experiences. The research interviews are based upon everyday life conversation; it covers many of the views of the respondent on some specific things. Therefore the basic objective of formulating the interview research is to collect data, which consists of meaningful relations to be interpreted (Kvale 1996).

Kvale (1996) stresses the importance of advance preparation and interviewer competence. He suggests seven stages for the formulation of an interview, which were used in the study. **Thematising**; the first stage is to formulate the purpose of the interview and describe the main concepts of the area to be investigated. **Designing**; after deciding the main objective, plan the design of the study. **Interviewing**; follow the interview guides to conduct the interviews with a reflective approach to the knowledge required. **Transcribing**; this is preparation of the interview material for analyses, which includes transformation of oral speech to the texts form. **Analyzing**; the method of the analyses is selected on the basis of the purpose and the topic of the research, and also the nature of the interview. **Verifying**; verification of the interview findings is very important for generalizability, reliability and validity achievement. **Reporting**; finally the last stage is to report or communicate the findings of the study in the scientific ways, keeping ethical aspects of the investigation in the consideration to come up with a readable research product (Kvale 1996).

For conducting interview research I formulated semi-structured questions, to provide some open way of answering to the interviewees. The questions were based on the theory, which was the theme of the interview questions.

The selection of different professional interviewees encouraged us to design the questionnaire with different questions focusing on their related area of interest and technologies in used. While constructing the questions for interview, it was kept in the mind that the interviewees who are technical should easily understand the main goal of the questions. To achieve this result we used information technology word instead of CC while interviewing the non-technical people like nurse and sector manager.

2.4.2 Population of Interview

The selection of the population for the interview is a critical and important part of the research methodology (Järvinen 2004). We selected different people from different fields, which are connected to our interested area from a different direction to gain holistic view of the problem area. The total number of respondents for the interviews is seven. A list of all respondents can be found in Chapter 4.2. All seven interviews help us to understand the actual use of information and communication technologies while taking care of the patients and management aspects of development of patient-centered healthcare.

2.5 Collection of data

The collection of data for the research purpose is done in two sections; primary data and secondary data. The primary data is the data we gathered using our interviews. The main theme and analysis of the thesis revolve around the data collected from interviews. The secondary data for our thesis is taken from two of reports produced by responsible organizations. We have found the rich and detailed results suitable for secondary data analysis of information sharing and communication in the health and home care processes and management of e-health development.

In the first the report “Icke värdeskapande i äldres vårdkedjor. En analys av komplexa flöden” (Bowin et al. 2012) eleven case studies reflecting the life of frail older adults in their contacts with different care providers are presented. The study is based on a process analysis of healthcare and home care in Sweden with the aim to develop a better-suited economical model in support of patient-centered care. Results from each study are summarized; facts are presented in tables and graphs and experiences are thematically organized. Facts give the specific context for each case; type of illness, amount of visits to hospitals, contacts with primary care staff, contact with home care staff, physiotherapists as well as understanding of medical prescriptions.

The second report “*Handlingsplan 2013-2018. Landstings, regioners och kommuners samarbete inom eHälso-området*” by Center for e-Health Cooperation, CeHis (2012) presents objectives for the period 2013-2018 on the subject of citizen’s future means for participating and engaging in his/her healthcare aimed at decision makers on a region and local level in Sweden. There are also objectives regarding healthcare employees future possibilities to efficiently access patient data and professional information systems. The report also presents a development scope together with principles for cooperation between these decision makers at a national level.

2.5.1 Analytical Procedure

It is very important to know the procedure to explore the respondents and the data used in the research about how they reflect to different contradictions within and among different contexts. The

analysis of my case study results is consists of few steps process of interpretation. As my research study is based on two types of data; primary data, which is gathered from interviewing different audience, related to research topic, and the secondary data, which is obtained from two of the already done research studies. Firstly, the primary data is analyzed question by question with a comparison of interviewee concepts and the related theoretical research done section. Then the secondary data is analyzed by dividing into two parts as secondary 1 (S1), and secondary 2 (S2). The division of the secondary data is based upon the life of frail older adults and the management of the development. The narrative approach is used to create the meaning and understanding of the results and was applied to explore the differences and similarities among the primary and secondary data. Riessman (2008), writing in his book about the narrative approach that a good narrative analysis helps the researcher to think beyond the textual data and can move towards a broader commentary. The narrative approaches interrogate cases, but it does not mean that the results cannot be generalized; actually the case studies contain generalization to the theoretical suggestions, which are transferable (Riessman, 2008).

In the first report (S1), the thematically organized experiences of information sharing and communication between patient, family and staff in hospitals, primary care and home care are used for analysis. Headings in the report for each case studied are structured according to the enterprise architecture alignment model presented in the theoretical framework. In the same way objectives, principles and statements about the envisioned development content in the second report (S2) are used for analysis. The analyses are presented in the form of tables structured according to the dimensions of the enterprise architecture model in order to provide an easy and guided way to conclude about our research questions. Some analysis from the second report is also presented as ordinary text. The main role of the presentation of the secondary data is to cross compare the results achieved by our primary data and then analyze for the final conclusion.

3 Theoretical Framework

In this chapter, we give an account of concepts for our investigation such as cloud computing, patient-centered healthcare process, stakeholders, information sharing and communication. It also presents knowledge for understanding management of development. Thus, this chapter provides a theoretical background understanding for our problem area and the effects and challenges of using cloud computing in healthcare sector.

The subject of informatics takes an interest in improving people's lives through the sound use of information technology, whether in the working place or elsewhere. Management of development is essential for the achievement. The choice of having an information technology driven development or a business driven development illustrates the management problem of alignment between different domains of knowledge and understanding. Thus, comprehending the scope of the development situation, its substantive and procedural aspects, is key to management work. Knowledge, communicated through guiding principles is the means for understanding the development situation and for reducing management uncertainty (Checkland 1985, Enquist et al. 2001, Burnes 2009, Magoulas et al. 2012).

3.1 Cloud Computing

There are many different definitions for cloud computing but we take on the definition of CC which presented by the National Institute of Standards and Technology (NIST), because it covers in our point of view all the essential characteristics of cloud computing (Peter et al. 2009).

NIST definition of cloud computing *Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.*

Recent merger of the technologies to establish a new technology called CC in the field of distributed computing system is getting popularity day by day. It is the combination and evaluation of virtualization, utility computing, on-demand computing, and grid computing, that offer scalability, flexibility, and faster starts up times, reduced management costs and just in time availability of the resources (Yuan et al. 2011). Scaling up or down software and hardware infrastructures without huge investments is the key importance of CC (Babar et. al. 2011).

Different types of services are offered by organization using CC; First, Software as a Service (SaaS) is one of the popular applications, which offers software applications to its customers. The Google email system is one of the examples of SaaS infrastructure. Another important infrastructure using CC is Platform as a Service (PaaS), where developers can access the platform through their APIs. In (SaaS) the users can access and modify the application for them. The third type, Infrastructure as a Service (IaaS) providers are not offering raw hardware infrastructure as a service, in other words (IaaS) is unified resources available for end users (Babar et. al. 2011).

3.1.1 Forms of cloud computing

Cloud computing comes in three forms: public clouds, private clouds and hybrids clouds, because of different level of security. The cloud infrastructure in which services are provided off-site over the public media like Internet is called *public cloud* computing. This type of cloud offers the greatest

level of efficiency in the shared resources. It is the obvious choice when the standardized workload is used by many people like email systems. It can be useful when testing and developing applications code. When a collaborated on a project this type of infrastructure is very useful as it provides access to everyone. A *private cloud* is one in which the services and infrastructure are established on a private local network. These provide the greatest level of security and control. But, it's still expensive because the company needs to buy all the software and services. The choice for such a cloud is made when a business is part of some industry that must confirm to security and data privacy issues. Especially when the company is large enough to run a next generation cloud data center efficiently and effectively on its own. Mixing the variety of public and private cloud options with multiple providers is called *hybrid clouds*. By spreading things out over a hybrid cloud, you keep each aspect as your business in the most efficient environment possible. But there is a downside to hybrid cloud that it is difficult to keep track of multiple security platforms and ensure that all aspects of your business can communicate with each other. This therefore kind of CC is mostly chosen when a company wants to use a SaaS application but is concerned with security (Denjoy 2012, Hurwitz et al. 2012)

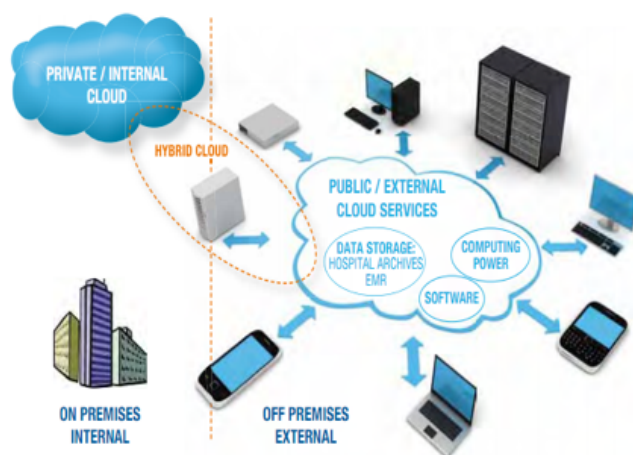


Figure 3-1. Cloud computing forms – public, private and hybrid cloud.
Source: Denjoy (2012).

3.1.2 Essential characteristics of cloud computing

There are five indispensable characteristics that must be realized in CC as mentioned below (Peter et al. 2009).

On-demand self-service is explained as computer capabilities, which can be utilized by the end user with minimum management effort as service provider interference, the consumer by himself should be able to retake the network storage needed automatically.

Broad network access are the potentials and capabilities, which are easy to reach by end user platforms such as smart mobile phones, laptops... etc.

Resource pooling refers to fact that the provider, after recognizing the consumer's demands, can pool the computing resources to be ready to serve multiple consumers using a suitable model. The consumer will be able to specify the location of storage or processing, of data for example country wise or data center.

Rapid elasticity is a flexible and fast supply of unlimited data access, available in any quantity and time.

Measured services are understood as transparent and easy to check control and reporting of resource consumption for the parties, both the provider and the consumer. Benefit from any kind of service is possible to be measured automatically.

3.1.3 Reasons to adopt cloud computing

Technical Benefits

The time needed in CC for computing resources is much less than that needed in internal IT functions. It is possible to scale up or down from one server to several servers without capital cost. Better alignment of technology resources without higher investments is one of the important advantages of CC (Smyth 2009).

Scalability: The platform automatically will respond to the capacity needed, this is what we can call elasticity. Changing the capacity according to the demand is based on the software developed and applied. This flexibility will give the small competitors a good chance and high ability to be real and serious competitors (Smyth 2009).

Disaster Recovery: The provider in CC is the responsible party for managing technology. Built-in data protection is the duty of the provider in addition to the disaster recovery. There will be no losing data because the cloud provider will replicate it (Smyth 2009).

Business Agility: In CC the additional storage or memory can be reached in almost no time. When we compare elasticity of CC with that of the in-house data centre to show the importance of CC. It would take weeks to have more capacity by only using the IT department and a fast reaction is very necessary to be updated with the market. New ideas will be created and applied with less cost and time (Smyth 2009).

Table 3-1. Summary of Cloud Computing Benefits based on Smyth 2009 and Warren et al. 2012.

Technical	Enterprise	Patients	Environmental
Speed Scalability Alignment	Cost saving Mang. effort	Time saving Updated medicine Advanced treatment	Power consumption Carbon emission Land using

Enterprise Benefits

Cost saving comes from the fact that the cloud customers will pay only for needed resources, and avoid all unnecessary requirement and utility costs. Cloud computing gives an opportunity to the enterprise to go directly to its recognized targets without consuming time with detailed IT functions (Warren et al. 2012).

Patients Benefits

Because of the major influence on medicines produced by pharmaceutical industries and health services, patients will be able to receive fast and advanced healthcare in both accidental cases and regular diseases (Warren et al. 2012).

Environmental Benefits

It's a Green. Private data centers means high consumption of power, this contributes to high pollution like carbon emissions and land using, while CC will avoid all of those disadvantages (Warren et al. 2012).

3.1.4 Reasons to avoid cloud computing

Security

Most of CIO:s hesitate to adopt CC in their business, because they don't feel secure if they put their business data in the hand of external providers. According to Smyth (2009) it is rational for CIO:s to expect that their business confidentiality could be breached in CC, but we must remind them that they will have the same risk with internal servers connected to the Internet. There is no 100% security, neither in CC nor in internal servers connected to Internet. The challenge of hackers always exists and it is the task of the security alliance to convene conservative CIO:s to adopt CC in their business (Smyth 2009).

Data location and privacy

This factor is very important for international companies because concerned laws in different countries controlling data access should be taken in consideration carefully. European Union countries laws are very strict about their citizen's data. Customers must be allowed to have the right of locating their data and to prevent providers from hindering customers to access their data for any reason (Smyth 2009).

Internet dependency, performance and latency For an enterprise to adopt CC, a high quality Internet connection and good performance is very important and essential. Therefore, organizations that want to adopt CC should improve their network infrastructure. To reach maximum performance, software applications must be architected for CC. Scalability is an important factor to minimize latency (delay). Latency is variable from one application to another (Smyth 2009).

Availability and service levels

One of the negative points in CC is that the system might not be available for use for any reason. Unavailability will reflect negatively and directly on both provider and user in terms of service, income and reputation. Satisfaction about availability is hard to achieve both in CC and internal systems. Cloud computing providers have to offer credible service level agreements (SLAs) to the customers (Smyth 2009).

Current enterprise applications cannot be migrated easily

With new applications it is easy to adopt CC platforms. However, if the organizations want to change from their existing application to CC there might be certain challenges that can be overcome with time (Smyth 2009).

3.1.5 Service Level Agreement

As the customer demands CC to be at a high level of performance, availability and responsiveness 24/7, there should be a mechanism to assure such rights. There are several approaches for supporting service levels followed by different providers. A service level agreement in general is '*a formal definition of the relationship that exists between a service provider and its customer*' (Verma 2004).

Regular information to be included in SLA

According to Verma (2004) a regular SAL usually includes:

- *Nature and Qualification* of the type of provided services and this may include the maintenance and other functions like dynamic host configuration or any other details.
- *Reliability and responsiveness*, the service must be available at all times without delay in responding to the demand of the customer.
- *Mechanism* of reporting the problem might be faced by the customer. The agreement should specify contact person, information needed about the problem and steps with a time schedule for resolving the problem.
- *The consequences of service disorder*: does the customer ask for compensation because of loss of service or can he terminate the relationship.
- *Unexpected accidents* like flood or war damage to the provider equipments prevent the provider from meeting the demand of the customer (Verma 2004).

3.1.6 Benefits of cloud computing in healthcare

Denjoy (2012) explained the benefits of cloud computing in healthcare as following:

- **Cutting cost and high efficiency**: the utilization of information and communication technologies in healthcare is rising significantly. This means, that keeping in-house systems up-to-date is both expensive and time consuming. Cloud computing can reduce comprehensive costs, rise access, and provide scalability and flexibility for healthcare services. Cloud computing improves server use and reduces energy exhaustion up to 30 %¹. This can lead to reducing costs up to 60 % compared to traditional non cloud-based solutions². An example of this is when the Swedish Cross adopted the cloud service it was able to save 20 % on its IT operating costs, rising cooperation and communication accuracy. Employees could focus 25 % more of their time on strategic missions, which could better uphold the main essence of the organization³.
- **Health records as a service** provide easy and fast access to information for both patients and healthcare teams, and the ability to fit out end-to-end management issues, is enabling patients to bear responsibility for their health. An interesting example says that with only 16 weeks to improve a easy and fast access, the enforcement of Patient Relationship Management at Guy's and St. Thomas's Hospital, London, led to reduce the time from 13 to 3 minutes (Denjoy 2012).
- **Accelerate business intelligence and data visualization**: healthcare organizations require precision, in-time information to address increasing costs, constantly changing assizes, rules rising patient mobility and ascending seek for medical care in senility inhabitancy. Digitizing patient information produces useful knowledge, creates the baseline for evolution of new efficiencies and equipped better visions to boost more informed decision making processes. This was shown when the Danish⁴ e-health portal upholds 92 % of all General Practitioners with online access for all hospitals and 330 separate laboratories. People can access information about all hospitals via the Internet and receive 81 % of prescription electronically (around 1 million per month).

¹ http://newsroom.accenture.com/article_display.cfm?article_id=5089

² <http://www.microsoft.eu/cloud-computing/case-studies/hospital-uses-cloud-computing-to-improve-patient-care-and-reduce-costs.aspx>

³ <http://blogs.technet.com/b/whymicrosoft/archive/2011/03/10/swedish-red-cross-saves-costs-with-microsoft-online-services.aspx>

⁴ <https://www.sundhed.dk>

- Cloud allows enhanced security safeguards. In order to avoid any disadvantage of releasing data related to people's information security is very necessary for using the cloud services in healthcare. It is obvious that cloud systems suppliers can give higher security than the security given by hospital IT services, which are less specialized and equipped. All IT services are reachable on the cloud services, which make it available to the healthcare providers whenever and wherever they need it. This means there is no need to develop recourses in-house (Denjoy 2012).

3.1.7 Challenges of cloud computing in healthcare

In healthcare cloud is dealing with storing and processing sensitive and important medical data. Therefore it is very important to understand the following challenges in CC (AbuKhousea and Al-Jaroodi 2012).

Technical challenges

- **Availability:** many reasons could cause defects to the service because the resources exist in open network on contrast to IT infrastructures within the organization.
- **Data and service reliability:** applications of e-health cloud demand assurance of high dependability and reliability. The service comes from several cloud providers so there could be a risk of false data.
- **Data management:** management of healthcare cloud data must consider high security, reliability, efficiency and scalability.
- **Scalability:** the huge number of providers and patient records makes scalability an unavoidable condition. A high level of performance will enhance scalability
- **Flexibility:** infrastructure and services in healthcare cloud must be flexible to be shaped for different provider's requirement, and adding new services.
- **Interoperability:** integration between different kinds of services (from different providers) like images or records is very essential.
- **Security:** open environment and sharing of service needs security and high control management.
- **Privacy:** protection of patient's records and providers is an important issue
- **Maintainability:** all resources and services must be easily maintained.

Non-technical challenges

- **Organizational change:** shifting to e-health cloud will involve the employees in the organization and medical processes.
- **Legislation and standards:** legitimacy of detailed procedures in healthcare practices is not very clear and definitive.
- **Data ownership:** the main question is, who is the owner of the patients records, the patient himself or the physician?
- **Privacy and trust:** it is a big threat to the reputation of the provider if any data loss occurred.
- **Usability and end-user experiences:** patient and medical staffs both are concerned with this issue. Training is a good solution in this regard.

3.2 Stakeholders information sharing and communication

The notion of stakeholder is explained in dictionaries such as Merriam-Webster⁵ as one who is involved in or affected by a course of action. Oxford Dictionary⁶ adds to the explanation by say it is a person with an interest or concern in something, especially a business. According to Wikipedia⁷ a stakeholder can also be a group, organization, member or system.

In 1997 Mitchell et al. made a scientific investigation of the notion. They identify three qualitative classes of stakeholders, power, urgency or legitimacy. A stakeholder typology, then describes a central, definitive stakeholder possessing all three attributes. Other types found are 1) a dormant stakeholder, 2) a discretionary stakeholder, 3) a demanding stakeholder, 4) a dominant stakeholder, 5) a dangerous stakeholder or 6) a dependent stakeholder based on the number of attributes they possess. The model is aimed at helping management identify relevant stakeholders to an enterprise (Mitchell et al. 1997).

In patient-centered healthcare relevant stakeholders are patients, their families, clinicians, and health systems. They should be given the opportunity to engage in aligning perspectives on issues of quality and value in the process i.e. what counts and how it should be accomplished (Epstein and Street 2011).

The information sharing and communication is the use of IT systems to support some kind of nosiness in organizations, to improve the business activities within and between organizations (Nilsson 2005). The most important and primary unit for knowledge sharing is community of knowing, because an individual cannot be the origin of knowledge himself. The community of knowing requires a system in order to do knowledge work (Boland and Tenkasi 1995). Orlikowski (2002) also referenced the work done by the Boland and Tenkasi (1995), as with the intensification, of globalization, acceleration in the change and the innovation in the technology, especially focus on the available resources and difficulties linked with the sharing of knowledge and transferring best practices internal or external to the organizations (Orlikowski 2002).

Currie and White (2012) examined the brokering of work place knowledge within the organizational context from the professional perspective from a healthcare system case study. The knowledge sharing and communication is a cultural and as well as political matter. The healthcare professional also may be not willing or unhappy to share the knowledge across the professional boundaries (Currie and White 2012).

3.3 Patient-centered healthcare process development

3.3.1 Process development

The reengineering of the organizational processes is one of the important actions taken by the businesses to focus employees on processes that provide importance to the customers. The integration of autonomous, functionally focused information systems into a shared and process-focused database and network is one of the possibilities that can make things go wrong during process development in society (Majchrzak and Wang 1996). Majchrzak and Wang (1996) have

⁵ <http://www.merriam-webster.com/>

⁶ <http://oxforddictionaries.com/>

⁷ http://en.wikipedia.org/wiki/Main_Page

conducted a study research to explore the process development in society, mostly the answer from the study was that the process development change will reduce the time and effort required to integrate and monitor the work of autonomous units to satisfy the customers. The achievement of such goals within an organization creates a common understanding of, and a collaborative sense of responsibility for customer needs. The cyclic time can be reduced for organizations by overlapping the job responsibilities of the employees. The physical layout of the organization can have both a positive and negative effect directions; can inhibit or can promote collective responsibility. The collaborative meetings for continuous improvement in the organization are also another type observed by the authors. When redesigning the work procedure it is very important to ask the actors of the process, what extent their departments encourage them to do things like: share ideas for improvement with people in other disciplines, involve everyone who would be affected by making that decision, finally the help others do their work without caring about their own work (Majchrzak and Wang 1996). Logistic innovation and development is extremely critical to the success of social organizations. Customer value oriented innovation within the organization is important.

Flint et al. (2005) is providing many choices for companies seeking advice for managing innovation. Most of the research work among them was specially written on highly technological innovation. The innovation or development in society does not mean adopting technologies new to the world; it is the adoption of technologies to facilitate and increase the quality of products and services for customers. The logistics innovation also suggests a need to explore customer value research and organizational learning (Flint et al. 2005).

It is an important prerequisite for reengineering or orientation of processes within the organization to understand which businesses processes, and how they are related to each other (Kohlbacher 2010). Kohlbacher (2010) wrote a number of case studies in his research paper about the effects of process orientation: a literature review. Among his case studies he provided some cases in the field of healthcare system delivery. *Siemens Health Services Corp., USA by Bocionek*, introduces the business process management in Siemens Medical Solutions Health Services Corporation. The key values of process orientation and business process management in the firm are the achievement of customer satisfaction, employee motivation, innovation strength and long-term partnership with its customers and suppliers. By implementing the business process management in Siemens Health Services Corp., the on time delivery of development milestones, cycle time reduction and the improvement of customer satisfaction were observed. *The Siemens Medical Solutions AX (Med AX) by Bulitta*, develops, produces and introduces medical application solutions and imaging systems. This Med AX project was initiated for the better alignment of processes like sales process, innovation process or system development process with the customer. Some of the valuable outcomes from the Med AX process orientation were; high maturity degree of process management for customer satisfaction and high product quality, increase in annual productivity by 10 percent, the improvement of process management contributed to the increase of sales and profits. Schmelzer and Sesselmann conducted similar comments, but studying as a whole about the Siemens Medical Solutions, in 2006. They concluded that the Siemens Medical Solutions has improved the delivery reliability and process quality had a significant positive effect on customer satisfaction and sales. Kohlbacher (2010) is also writing a quantitative study done by *Gustafsson et al.*; they analyzed the quality practices from small to large scale Swedish Services organizations, like real estate organizations, education, healthcare, Research and Development, and computer industry. They have shown that process orientation has a direct significant effect on customer satisfaction for large services organizations (Kohlbacher 2010).

3.3.2 Process development in the healthcare system

The process development or orientation in the healthcare industry is also in practice. The healthcare institutes are stable social structures with specific rules and regulations that maintain the social order and activities, which are continuously in the stage of reproduction of standardized and interactivity processes (Ledderer 2010). A useful study about the process development in healthcare system is made by Ranerup (2010) about the transformation of patients to the consumers, she evaluated the national healthcare systems of UK and Nordic countries; Norway, Denmark and Sweden. The use of technological devices to promote patient-centered care systems enhances the understanding of the fundamental design issues related to the role of ICT (Information and Communication Technologies) in healthcare system (Ranerup 2010). Ranerup referenced the research of Andreasson *et al.* that 75 % of Internet users utilize web technologies to search for information on general health, illnesses and healthcare (Ranerup 2010)

The development in the mobile applications and devices for power of changing consumer behaviour also should not be underestimated. There are many examples of health oriented mobile applications and devices coming in the international market. An important development is that many companies in the consumer electronics shown to be active in e-health systems. Samsung Medison plans to become one of the four largest suppliers for ultrasound devices; Panasonic is also making efforts for becoming a healthcare system provider leader in Indian healthcare market (Ejenäs 2012).

Andreasson and Winge (2009) wrote a report on their final project named VVP - the value adding process of care. In this report they designed the concepts to care and the need for different contributions from different areas of expertise. The purpose of the project is to individualize the cares, which are the actions that create value for the patient. This can be achieved by capturing the patient's perception and expressions for the value of changing priorities and new needs. The VVP project was aimed at increasing the value creation for patients in business development process. For this process development in patient-centered system, Andreasson and Winge (2009) argue that the more traditional way of planning and development in healthcare needs to be more holistic. This can be achieved when there is an interest showing from the professionals and care providers to focus on the patient's needs and information-based e-services. Healthcare professionals should be able to get an overall picture of the patient's needs and what is planned for later, which gives an insight of the need to coordinate actions to create the greatest value for the patients. The support of e-services can provide a more process-oriented approach and a collaborated support to communicate with each other (Andreasson and Winge 2009).

3.3.3 Patient-centered healthcare

The definition: *patient-centered healthcare*: is a process which respects preferences, needs, and values of the patients from bio psychosocial perspective rather than a purely bio medical perspective with building a strong relationship among the patients and the taking care staffs. The Institute of Medicine (US) Committee on Quality of Healthcare in America has defined the patient-care health system as "Care that is respectful of and responsive to individual patient preferences, needs, and values." (Greene at al. 2012).

The emergence of a patient-centered care system came in early 1950's and in early 90's it was included in healthcare research policy (Jayadevappa and Chhatre 2011). Jayadevappa and Chhatre (2011) referenced the definition of patient-centered care system from the book of Gerteis et al., written in 1990; there are different dimensions of patient-centered care systems, this important work emphasizes quality of the care as perceived through patient's perspective. The highlighted

dimensions of patient-centered care system were respecting patient's individuality, coordination of care that is unique to the environment of the hospitals and healthcare facilities, the communication among the patients and the taking care staffs like doctors and nurses, interference strategies for improving quality within an organization, minimizing the treatment time during the acute care, providing patients their social and emotional needs, role of patient families, the facility of continuous care treatment. The social and cultural competence needs to be factored into patient-centered care system (Jayadevappa and Chhatre 2011).

3.4 Alignment in the stakeholders information sharing and communication

In the previous section, "*Process development in the healthcare system*" we discussed that an important development is that companies are trying to be active in e-health systems which are a part of informatics (Ejenäs 2012). Most of the information systems in the health system focus on the facilities like the use of electronic medical records by clinicians. However patients also have to use the information technology to keep updated (Krist and Woolf (2011).

The increasing use of Internet provides an opportunity to the healthcare professionals to access medical and health information to improve the efficiency and effectiveness. Mobile devices are an exciting and rapidly expanding domain for healthcare applications. Eventually, the healthcare applications have to resonate with a society's dominant form of technology use. The use of Internet and communication technologies is supposed to be the ideal way to disseminate information both locally and globally (Castells and Cardoso 2005).

The emergence of information and communication technology in the healthcare system needs an alignment within the enterprise architectures, which can be functional, structural, socio-cultural, and infological. Alignment between the business and the information technology is important for the process and goals of achieving a competitive advantage through developing and sustaining a symbolic relationship between the stakeholders and their IT systems. Henderson and Venkatraman (1999), incorporated the cross-domain perspectives of the business and IT alignment, arguing that neither strategic nor functional integration alone is sufficient to align the business effectively (Henderson and Venkatraman (1999). The strategic alignment model (SAM) was developed to cover the lack of alignment between IT and the businesses. SAM has certainly dominated the research efforts in the field of this alignment. It mainly focuses on the integration of IT and business, as well as the need to adopt the internal structure of the business. There are always the goals and objectives of an organization in a hierarchical format whereas the aspects like, values, norms, culture etc. define the conditions under which this hierarchical format works. From the informatics point of view the structure of these goals can be asymmetric hierarchies or symmetric networks because they are established through negotiations. Organizations should not be concerned only about profitability, but also promote a favourable environment for the individual that works towards collective goals (Magoulas et al. 2012). The stakeholders within an organization can be executive, employees, support staff, customers, suppliers, shareholders, local communities or other enterprise concerned groups. The collaboration and communication of the stakeholders is most significant to the system (Magoulas et al. 2012).

Functional alignment

Functional alignment is the requirement of Information systems capabilities for information services and relations of the organization. In the change process the architectural approaches refer to the architecture as a singular information system that serves the whole enterprise and its surroundings (Magoulas et al. 2012). There are so many firms in Europe and America, which are currently using

process innovation initiatives for alignment purposes. In fact the functional alignment in the enterprise is completely distinct from the architectural approaches of business. It is not a new concept to change management according to the information system for functional boundaries of the business. It becomes difficult to cut across the department lines in developing the kind of new information system, which ties together different departments and sections (Davenport 1993). Functional alignment is a relationship between the information system and the processes. Alignment can be defined in an equation of required information capabilities and the available information capabilities as a time (Magoulas et al. 2012).

Structural alignment

When Information systems and information and communication technologies are accepted as a form of authority and responsibility and characterized by a clear and comprehensible such a situation is called structural alignment (Magoulas et al. 2012). The integration of information system and the sources of authorities and responsibilities within the organization is called as the structural alignment. Magoulas refers, to the concept of “information politics” used by the Davenport (1993) and also reflects the same issues as structural alignment. Magoulas et al. (2012) defines a relationship of structural alignment as the established structure being equal to the accepted structure. When this relationship is balanced it means that the stakeholders of the enterprise accept the established structure. When the structures are not so comprehensible, it leads to difficulty to manage both process and information. Therefore the structuring of the enterprise should be prior than to the technological sophistication (Magoulas et al. 2012).

Sociocultural alignment

Every enterprise has a hierarchy for the goals and objectives, while the aspects like values, norms, and cultures define the conditions under which this hierarchy is constructed. The organizations dealing with the social aspects should not be limited to only profitability; they should promote a structure for the individuals that work towards the goals and objectives (Magoulas et al. 2012). The sociocultural alignment is the relationship between the information system and the goals and the objectives. The business and its social communities are attached together due to the information and knowledge within the organization. Hence the sociocultural alignment is defined as the stakeholders expectations are in line with shared values, shared goals, and collaborative behaviours such as time (Magoulas et al. 2012).

Infological alignment

The capabilities of satisfying the required informational and relational needs of the stakeholders, using of information system and ICTs is called infological alignment. It is the direct relationship between the area of information system and the individual stakeholders, by knowledge communicating through the language. The infological is defined now, as the required information is equal to the information provided plus some extra information. In many situations the information communication needs some additional information. The information system of the organization should be designed, as they should support the learning processes that take place within the functions of the organization. When the environments are dynamic, the standard operating procedures should be avoided. The advantage of the infological alignment can be measured in terms of infological completeness, which is a clear and unequal understanding of means and ends. The confirmation of information to implicit knowledge of actors in terms of validity, functionality and relevance is used to demonstrate the state of infological alignment (Magoulas et al. 2012).

Alignment of organizational components is a key to managing the situational change within the organization. It's not easy to understand the development dimensions for a coordinated wide, information system and knowledge development. A contradiction for the change management among the organizations is found, that the adoptability and the flexibility of the information technology is become critical, the contradiction is for example in connection to new investments for internet and e-marketing or e-social services.

3.5 Management of a patient-centered healthcare process development

Mostly the change within the organization is caused by the external forces, like substantial cuts in funding, decreased marketing values and dramatic increases in services. The innovation in the organization is typically, technical, structural or strategic change. The set of processes applied in systematically and controlled manner to achieve the changes are called change management. Current situation of the organization is important to know when applying the changes within the organization. Bernus (1999), also write about these three circles of an organizational development or management change process. According to him the role of people circle of the situational change in the organization remains fundamental. The organizations operating according to the new management paradigms achieve an individual asset with the emergence of authority delegation and flat hierarchies. Typically the people play different roles when changes occur and reengineering is in process. This knowledge of about the roles performed by the people within the organizations can be capitalized and reused as an asset (Bernus, 1999).

Understanding what characterizes situational change is one important side of management. The other side is to comprehend the procedural aspects of the development situation that deals with how the change process and work can be organized as well as the rate of change. Procedural aspects further include understanding of the goodness of instruments for change, like frameworks, models, methods, tools, techniques and principles, as they are means for management. Thus, comprehension of the development situation, its scope and content is important to management in order to reduce uncertainty and increase manageability of change (Enquist et al. 2001).

3.5.1 Leading change

Kotter proposed (2007) eight steps to transforming an organization in order to reach successful and lasting change. He suggested leadership should start by engaging in a discussion of major opportunities and threats to the organization. Once there is a sense of urgency and need for change it is important to group influential and powerful people into a team that can lead the effort. Their first task is to give direction through a vision, develop strategies for achieving it and of course communicating the vision. People can then learn from the good examples and be encouraged to act on their own. Leadership should in other words support change by removing hindering structures and encouraging risk taking. It is important for those involved to see the wins and improvements of change and to feel rewarded for their engagement. Thus, according to Kotter (2007) leadership should plan for and eventually build up the employees' engagement in further projects, new behaviours and possibly successful change.

3.5.2 Improvement of the take and impact of e-Health technologies

Van Gemert-Pijnen et al. (2011) presented a roadmap and principles for e-Health technologies development based on sixteen frameworks, with theoretical foundations in human-technology interaction, software engineering and behavioural theories that matched the inclusion criteria for their investigation. The criteria stated that a paper must be presented in a peer-reviewed journal; it had to describe an e-Health theory, framework, perspective or model. Particularly, papers presenting

guiding principles for the uptake and impact of e-Health technologies were chosen for the investigation. Further, paper had to propose quality criteria for each step in the process as well as human, technical, environmental and organizational aspects and the journal had to comprise relevant key word like for instance e-Health.

The roadmap for e-Health technologies development presented by Van Gemert-Pijnen et al. (2011) comprises five steps, 1) *Conceptual Inquiry*, 2) *Value Specification*, 3) *Design*, 4) *Operationalization* and 5) *Summative Evaluation*, see Figure 3-2 The Value Specification step use material from User Requirements and Value Creation (ovals to the left) as an input. In the same way, the Design step use material from Prototyping and the Business Model (ovals to the right) as an input. Circular arrows indicate iterations of Formative Evaluations between the each step.

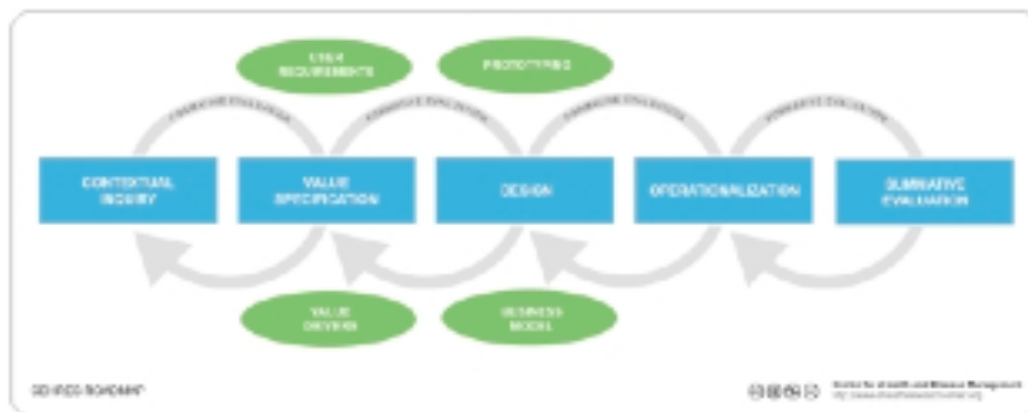


Figure 3-2. Roadmap for the development of e-Health technologies.

Source: Van Gemert-Pijnen et al. 2011.

In addition to the roadmap, researchers were able to formulate six principles for e-health technologies development:

1. e-health technologies development is a participatory process.
2. e-health technologies development involves continuous evaluation cycles.
3. e-health technologies development is intertwined with implementation.
4. e-health technologies development changes the organization of healthcare.
5. e-health technologies development should involve persuasive design techniques.
6. e-health technologies development needs advanced methods to assess impact.

Together the roadmap and the six principles constitute a holistic framework for improvement of the uptake and impact of e-Health technologies (Van Gemert-Pijnen et al. 2011).

3.5.3 Coordinated development

The idea of enterprise architecture is said to embrace three important domains, 1) IT-architecture i.e. the transfer of data between technical devices or computers through an infrastructure like the Internet. 2) Communicative architecture i.e. peoples ways of dealing with information and using information through a graphical interface of information technology, the human-computer interface. It concerns peoples interpretation of data using their preknowledge, time and motivation and 3) Social architecture i.e. information sharing and communication in an enterprise, which concerns the exchange of data between people, human-to-human. These sub-architectures constitute an information environment and thus, what aspects of change management can face, see Table 3-2.

Their common dimensions are functional, structural, infological and sociocultural alignment. (Langefors1995, Magoulas and Pessi 1998).

As mentioned, a social architecture concerns the exchange of data between people. Here we extend the view of social architecture by first pointing to the varied knowledge and understanding that people possess. That is then demonstrated through varied perceptions of the development situation at hand, varied understanding of the need for change and variations in how possible solutions and its implementation are perceived (Boland and Tenkasi 1995, Burnes 2009). A social architecture view can thus be explained as a shared and communicated understanding of a situation within a group of stakeholders that share a sense of “togetherness” (Magoulas and Pessi 1998).

Table 3-2. Domains and dimensions of enterprise architecture, i.e. and information environment based on Magoulas & Pessi 1998 and Magoulas et al. 2012.

Sub-architecture of the enterprise	Alignment dimensions
Social architecture	Sociocultural alignment or acceptance of ends and means.
Communicative architecture	Infological alignment or comprehension across professional barriers.
IT architecture	Structural alignment or purposeful distribution of power. Functional alignment or advancing healthcare delivery with CC.

The knowledge and understanding of social architecture is reflected in the DELTA meta-model for coordinated development, its understanding of change as a learning process, its basic building blocks and its principles (Enquist et al. 2001). According to the DELTA meta-model stakeholders engage in a dialog for understanding of the enterprise, its present state and future transition. In sharing and communicating their perception of the world, i.e. how they picture it, a shared goal for development and the development process can be achieved. Thus, the *stakeholders*, their present and future views of the *enterprise pictures* of form and content, its *development goal* and *development process* make up the four DELTA basic building blocks or elements of change in a coordinated development.

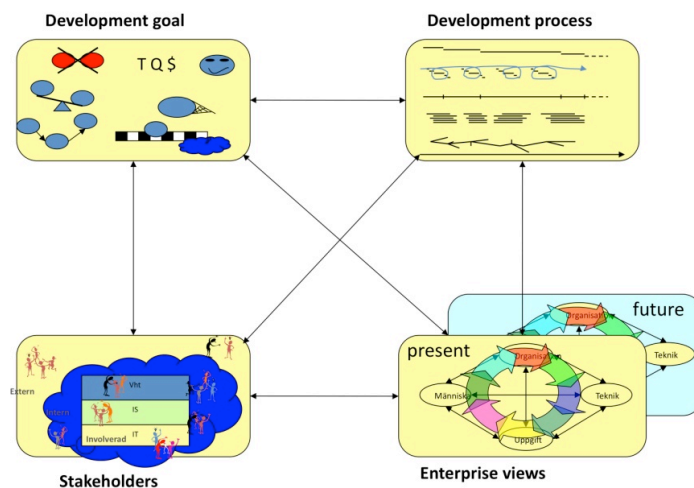


Figure 3-3. DELTA elements of change in a coordinated development. Source: Enquist et al. 2001.

The coordinated development process comprises four different situations of continuous learning and unlearning among the stakeholders, 1) *Situational Analysis*, 2) *Architectural Design*, 3) *Choice*, 4) *Implementation* and again, *Situational Analysis* etc. in which a common understanding of meaningful change could be managed (Enquist et al. 2001).

The principles for management of coordinated development can be associated with the four basic building blocks. With each principle follows an interpretation indicating what should be asked of a framework supporting management of coordinated development. For instance the first principle associated with Stakeholders, The principle of “Maturity” is interpreted, as “*The framework should emphasize the capacity of participants for learning.*” The following principle, the principle of Contradiction, is interpreted as *the framework should deal with plural and conflicting interests*” etc., see Table 3-3.

Table 3-3. DELTA Principles for management of coordinated development.

Element	Principle	Interpretation
Stakeholders	Principle of “Maturity”	The framework should emphasize the capacity of participants for learning.
	Principle of Contradiction	The framework should deal with plural and conflicting interests.
	Principle of Completeness	The framework should take into account the absent and future clients.
	Principle of Cultural diversity	The framework should be appropriate to diverse cultures.
	Principle of Simplicity	The framework should secure the understanding of reality through the sound employment of concepts, significant perspectives and significant points of views, i.e. abstractions.
	Principle of Conceptual clarity	The framework should support the understanding of complex concepts and communicate them precisely with few, non-technical words.
	Principle of Awareness	The framework should support the awareness of contextual relationships that are significant to preserve the integrity of the object.
Enterprise Pictures	Principle of Innovativeness	The framework should suggest new possibilities of form. The framework should enable people to see a total range of alternative strategies/solutions.
	Principle of Wholeness	The framework should address the enterprise as a whole.
	Principle of Architectural goodness	The framework should deal directly with architectural forms and their qualities.
	Principle of Realism	The framework should lead eventually to structures or processes that can be implemented in IS or in human organizations and jobs.
	Principle of Relativeness	The framework should provide concepts that have meaning only in relation to the enterprise and in the context of all concerned architectural dimensions.
Development Goal	Principle of Purpose	The framework should start from purposeful behavior and the images and feelings that accompany it.
	Principle of “Here and now”	The framework should emphasize the active purposes of participants.
	Principle of Usefulness	The framework should lead to measurable contribution to the strategic advantage.
Development Process	Principle of Decisional appropriateness	The framework should be appropriate to variations in decision situations.
	Principle of Non-seperability	It should be possible to evaluate the quality of state and process together, as it varies over a moderate span of time.
	Principle of Usability	The framework should be used in rapid, partial decisions, with imperfect information, by laypersons that are the direct users of the "place" in question.
	Principle of Methodological quality	The framework should be sufficiently simple, flexible and divisible.
	Principle of Temporal significance	The framework should connect values of very general and long-range importance to that form, and to immediate, practical actions about it.

3.6 Principles for management of patient-centered healthcare process development

The above presented principles for leading change; e-Health technologies development and coordinated development all represent knowledge for management. From the point of view of informatics it is important for management to have a better understanding of the whole situation rather than a fragmented view of its parts. Therefore we suggest a more complete knowledge for management by summarizing the principles for management of a patient-centered healthcare process development, see Table 3-4.

Table 3-4. Principles for management of patient-centered healthcare process development.

Architectural knowledge	Knowledge Dimensions	Principles
Knowledge Domains		
Social architecture	Sociocultural alignment	<ul style="list-style-type: none"> • Kotter 2007 • Enquist et al. 2001 • van Gemert-Pijnen et al. 2011
Communicative architecture	Infological alignment	
IT architecture or	Structural alignment	
Infrastructure	Functional alignment	

4 Empirical Study

The chapter starts with background information, history, and the current position of the interviewees. The interviews questions relate to different issues within CC in the healthcare CC for information sharing among stakeholders in a patient-centered healthcare process and the management of the development process. This chapter includes questions and answers from the interviews and secondary data too.

4.1 Initial facts about Sweden

There are 290 local councils (kommuner) in Sweden. They are responsible for the majority of the services for the people in the area (*local level*). The responsibility includes compulsory care for the elderly and disabled together with healthcare in special housing for the elderly and sick. Healthcare in private homes is not compulsory. A local council can thus independently choose whether or not to provide their service in private homes. Councils are organized in independent, regional groups aimed at common regional development (ETC Kommunikation 2012).

In Sweden there are 20 regions (landsting) responsible for development in a larger geographical area (*regional level*), which requires a large amount of money. The regions most important and compulsory task is to govern healthcare. A region also has responsibility for innovation and growth in the area (ETC Kommunikation 2012).

Regions and councils cooperate concerning the development of general e-Health issues at the *national level* through the organization, CeHis, Center för eHälsa i samverkan (CeHis 2013).

Statistics Sweden publishes each year a report concerning the use of computers and the Internet by private persons in the country, this year (2013) with a special focus on mobile Internet use. The report includes a section on the use of technology among the elderly. A brief look at the valuable content clearly shows that the elderly form a special group that does not have access to or use the technology as frequent as the rest of the population. Men, however has better access than women, well educated have better access than those with low educational profile, those living in cities and towns have better access than those living in the country side. Although women between 75-85 years old have increased their technology use during the last year, less than 50 % of both men and women have access to a computer in the home in this particular group. In the group 65-74 years old approximately 80 % of both men and women have access to the Internet in the home, however men are more frequent users than women (Statistics Sweden 2013).

4.2 Population of interview

The interviewees are presented in the order as the interviews were conducted.

Interview NO. 1: The interviewee has had several positions at the Swedish branch of a global IT Provider firm. Now, he is **Cloud leader** and manages all initiatives regarding cloud computing within the firm.

Interview NO. 2: The interviewee has had many positions as IT architect in a large community hospital in Sweden. Now, his responsibility is **Chief medical information officer (CMIO)** with a special task to make vital information systems for radiology and pathology totally independent.

Interview NO. 3: The interviewee has a professional nursing background. After being a nurse she had a management position in a private consulting company. Now she is **Director of business development** at a primary care unit, which means that she supports both enterprise processes and IT acquisitions

Interview NO. 4: The interviewee has had many positions in IT consultancy and has a good insight into healthcare services in Sweden. Now he is a company board member. He also works part time as **Senior adviser**.

Interview NO. 5: In this interview there were two interviewees. The first interviewee is an **Enterprise leader** and the second is an Infrastructure leader on national level. They are treated as one interviewee because both of them gave similar answers to the questions.

Interview NO. 6: To begin with the interviewee worked as a nurse, then as a psychiatrist with older people in home healthcare. Today she is **Sector manager** for a local community with responsibility for elderly care

Interview NO. 7: The interviewee is currently working in a local home healthcare department, and she is a **Nurse** by profession. Her responsibility is to take care of patients, fix and coordinate their documentation with different stakeholders.

4.3 Result

4.3.1 Cloud computing in healthcare

Recommendation of adopting Cloud Computing

I asked the interviewees if their organization adopted CC and what are the main reasons behind adopting it. The Cloud leader explained that CC is one of the cornerstones of their firm strategy. They are recommending clients to assess the leveraging benefits of the CC, because of cost efficiency, flexibility and also time to market. The CMIO said that they recommend it in some cases, but not in all cases because of security aspects and the other reason behind not using the CC is the difficulty of the transition to go from the old system to a new one. He described it as "mission impossible". The Director of business development was very clear "yes, we do." The reasons behind this positive answer are that CC is flexible, safer and cheaper. The Senior adviser said that they have adopted CC because of the lower cost. The Enterprise leader answered that they adopt CC with special attention to the legal requirements on how to be safe in data world. The reasons behind adopting it according to him, the reasons are Cost-effectiveness, scalability and flexibility. The Sector manager and the Nurse had no idea about CC. Instead of asking about CC, the question was about IT. The Sector manager said there are health, medical law, Social Services Act and "we use IT to document the meaning of these laws".

Deployment of Cloud Computing

I asked the interviewees if there are any issues involved in the deployment of CC. The Cloud leader explained that cloud can be from different levels from IaaS to PaaS and also SaaS different things depending on how you look at it. The CMIO focused on the legal and security aspect. While the Director of business development centred on flexibility, safety, and low cost but she was conservative about some information sharing, which she described as very (critical). The Enterprise leader mentioned security and law requirements regarding the information that you send up in cloud. He also discussed the legal requirements around the management of information, Information

permissions on the healthcare side, various aspects related to different situations for different types of people, mature friendliness and confidence to utilize this type of distribution shape for IT services, the requirements for guaranteed availability, and the requirements for guaranteed performance. Similar to question 1 the Sector manager discussed IT instead of CC. She said for patients, the safety is most important, for employees, it is important to get information quickly.

Form of Cloud Computing recommended and saving patient and hospital data

I asked which form of CC you recommend for saving patient and hospital data. The Cloud leader replied that there is not one answer but usually you end up within hybrid solutions. The CMIO mentioned private cloud as a preferable form because the patients feel much secure with it. According to the Senior adviser, that the form to be chosen is depending on the type of service and what vendor you are working with. The Enterprise leader said right now, we do not recommend any of them until we have all the answers, then we act while we are required to give all patients all the data during the research. It is about how safe we are when changing information out from eligibility.

Major security issues in Cloud Computing

I asked about the major security issues in CC and how far it is safe and secure to save all patient data in it. The Cloud leader said that the main security issues for e-health cloud services and for public access are different legislation aspects. The level of security depends on the form of CC. The CMIO was insisting that there is never 100% safety because of the connection with the network. The Senior adviser almost agreed with the CMIO but he explained that with a good data centre and a good storage routine we can reach acceptable security level. The Enterprise leader said that politicians and other officials do not know not how fast change is occurring. It will be global changes regardless of EU organizational limits, there are difficult issues involved, and how far the differences in detail should be between our generation and the coming generation. He referred also to individual control and protection of the information in specified areas.

4.3.2 Cloud computing for information sharing among stakeholders in a patient-centred healthcare process

Information sharing in a patient-centred healthcare process

I asked the interviewees what is the affect of CC on information sharing in a patient-centred healthcare process. The Cloud leader said that the key aspect is fast information access to large data volume and fast time to market. The CMIO explained the possibility to have much higher quality, the possibility of doing knowledge collaboration, take away the negative aspect of having the geographical location as the limitation of the information and limit waste of resources. The Director of business development answered that you need a relative interaction with different types of organization and actors so it's safer and more dynamic technique but you can still steer the information and that is a positive point. The Senior adviser stated that the affect is patient participation in the care process and his capability to access from home and everywhere. The Enterprise leader answered that the (access) availability of information to all involved in the process is important. He mentioned three levels of sharing information:

- Highest level: Activity and service level.
- Intermediate level of process level.
- Lowest level: Technology level.

Similar to other questions the Sector manager talking about IT instead of CC. She said the main effect is to maintain security. The nurses have their information / documentation, doctors have their

information / documentation they cannot read each other's information. Maybe it's strange but it is so. It should be, as patients feel confident that not everyone can read all the information.

Improvement of information sharing and communication in a patient-centred healthcare process

I asked how CC can improve information sharing and communication in a patient-centred healthcare process. The Cloud leader said they have software solutions for connecting different information sources. The CMIO thinks that CC is already shareable and reachable and expressed that "sharing is caring". The Senior adviser answered that the improvement comes from the easy to access and share but it is very necessary to supervise the process. The Enterprise leader explained that improvement comes from the importance of involving patients in the care process and its information management in order to create conditions brought the patients to choose. The same question regarding IT, the Nurse said that we are in the Stone Age when it comes to communication / collaboration. It will be a long time before any change takes place when confidentiality is important. Everything concerning the patient may not transfer and you have no information about the patient visit, if you do not read about it before the visit.

Support for healthcare decision makers and professionals in a patient-centred healthcare process

I asked how cloud services can support healthcare decision makers and professionals in a patient-centred healthcare process. The Cloud leader explained that the support is coming from the fact that the data is accessible to any doctor and anybody in healthcare system, which leads to making good judgment on the diagnosis. The CMIO said the support comes from providing all the information, which created for that patient and this information, is helping to make a good decision. The Director of business development declared that they don't have a very good decision making that pays attention to the patient and relatives or other actors outside the healthcare system and they have lack of information and that is why they don't have CC in healthcare process yet. The Senior adviser said that the accessibility by everybody and any time is giving that support. The Enterprise leader answered that the information optimization comes from easily available information, which will help the decision makers to create a new ways for management.

Limiting factors for using cloud based health services

I asked what the limiting factors are for using cloud based health services. The Cloud leader considered the integration of the enormous amount of information stored in different places is the main limiting factor in addition to understanding of the legislation for handling sensitive data. The CMIO centered on security issues that could be limiting one because they have a fear to put everything in the cloud. The Director of business development talked about lack of knowledge and understanding as a limiting factor. The Senior adviser thinks that the biggest obstacle to implementation in a broad way that is the old structure. The Enterprise leader concentrated on the difficulties of transformation from traditional IT perspective to CC taking in consideration the legal aspect. The Sector manager said lack of security.

Service level agreements (SLA)

I asked about SLA role, regular information to be included and saving the rights of both providers and users. The Cloud leader explained that SLA is related to vendor the ability to actually deliver on contracted SLA, vendor scalabilities include: skills, infrastructural and organizational abilities in line with the contractual obligations and those penalties the vendor is backing a missed SLA. The CMIO concentrated on FLA (functional level agreement) which is dealing with service up and running 24.7 in 365, never stop running, the image will be up and running within two seconds, there is no

acceptance for information loss, if total crash appears we have 168 hours to totally repair it. Also he referred to the functionality due to the importance of the healthcare. He pinpointed business model a solution for saving both provider and user. The Senior adviser said that the role is to check the delivery against the agreement to insure what you are ordering and paying for. The Senior adviser also answered that the information to be included varies from contract to contract but still there is a standard SLA that they can apply. Regarding the saving of the rights of both parties he referred to high quality level as an important issue. The Enterprise leader answered that the role of SLA and what should be included in SLA depends on the reliability and the trust between the two parties he expressed it is “question of trust”.

4.3.3 Alignment in stakeholder information sharing and communication

Involvement of persons affected by a decision in the decision making process

I asked the interviewee if they involve everyone affected by a decision in the decision making process. The Director of business development answered that they are not doing that and explained that as care giving is going through several stage and there is no sharing information between these stages and the end result is a very weak decision making process, especially that the patient is not involved at all in this process and only the organisation while the ideal picture is to have equal impact for the patient, family or friends and professionals we want patient make the decision. The Sector manager said that she is far from patient process. There is unit manager who works with staff and patient process. It is just the nurses can access the journal. She added that they have no system that we can communicate with each other.

Strong relationship between taking care staff and patient

I asked the interviewees do they instruct the care taking staff to build a strong relationship with the patient/care taker and his/her family. The Director of business development answered Yes, as a director I do that from my position we have a plan must develop the organization in this direction it's very clear here but it does not mean that is the technique is with us yet the IT are far away from our way of thinking so we create work process more like this. The Sector manager said it is the nurse's job to make a relation with the patient and their families.

Focusing on technological devices to promote a patient-centred healthcare process

I asked the interviewee to what extent do you and your sub staffs focuses on technological devices to promote a patient-centred healthcare process where patients become more of a consumer of care. The Director of business development declared that now they are very far from that and they are working allot to reach that goal so it's going to take many years because of having so much old technique. The Sector manager said we're just talking to each other. However, we have an IT system to keep check on various medical devices (MTP) in which each manager is responsible for the information.

Electronic devices to be used by the staff

I asked what electronic devices do staff at the clinic/in welfare care use to keep patients/peoples data saved. The Director of business development said just paper today, if the patient comes to our hospital then they have digital journal but if they go out home to the patient then we have paper and pen still have that. We don't have mobile information. The Nurse explained that they just take pen and paper to home healthcare and then in our office we documenting it in the system Medidoc. Everything concerning the patient may not transfer and you have no information to the patient visit, if you do not read about before the visit. The Sector manager home healthcare and nurses each one of them has its separated different system. No communication between the groups. It is not legal to staff nurses may read medical information on patient.

The roles of the mobile devices in patient-centred healthcare

I asked the interviewee's in your view, what are the roles of the mobile devices such as phones, laptops, iPads, iPhones etc. in patient-centred healthcare. The Director of business development answered that the time being we are using the mobile phone to communicate with the patient after taking his personal number (just voice contact). Other devices are coming to be used in future but going to take some years because there are so many stakeholders. The Nurse said mobile phone just we can call (our older telephone does not have email access) the older have no emails. We work with the confidentiality of patient data, and that's why it does not come anymore answered the nurse. The Sector manager said it is good solution with iPad / smart phones to document, but we have too little of this 'very poor'.

Balancing patient care processes needs with information technology

I asked the interviewees how we can balance patient care processes needs with information technology. The Director of business development centred on what she called (usability) which means easy to be used by the patient securely. She named four stone in this balancing:

- Decision makers
- System
- Patient (which is the easiest part) as long as we have high usability in our products
- Ethics

If you have all four, the communication is secure. The Sector manager expressed "We are Stone Age"

Reflection of authority in patient care process on information system

I asked the interviewees how authority in patient care processes can be reflected in information systems. The Director of business development answered that the patient has nothing to do with that and we are only one side responsible, because we own the problem of the technique. The Sector manager said responsibility and authority is that not everyone will get to read all the information from the various IT systems. (Right person has right information).

Reflection of cultural differences in patient care on information system

I asked the interviewees how cultural differences in patient care could be reflected in information systems. The Director of business development said that because of the gap between the patient and us we cannot make one solution we have to make many solutions like IT today is one solution for everybody and in the future different solutions for different type of problems in the same issues.

Promotion of stakeholders understanding and comprehension of information systems and information technology

I asked the interviewees how can we promote stakeholder (staff, patient, care taker, family) understanding and comprehension of information systems and information technology. The Director of business development answered that the promotion will come from the practice itself and interaction between two parties. The Sector manager explained that it must be simple and easy and the complicating about this is that doctors are in hospitals and nurse is on the municipality and they work in separate systems where they cannot read each other's systems, there should be continued efforts at national level to facilitate that one can safely access information from different systems.

Positive reaction between taking care staff and the patient

I asked the Nurse did she note a positive reaction because of strong relationship between you as a taking care staff and the patient. The Nurse said yes absolutely, the core of my work to build a good

relationship. There is a strong relationship between patients and nurses. The relationship depends on the patient if she/he wants it or not, it is the art of nursing.

The differences between home healthcare and health centers

I asked the Nurse if she feels that there is an important difference between home healthcare and healthcare centers. The Nurse answered that she has different role when she meet the patient, she has to be more responsive in home healthcare.

- Patient to healthcare center: here the patient is a guest of healthcare center.
- Nurse to the patient (home healthcare): more private, in this situation the nurse is a guest of the patient, so she has to be more responsive, here the patient is more vulnerable and often feel so bad that he or she cannot go to healthcare center.

Evaluation the personal variation of the patient

I asked the Nurse who does you evaluate the personal variation of patient (social, emotional needs, patient family's circumstances. She said that every patient is unique with different personal need and condition. The nurse in home healthcare has to adapt to the situation in a different way than in healthcare center or hospital. In a home healthcare the nurse has limited conditions so in this situation she has to be more creative. The primary for nurses in home healthcare to be cure, comfort and alleviate.

Information access

I asked the nurse if she has an access to the information, which is created about the patient. "No, not always we have to fix it by ourselves. So when we go to the patient we have to call the hospital". Often the nurses in a home healthcare don't have the right to the information we have to ask about it. We cannot come to the information, which is stored in the hospital. Communal has its journal, hospital has its journal, and healthcare center has its journal. No one has access to the other said the nurse.

4.3.4 Knowledge for supporting management of patient-centered healthcare process development

Support needed for developing an enterprise based on cloud computing

I asked the interviewees what type of support they have for developing an enterprise based on cloud service, for instance a patient-centered healthcare process. I mean by type of support a method, technique, tool, model, framework etc. The CMIO gave tow supports first technical framework based on medical quality perspective and second is the functional level agreement (FLA). The Director of business development replied was (none). The Senior adviser said that for support they depend on the skills of their employee on the service desk. The Enterprise leader said what to do now on the national level is to open up the system and information. However, for this to work, a clear categorization of the information is important. The Nurse answered that they have training on medical equipment but nothing else.

Guiding principles for supporting management

I asked the interviewees what guiding principles should support management in developing patient-centered healthcare process. The CMIO considered tow factors as guideline principles first is the understanding of the harmonization of the information; the other is the handling of that information. The Director of business development answered that although the organization is concentrating that principle must be safe but she is very interesting in the influence of the patient on the process. The Senior adviser said ITIL, that is the framework for developing for good services it's not rules but

recommendations how to do develop, deliver, and services and support. The Enterprise leader explained that the infrastructure is now under construction from the national perspective is based on a service structure is a prerequisite for creating service continuity. According to the Sector manager the guiding principle is that patients feel confident that the information is not disseminated.

5 Analysis

First the analysis of secondary data is presented. It is structured according to the nature of the change situation, present and future views and the scope and content of development. Then comes the analysis of primary data result.

5.1 Nature of the change situation

5.1.1 Frail older adults – present view of information sharing and communication

As mentioned in Chapter 2 Methodological Approach, the thematically organized experiences of information sharing and communication between patient, family and staff in hospitals, primary care and home care from the report “*Icke värdeskapande episoder i äldres vårdkedjor. En analys av komplexa flöden*” (Bowin et al. 2012) have been used for analysis. Headings in the report for each case was structured according to the enterprise architecture alignment model presented in Chapter 3 Theoretical framework (Magoulas et al. 2012) and presented in Table 5-1.

Table 5-1. Demonstrating the situation at hand in health and home care by structuring headings per case studied in the report according to the enterprise architecture alignment model (Magoulas et al. 2012).

Case	Functional alignment	Sociocultural alignment	Structural alignment	Infological alignment	Alignment of the whole
1	Repeated actions that do not solve patient's problem.		Huge health and home care responsibility on patient's family or relative.	Lack of information sharing among healthcare providers.	Patient's wife functions as the information messenger between hospitals, primary care, pharmacy and home care.
2	Referrals submitted left without following up.		Unclear responsibility for after care. No coordinated judgement of patient's needs.		
3	Actions do not meet with patient's needs Care is not happening.		Several symptoms and ambiguities regarding medication.	Lagging information exchange causes problems.	
4	Multiple medicine and care contacts. Insufficient actions.		Huge health and on patient's family or relative. Uncoordinated actions by many parties.		Fulltime working daughter provides additional help and home care.
5	Multiple symptoms are treated individually. Referrals are lost.		No coordinated judgement of patient's needs.	Patient has to repeat her sickness story each time she meets a new healthcare contact.	
6	Repeated emergency ward care of chronicle condition.		Ambiguities about medical side effects.	Lack of competence in home care.	Patient's daughter is urged to contact mother's long time care unit and find out medical details

					and bring the information back to the primary care unit.
7	Insufficient and delayed actions. Referrals submitted but no result achieved.			Lack of information sharing.	
8	Decided care not happening or ineffective. Insufficient judgment of patient's needs.		No overall responsibility.		
9	Delayed actions. Insufficient actions.		Many actors with unclear responsibility. Reactive actions without coordination.		
10	Actions not being followed up. Inaccurate and ineffective actions.		Uncoordinated care. No overall responsibility.		Daughter constantly carries information between long time care and primary care units.
11	Doubt and insufficient actions.			Lack of communication between care providers.	

The analysis demonstrates a dominance of issues concerning functional alignment, which indicates a misalignment between required and available information capabilities. There is also a large amount of issues concerning structural alignment indicating an incomprehensible situation with unclear structures of authority and responsibilities. In addition some issues of infological alignment are also found that represents misalignment of required and available information between different care providers and between the patient and care providers. This is also demonstrated in the column Alignment of the whole, which demonstrates the significant finding that family members act as information brokers for different care providers. However, there are no issues found concerning the sociocultural alignment. In other words, the report did not explicitly include issues of stakeholders' expectations, their shared values, goals and collaborative behaviour in their study. Using the framework for management of coordinated development (Enquist et al. 2001) the analysis can be perceived as a picture of the present enterprise.

5.1.2 My e-Health Services – Future view of information sharing and communication

In the analysis objectives in the report (CeHis 2012) are structured according to the enterprise architecture alignment model presented in the theoretical framework (Magoulas et al. 2012) in order to demonstrate the idea of citizen and employee use of future technology services, “My eHealth services” see Table 5-2.

The analysis demonstrates a dominance of objectives concerning functional alignment, which show a strong ambition to improve the alignment between required and available information capabilities.

There is also a large amount of objectives concerning structural alignment indicating a serious ambition to improve understanding of the situation and creating clear structures of authority and responsibilities. In addition a few objectives concern infological alignment and the improvement of required and available information between the patient and care providers. However, it is not clear how to improve the misalignment between care providers and it is not clear how to find a solution to family members acting as information brokers.

Table 5-2. Demonstrating the idea of use of future technology services by structuring objectives for the period according to the enterprise architecture alignment model (Magoulas et al. 2012).

Year	Functional alignment	Sociocultural alignment	Structural alignment	Infological alignment
2013			25 % of citizens are connected to "My e-Health Services".	50 % of citizens know that they can get healthcare advice via Internet and telephone.
2014	50 % of citizens have the possibility to share results and values from sampling and studies via "My e-Health Services".	70 % of citizens consider Internet and phones as suitable complementary means for contacting primary care.		75 % of citizens know how to become a member of "My e-Health Services".
	100 % of citizens have the possibility to view parts of his/hers journal information regarding care according the Swedish health and home care law integrated with detailed facts about their treatment via "My e-Health Services".		100 % of staff treating patients in healthcare has access to patients' sickness history and medication.	
2015	80 % of citizens have the possibility to access all certificates issued from healthcare via "My e-Health Services".		40 % of appointments made to primary care are booked via "My e-Health Services".	
	100 % of citizens have the possibility to collect and have an overview of their vaccinations via "My e-Health Services".			
2016	100 % of patients have the possibility to follow their referrals' via "My e-Health Services".		100 % of staff can access their professional enterprise system with a coordinated, easy and secure single log-on.	
2017	100 % of citizens have the possibility to access journal information for all healthcare and home care via "My e-Health Services".	60 % of citizens use "My e-Health Services" (including healthcare advice via telephone) as their first point of contact with healthcare.		
2018			New economical model stimulates use of e-Health services.	

The analysis explicitly show one objective concerning stakeholders' expectations, their shared values, goals and collaborative behaviour were included in the study. In other words, some thoughts about sociocultural alignment are given in the report, but it is not clear how this will be managed.

In the report it is also stated the specific task given to the healthcare and home care industries “...to deliver better results in terms of quality, availability and service with the same amount of resources.” Using the framework for management of coordinated development (Enquist et al. 2001) for analysis, the table and the statement can be perceived as a picture of the future enterprise.

In addition, there is an illustration next to the statements that shows people of diverse age presumably accessing their personal information at “My e-Health services” through the inter-face of information technology devices such as smart phones, iPads and laptops. Analysis of the statements of desired outcomes and the illustration suggest an infrastructure driven development. This is in harmony with the two of the sub-architectures in an information environment and; communicative architecture and IT-architecture, presented by Magoulas and Pessi (1998). We have not been able to identify statements of desired outcomes supporting the development of a social architecture.

However, the report reflects issues of coordination in the form of several guiding principles. These define stakeholders as decision makers at national, regional and local level together with their specific responsibility and contribution. We interpret the principles as support for the formation of a strong platform supporting envisioned coordination efforts between healthcare and home care providers in Sweden. Although stakeholders are limited to decision makers, we interpret the recommendation for active engagement at all management levels as awareness of the importance of developing a social architecture (Magoulas and Pessi 1998).

5.1.3 Scope and content of development

In the report (CeHis 2012) principles and the development scope expressed in the report are also analyzed through the framework for improvement of the uptake and impact of e-Health technologies (Van Gemert-Pijnen et al. 2011) and the DELTA framework for coordinated development (Enquist et al. 2001). In the report it is clear that the seriousness of the change situation calls for attention from managers at all levels of both healthcare and home care to engage in the up-coming e-Health development process. It is also clear that the development situation, characterized by an increasing need for care, an increasing demand for freedom of choice and the same amount of resources as before, calls for an even stronger political engagement in e-Health issues as development will change healthcare ways of working. This is in harmony with the first principles for e-Health technologies development (Van Gemert-Pijnen et al. 2011), which states that development is a participatory process and the fourth principle, which states that e-Health development, will change the organization of healthcare.

In the report there are statements about the envisioned development content, which can be analyzed for grasping the development scope. Statements are presented as desired outcomes for the period 2013-2018:

- *Decide, develop and maintain a common architecture.*
- *Create standards and methods of information transfer that can work for both healthcare and home care.*
- *Create a common platform in terms of rules, concepts and technical architecture that can support integration of e-Health services independent of originator.*
- *Infrastructural goals are security services, safe and trustworthy accessibility.*
- *Manage development, implementation and maintenance of specific services suitable for all stakeholders.*

The principles presented in the report are contrasting the principles proposed by Van Gemert-Pijnen et al. (2011) and Enquist et al. (2001) as they speak of a coalition of stakeholders for the

development of an IT-architecture rather than engaging people in the process and how to support a shared understanding of the development of every day healthcare and home care. Thus, they are more in harmony with Kotter's framework for leading change (2007), the first, second and third step that speak of creating a sense of urgency, creating a guiding coalition and forming a vision. Healthcare and home care have to deliver better quality and service within existing resources, the guiding coalition has to be put in place and the vision of developing an IT-architecture is already in place. However, Kotter (2007) proposed his eight steps for change within an organization rather than for a nation.

5.2 Cloud computing in healthcare

Recommendation of adopting Cloud Computing

According to Yuan et al. (2011) CC offer scalability, flexibility and faster start up time, reduced management cost and just in time availability of resources. The Cloud leader specified three reasons, cost efficiency, flexibility and time to market this has been referred to as an example about saving 20% on Swedish cross on their cloud services adopting comparing to their IT operation cost (Denjoy 2012).

According to Smyth (2009) most of CIO: s is hesitating to adopt CC in their business, because they don't feel secure with it. This is going with what the CMIO said that they don't adopt CC in all cases because of the security aspect. He mentioned the difficulty of transition to go from the old system to a new one, which applies with Smyth (2009) when he explained that if the organization wants to change from their existing application to CC it is not easy. Obviously the adopting of CC will increase and grow by the time this negative point will be overcome.

The Cloud leader, Director of business development, Senior adviser, Sector manager, and Enterprise leader all referred to cost efficiency, which complied with what Babar et al. (2011) stated, the scaling up or down software and hardware infrastructures without huge investments is the key importance of CC. Denjoy (2012) mentioned that one of the benefits of CC in healthcare is that it reduces costs up to 60 % compared to traditional non cloud-based solutions. The Director of business development, Senior adviser and Enterprise leader referred to flexibility and scalability, AbuKhoua and Al-Jaroodi (2012) mentioned that it is one of the challenges of CC in healthcare that a high level of performance will enhance scalability and the cloud must be flexible.

Deployment of Cloud Computing

According to Babar et al. (2011) there are three important infrastructures using CC is platform as a Service (PaaS), and software as a service (SaaS) and how with (PaaS) developers can access the platform through their APIs while in (SaaS) it's the user who can access and modify the application for themselves.

The Cloud leader said that the cloud can be from different levels IaaS, PaaS, and SaaS depending on how you look at it. The CMIO focused on legal and security aspects, which is also referred by the enterprise leader. The Director of business development added flexibility and low cost. All of those factors go with what is mentioned in AbuKhoua and Al-Jaroodi (2012) with scalability in technical advantages of CC. which also names elasticity and changing capacity according to demand. Smyth (2009) regards the security as an important factor that will be faced even in internal servers connected to Internet.

Form of Cloud Computing recommended and saving patient and hospital data

Hurwitz et al. (2012) say that spreading things out over a hybrid cloud helps you keep each aspect of your business in the most efficient environment possible. The Cloud leader though explained that the type of CC chosen depends on what kind of data we are talking about, but he added that the practically hybrid solution is preferable by clients, and he also specified that legislation is an important factor in different kinds of CC especially in healthcare.

The Cloud leader explained that usually you end up in a hybrid solution, which complies with what is mentioned by Hurwitz et al. (2012) that you keep each aspect of your business in the most efficient environment possible. The CMIO preferred private cloud because of security aspects, which goes with Hurwitz et al. (2012) when he explained that private cloud provide the greatest level of security and control. The Senior adviser and Enterprise leader did not specify any form of CC.

The major security issues in Cloud Computing

The Cloud leader centered on different legislation aspects as a major security issue and it depends on the form of CC. Both the CMIO and Senior adviser said there is no 100 % safety and there is possibility of hacking. Smyth (2009) declared that there is no 100 % security, neither in CC nor in internal servers connected to the Internet.

The Senior adviser added that with a good data center and good storage routine we can reach an acceptable security level. The Enterprise leader referred to individual control and protection of the information in specified area. As AbuKhoua and Al-Jaroodi (2012) explained the open environment and sharing of service needs security and high control management. The Enterprise leader added that politicians and other officials do not know how fast change is occurring. There will be global changes regardless of EU organizational limits, there are difficult issues involved, and how far the differences in detail should be between our generation and the coming generation. Again AbuKhoua and Al-Jaroodi (2012) referred to the legitimacy of detailed procedures in healthcare practices as not very clear and definitive.

5.3 Cloud computing for information sharing and communication

Information sharing in a patient-centred healthcare process

The Cloud leader said that the key aspects are fast information access to large data volume and fast time to market, which is the most important with shared access. This complies with what is explained by Peter et al. (2009) that the fast supplying of unlimited data is available in any quantity and time.

According Castells and Cardoso (2005), the use of Internet and communication technologies is supposed to be the ideal way to disseminate information both locally and globally. This is something that the CMIO said that there is the possibility to have much higher quality, the possibility of location as the limitation of the information, and limit waste of resources. The Director of business development spoke about needing a relative interaction with different types of organizations and actors. This is supported by Davenport (1993) when he explained in functional alignment that it becomes difficult to cut across the department lines in developing the kind of new information system which ties together different departments and sections.

The Senior adviser stated that the affect is patient participation in the care process and his capability to access from home and everywhere. According to Warren et al. (2012) this is one of the patient's advantages both in accidental cases and regular diseases that the patients will be able to receive fast and advanced healthcare. As Denjoy (2012) explained, this is also one of the benefits of CC in

healthcare when easy and fast access to information is available for both patients and healthcare team. The Enterprise leader also referred to the access availability of information to all involved in the process.

The Sector manager said the main effect is to maintain security. Both nurses and doctors cannot read each other's information." Maybe it's strange but it is so". It should be patient feel confident that not everyone can read all the information. This factor is very important referred to by Smyth (2009), who explained that European Union countries laws are very strict about their citizen's data. Customers must be allowed to have the right locate their data, and while providers should not hinder customer's access to their data for any reason. The same assurance written by Denjoy (2012) is that in benefits of CC in healthcare it is very clear that cloud systems suppliers can give higher security than the security given by hospital IT services.

Improvement of information sharing and communication in a patient-centred healthcare process

The Cloud leader said that his company has software solutions for connecting different information sources. Orlikowski (2002) referenced on focusing on the available recourses and difficulties linked with the sharing of knowledge and transferring best practices internal or external to the organizations.

The Enterprise leader explained that improvement that coming from the importance of involving patients in the care process. That is very obvious in the definition of the patient centred healthcare "building a strong relationship among the patients and the taking care staffs". The definition also goes with what the CMIO said CC is already sharable. The Senior adviser answered that improvement is coming from easy to access and share and necessity to supervise the process. That is complies with Andreasson and Winge (2009) that the support of e-services can provide more process-oriented approach and a collaborated support to communicate with each other.

Support healthcare decision makers and professionals in a patient-centred healthcare process

As an answer to this question almost all interviewees gave the same point, which is the accessibility and easily available information, which will help the decision makers and support him or her. That is in comply with what is mentioned by Denjoy (2012) as benefits of CC in healthcare that easy and fast access to information and the ability to fit out end-to-end management issues.

Limiting factors for using cloud based health services

Both the Senior adviser and enterprise leader gave a harmonic answer that the important limiting factor is the difficulty of transformation from old structure to CC and this factor explained by Smyth (2009) that if the organization want to change from their existing application to CC it is not easy and probably outweigh the advantage.

The CMIO and Sector manager were worried about security issues. This goes with what mentioned by Smyth (2009) European Union countries laws are very strict about their citizen's data. Customers must be allowed to have the right of locating their data and to prevent providers from hindering customers to access to their data for any reason.

The Cloud leader pinpointed tow factors, the integration of the enormous amount of information stored in different places and understanding legislation, AbuKhousa and Al-Jaroodi (2012) was mentioned in non technical challenges in CC in healthcare the legislation and technical one is the integration between different kinds of services.

The Cloud leader and Sector manager referred to security aspect too, according to AbuKhoua and Al-Jaroodi (2012) it is one of technical challenges of CC in healthcare that open environment and sharing of service needs security and high control management.

The Director of business development talked about lack of knowledge as a limiting factor. According to Flint (2005) the logistics innovation also suggests need to explore customer value research and organizational learning.

Service level agreements (SLA)

The Cloud leader, in his answer centred on vendor ability and high skills to deliver the service and the penalties that the vendor is backing in case of missing service. However the CMIO concentrated on service running 24.7 in 365 with no acceptance of information loss. The Senior adviser referred to high quality level and saving rights of both parties. All of those factors mentioned by Verma (2004) in Nature and Qualification of provider and this may include the maintenance. Second factor is in Reliability and responsiveness, that the service must be available at any time and all the time with no delay. The other one is consequences of service disorder, does the customer can ask for compensation because of loss of service.

5.3.1 Alignment in stakeholder information sharing and communication

Involvement of personals affected by a decision in the decision making process

According to Majchrzak and Wang (1996) one of the most important points to redesigning the work procedure is to involve everyone who would be affected by a decision in making that decision. This contrary to what has been said by the Director of business development that they are not doing that and explained that as care giving is going through several stage and there is no sharing information between these stages and the end result is a very week decision making process, especially that the patient is not involved at all in this process. This is what the Sector manager said in another words when she said that she far from patient process and they have no system that allows them to communicate with each other.

Strong relationship between taking care staff and patient

The Director of business development answered yes, she does that from her position and the Sector manager said it is the nurse job to do that. Andreasson and Winge (2009) stated that there should be able to get an overall picture of the patient's needs and what is planned for later, which gives an insight of the need to coordinate actions to create the greatest value for the patients.

Focusing on technological devices to promote a patient-centred healthcare process

According to Ranerup (2010) that the use of technological devices to promote patient-centered care system to enhance the understanding of the fundamental design issues related to the role of ICT (Information and Communication Technologies) in healthcare system. Ranerup (2010) added that 75 percent of Internet users utilize the web technologies to search for information on general health, illnesses and healthcare. Whereas the Director of business development said that now they are very far from that and they are working allot to reach that goal so it's going to take many years because of having so much old technique. The Sector manager said that they are just talking to each other. However, we have an IT system to keep check on various medical devices (MTP) in which each manager is responsible for the information.

Electronic and mobile devices to be used by the staff in patient centred healthcare

In theory world Castells and Cardoso (2005) that the increasingly use of Internet provides an opportunity to the healthcare professionals to access medical and health information to improve the efficiency and effectiveness. The mobile devices are an exciting and rapidly expanding domain for healthcare applications. Whereas in practical world the Director of business development and the Nurse said just paper and pen in a home healthcare today and both of them added that mobile phone just we can call.

According Ejenäs (2012) that the development in the mobile applications and devices for power of changing consumer behaviours also should not be underestimated, there are many examples of health oriented mobile applications and devices coming in the international market. This is matching with what the Director of business development said other devices are coming to be used in future but going to take some years because there are so many stakeholders.

Balancing patient care processes needs with information technology

In the functional alignment according to Davenport (1993) it is difficult to cut across the department lines in developing the kind of new information system which ties together different departments and sections. The Director of business development centred on what she called (usability) which means easy to be used by the patient securely. She named four stones in this balancing: decision makers, system, patient (which is the easiest part) as long as we have high usability in our products, ethics. Magoulas et al (2012) explained that the functional alignment is a relationship between the information system and the processes; alignment can be defined in an equation of required information capabilities and the available information capabilities as a time. However, the Sector manager expressed "We are Stone Age".

Reflection of authority in patient care process on information system

The Director of business development answered that the patient has nothing to do with that because we own the problem of the technique. The Sector manager also said that not everyone would get to read all the information from the various IT. Babar et al. (2011) explained that in (SaaS) it is the user who can access and modify the application for them. Also by Smyth (2009) explained because concerned laws in different countries controlling data accessing should be taken in consideration carefully.

Reflection of cultural differences in patient care on information system

The Director of business development said that because of the gap between the patient, and us we cannot make one solution; we have to make many solutions like IT today is one solution for everybody. According to Magoulas et al (2012) that the organizations dealing with the social aspects should not be limited to only profitability; they should promote a structure for the individuals that work towards the goals and objectives, the sociocultural alignment is defined as the stakeholders expectations equal to how shared values, shared goals, and collaborative behaviour as time.

Promotion of stakeholders understanding and comprehension of information systems and information technology

The Director of business development said that promotion will come from the practice itself and interaction between two parties, which was very clear when Epstein and Street (2011) explained that stakeholders should be given the opportunity to engage in aligning perspectives on issues of quality and value in the process i.e. what counts and how it should be accomplished.

The same question regarding IT, answered by the Sector manager that doctors and nurses work in separate system where they cannot read each other's systems. This point referred to by Currie and White (2012) that the healthcare professional also may be not willing or unhappy to share the knowledge across the professional boundaries.

Positive reaction between taking care staff and the patient

According to Greene et al. (2012) that the patient-centered healthcare process is a process which respect preferences, needs, and values of the patients from bio psychosocial perspective rather than a purely bio medical perspective with building a strong relationship among the patients and the taking care staffs. This is what the Nurse answered about the relationship between her and the patient "yes absolutely, the core of my work to build a good relationship. There is a strong relationship between patients and nurses".

The differences between home healthcare and health centers

The Nurse explained that in the home healthcare it's more private and the nurse is a guest of the patient. This is what Jayadevappa and Chhatre (2011) explained that the patient-centered healthcare process providing patients their social and emotional needs, role of patient families, the facility of continuous care treatment.

Evaluation the personal variation of the patient

The Nurse answered that every patient is unique with different personal need and condition. She has to adapt in a different way than in healthcare center or hospital. She added that there are limiting factors in home healthcare. According to Green et al. (2012) the Institute of Medicine (US) Committee on Quality of Healthcare has defined the patient-care health system as "Care that is respectful of and responsive to individual patient preferences, needs, and values."

5.4 Knowledge for management of patient-centered healthcare process development

Supports needed for developing an enterprise based on cloud computing

The CMIO gave two supports first technical framework based on medical quality perspective and second is the functional level agreement (FLA). The Director of business development answer was (none). The Senior adviser mentioned the skills of the employee. The Enterprise leader centered on the necessity to open up the system and information "categorization of the information". The Nurse was worried about training on medical equipment. According to Van Gemert-Pijnen et al. (2011) comprise five steps, 1) Conceptual Inquiry, 2) Value Specification, 3) Design, 4) Operationalization and 5) Summative Evaluation. Researchers also formulate six principles for e-health technologies development: it is a participatory process, involves continuous evaluation cycles, it is intertwined with implementation, changes the organization of healthcare, should involve persuasive design techniques, and finally needs advanced methods to assess impact.

Guiding principles for supporting management

The CMIO recognized two factors first is understanding of the harmonization of the information, second is handling of that information. The Director of business development concentrated on two factors first is safe principles and influence of patients on the process. The Senior adviser said it is a matter of recommendations to develop, deliver, and service support. The Enterprise leader explained that the infrastructure is now under construction from the national perspective, is based on a service structure is a prerequisite for creating service continuity. The Sector manager answered that the main factor is that the patients feel confident that the information is not disseminated. Enquist et al. (2001)

summarized the principles according to the DELTA meta-model stakeholders engage in a dialog for understanding of the enterprise, its present state and future transition. He listed twenty principles for management of coordinated development like maturity, completeness, simplicity, awareness, innovativeness, realism, usability, etc.

6 Discussion

In this chapter we clarify and discuss the findings from previously presented analysis in order to fulfill the study aim and come to the conclusions.

The first chapter highlighted the world's growing interest in facilities provided by CC for the development of e-Health and a patient-centered healthcare process as societies face growing aging populations, rising costs and decreasing resources. It also showed that management of e-Health development is becoming an increasingly difficult task as the number of organizations, public services and stakeholders involved in the development process are mounting. Taken this as a starting point, the study aim was to explore the affect of stakeholders information sharing and communication on management of patient-centered healthcare process development. In order to provide an answer, the study logic supported the three sub-question of investigation, which are clarified and discussed in turn. The sub-questions were:

1. What is the nature of the change situation?
2. What are the stakeholders view on information sharing and communication?
3. What knowledge is supporting management of patient-centered health process development?

6.1 Clarifying the nature of the change situation

In the analysis of the future view of “My e-Health Services” findings correspond to the problem situation presented in the analysis of the life of the frail older adults. Alignment in stakeholders information sharing and communication, which was based on the enterprise architecture model, both show a dominance of functional and structural alignment issues. Sociocultural alignment however, is not so well matched as there is a dominance of issues of economic value.

Our understanding is reflected in the demand that healthcare and home care should deliver better results in terms of quality, availability and service with the same amount of resources, see Figure 6-1. The freedom of choice mentioned in the e-Health report reflects a quality demand from a patient's perspective and a support for a more individually focused development goal, were the patient is seen as a consumer of healthcare and user of IT devices such as smart phones, iPad or laptop. Patient-centered healthcare puts the patient in focus, not only as a customer and consumer of information, but as an individual who's preferences, needs and values as human should be met with respect and quick respond.

When looking at the secondary data from an information sharing and communication point of view, we found in the table showing the present view of 11 case studies there is a lack of information sharing and the communication between the healthcare providers. The issues presented concerned misalignment between required and available information capabilities. The findings also showed how the frail older adults suffer from having to repeat their story again and again in their contact with hospital and primary care staff. However, the significant finding was that family members act as information brokers for different care providers. This can cause a serious gap of actual information sharing about the patient condition and particular situation, which in the end might cause the patient unnecessary harm.

From a management perspective secondary data findings demonstrate a gap between the information needs in the life of the frail older adults and the scope of IT architecture and “My e-Health Services”

development. Principles that suggest the formation of a guiding coalition and urge managers at all levels to engage in the development (Kotter 2007) raise several questions. Will an individually orientated IT solution come to terms with family members acting as information brokers? Are family members included as financially responsible decision makers? Will husbands, wives and children be considered as stakeholders in a process of implementation projects, support and maintenance and service development? etc.

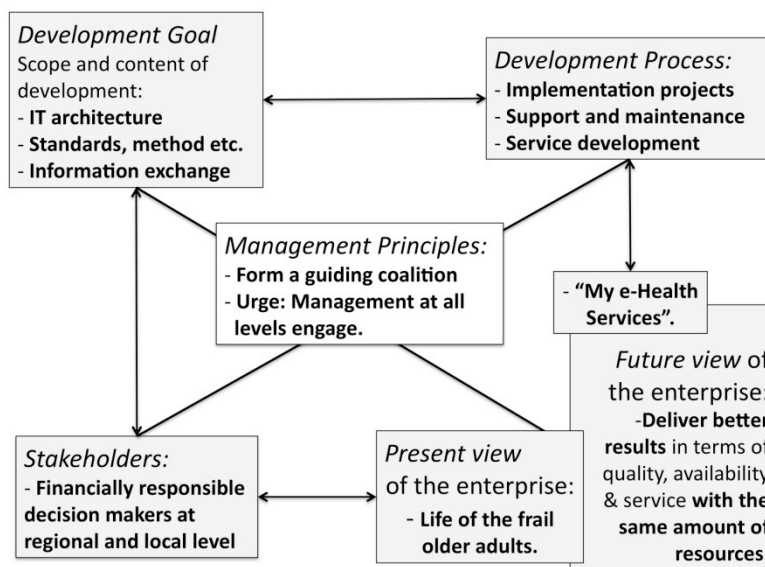


Figure 6-1. Clarifying the change situation using the DELTA framework to exhibit secondary data findings of enterprise views, development goal and development process.

The report of the life of the frail older adults is said to favor a patient-centered healthcare process and it is an input to the search for a new financial model for care for the elderly. It clearly speaks for a horizontal logic of flow between health and home care to prevail rather than the vertical, optimization of resources logic that is in place. Thus, patient’s preferences as human, more than consumer, reflect traditional values and norms in healthcare to be considered in a patient-centered healthcare process.

It can thus be argued that a patient-centered healthcare process can be understood as a value adding process both in economical terms of customer/consumer needs and in terms of human needs of the patient, the frail older adults.

Based on our analysis the nature of the change situation is contrasted by the IT architecture need for implementing the vision of My e-Health Services and the information needs for supporting the life of the frail older adults. It is contrasted by the common demand for efficiency in healthcare and the patients’ demand for individual needs. In other words, the change situation is contrasted by values dominated by managements demand for control of economical resources and values for the individuals demand for the fulfillment of human needs.

6.2 Change situation affects on stakeholder’s views of information sharing and communication

For the moment, based on the interviews, there are large issues to share information between different groups of the providers, decision makers and staff within healthcare services. Today this

has the impact that the provided health services have large challenges to get the needed information about the patient to provide them secure and optimal healthcare service. The missing information for the working healthcare service staff is a larger and large issue that needs to be managed. New cloud based provided services could improve the information access for the staff that need the information to improve their level of service for the elderly people. It was also raised within the interviews that new cloud services for information sharing and collaboration can create new possibilities for the contacts between the patients, relatives and the staff providing the healthcare services. Cloud based services can also in the future provide the backend structure for an increased number of used healthcare devices within the homes of the elderly patients. In that case the cloud services can provide improved healthcare information about the patients and hopefully this can then result in improved health for the elderly people within their homes.

The findings from the primary data showed that there is a lack of information sharing and communication because the doctors and nurses work in separate systems where they cannot read each other's systems. The nurse explained that often they don't have access to the information they need, they have to ask for it. The healthcare professional also may be not willing or unhappy to share the knowledge across the professional boundaries.

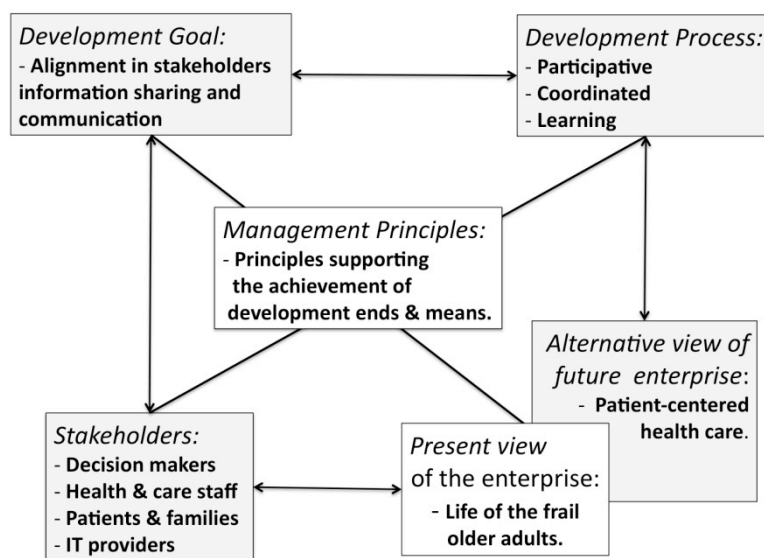


Figure 6-2. Clarifying the alternative view of a future patient-centered healthcare.

However, the most important findings from the analysis of primary data demonstrate that management of healthcare in society is separated in different islands with no or very little communication. This finding is also characteristically reflected in the two secondary data reports. We therefore argue that development will not thrive on the advantages of communication and information sharing of ideas and common understanding. This in turn means that the promises that CC can add to the life of the frail older adults is far from being implemented.

It is clear that CC has a big value even for frail older adults in value adding healthcare processes were patients act as customers. The wrong is not in the technique as there are many good opportunities for saving money and becoming more effective. However, the findings also shows that taking care staff has a balancing perspective, rooted in their professional role and responsibilities of respecting patients preferences, needs and values from bio psychosocial perspective rather than a

purely bio medical perspective and for building strong relations among the patients and their colleagues in the care process.

So, financially responsible decision makers view on what creates value in healthcare is sometimes contrasted by taking care staffs professional respect for more personal issues and understanding. Thus, efforts will not have full effect if nurses' professional patient view is not considered in the development process. We argue that a patient-centered process should balance both common economical and individual value aspects to be valuable to a broad spectrum of stakeholders. However, primary data clearly demonstrate a gap of information sharing and communication between the decisions makers and staff, between healthcare and home care. This supports our understanding that measures for decision makers and staff to share values, goals and collaborative behavior on issues of patients needs in addition to equally sharing issues of profitability appears weak. We also argue that a collaborative behavior among stakeholders not being an issue is also typical for the change situation. Overall, the IT healthcare services and information related to the elderly people need to be more personal oriented than IT system oriented as it is today. From a human perspective IT systems should follow people's needs and expectations as we strive for improving their lives.

The findings from secondary data made us aware of the information gap that can be perceived between on one hand the futurist development of an IT solution for patient healthcare and on the other hand the needs of the frail older patients. We argue that an one-eyed system centric view of an IT architecture enabling different e-Health services is not sufficient as a base for developing healthcare and thus, adding value to the life of the frail older adults. The need for a technical architecture is only half of the solution as there is more to development than to integrate and monitor work of autonomous units to satisfy the customers (Majchrzak & Wang 1996). In addition, we suggest a patient-centric view on development where the patient and the patient's life becomes the ultimate goal for development of a social architecture, which respects preferences, needs, and values of the patients together with technical issues. In other words, we argue for a two-eyed enterprise architecture that can balance issues of sociocultural aspects, of shared values and goals, on collaboration together with issues of work processes, distribution of power and knowledge among the stakeholders affected by development being reflected in a technical architecture and IT solutions.

Table 6-1. The population shift in age.

Dimensions	Current situation	Future situation
Age and number	Elderly people born in 1910, 1920, and 1930. Rather few people within this generation	Elderly born in 1940, 1950. Increased number of elderly.
Internet use	Used to only face to face meeting, limited experience of using IT and internet.	Daily usage of internet tools and services.
Dependency	Elderly expect other people (doctors, nurses) to handle their healthcare information.	Elderly expect themselves to be in charge for their healthcare information.
Patient involvement	Used to be treated as they are told from healthcare expert.	Want to drive their healthcare and change of their treatment. Prefer to be involved in the treatment.

Thus, the strong system centric development view that has been expressed in both primary and secondary findings needs to be balanced with a patient-centric view in order for management to fully understand the need for change. This becomes increasingly important as the population shift in age; number, Internet use, dependency and habit of involvement in healthcare are changing. Based on the interview findings, Table 6-1 gives a short account of these dimensions.

To manage the challenges within future healthcare services a mindset change is needed. The healthcare providers need to change from a system centric approach to a patient centric mindset. With a patient centric structure information is needed to be stored between different healthcare stakeholders. However, the challenge facing management in terms of balancing enterprise architecture alignment, not for a single local unit, nor for a single region but rather for a nation is vast.

6.3 Change situation affects on communication contribution to management of development

Findings from the primary data clearly demonstrate that there is little common understanding of management principles. Instead all respondents have their own way of guiding the management work. At the national level, there are a few principles to guide the alignment of advancing healthcare delivery with CC and alignment of purposeful distribution of power. However, at a regional and a local level common principles to guide the alignment of comprehension across professional barriers in healthcare and home care and acceptance of ends and means at are fuzzy and insufficient. Management of the development of patient-centered healthcare at present is uncertain and based on experience and practice rather than theoretical knowledge. Thus, management risk repeating the same workflow and management habits, which means that management of development, can be an obstacle in the change situation itself.

There is theoretical knowledge in terms of guidelines and principles sustaining management of development. However, this guidance is fragmentary and provides limited support to management of both technical and social issues. Kotter's framework (2007) for leading change provides guidance for an organization or smaller group of stakeholders. The holistic framework for e-Health technologies development foremost highlights the participatory aspect of development and the need for continuous evaluations provides guidance for a somewhat limited socio-technical development of stakeholders, were as the framework for coordinated development provides a rich variation of management principles suited for a process of inquiry and learning among a variety of stakeholders (Kotter 2007, Van Gemert-Pijnen et al. 2012, Enquist et al. 2001). Together these principles form a system of knowledge for wider understanding of management of a patient-centered healthcare process development. The imminent management of development can find its support, first of all from the DELTA Stakeholder principles of coordinated development.

7 Conclusions

The aim of this study was to contribute to management of patient-centered healthcare development and thus, to the good life of frail older adults. The analysis showed that there is a split in understanding healthcare and the development of a patient-centered healthcare process in society. In this sense, the situation is not good or bad and nobody is right or wrong. Rather, there are problems to be solved by balancing patients, decision makers, providers and staff needs and demands; by balancing human issues and economic issues and by balancing different information needs.

First, we inquired how stakeholders information sharing and communication could add value to the life of the frail older adults. From the discussion we conclude that there is little information sharing and communication between stakeholders. However, we also conclude that cloud computing does hold promising possibilities for innovation of health care in this important aspect as the infrastructure can form the base for building future information services. For instance, new ways of distributing information about the patient's medicines between hospitals, primary care, home care and patient's family members can liberate relatives from having to act as information brokers. New services can free staff to spend more time with the patient instead of searching for information about the patient in different databases. Thereby, patient security in terms of medication and physical attention can be improved.

Second, we inquired how the imminent management of patient-centered healthcare process development could be supported. We conclude that there is a lot of experience among stakeholders for managing development, but not enough knowledge for managing patient-centered healthcare development in the light of cloud computing and in this critical situation of change. However, we also conclude there are a rich variety of principles derived from theory that can be of great value to management of the relationships between technology, human characteristics and social economic environment. We especially find the DELTA Stakeholder principles of value for supporting the imminent management of patient-centered healthcare process development. Hence, we suggest that management can be enriched and find new inspiration by these theoretically underpinned guidelines for stakeholder information sharing and communication:

- Emphasizing the capacity for participants for learning.
- Dealing with plural and conflicting interests.
- Taking into account absent and future clients.
- Being appropriate to diverse cultures.
- Securing the understanding of reality through the sound employment of concepts, significant perspectives and significant points of view.
- Supporting the understanding of complex concepts and communicate them precisely with few non-technical words.
- Supporting the awareness of contextual relationships that are significant to preserve the integrity between care entities and at the same time supporting cooperation.

By implementing these guidelines management of patient-centered healthcare process development can improve stakeholder information sharing and communication in the light of cloud computing and thus, to the life of the frail older adults.

8 Bibliography

Articles

- AbuKhoua, E., Mohamed, N and Al-Jaroodi, J. (2012). e-Health Cloud: Opportunities and Challenges, *Future Internet* 2012, 4, 621-645.
- Babar, M. A., & Chauhan, M. A. (2011, May). A tale of migration to cloud computing for sharing experiences and observations. In *Proceedings of the 2nd International Workshop on Software Engineering for Cloud Computing*, SECCLOUD (Vol. 11, pp. 50-56).
- Bernus, P. (1999). GERAM: Generalised Enterprise Reference Architecture and Methodology, IFIP-IFAC Task Force, version 1.6.3.
- Boland, R. J. and Tenkasi, R. V. (1995). Perspective making, perspective taking in communities of practice. *Organization Science*, July/August, Vol. 6 No. 4 pp. 350-372.
- Checkland, P. (1985). From Optimizing to Learning: A Development of Systems Thinking for the 1990s. *Journal of Operational Research*, Vol. 36, No. 9 pp. 757-767.
- Currie, G. and Leroy, W. (2012). Inter-professional Barriers and Knowledge Brokering in an Organizational Context: The Case of Healthcare. *Organization Studies*, October, Vol. 33 No. 10 pp. 1333-1361.
- Edes, T. (2010), Innovations in Homecare: VA Home-Based Primary Care, *Generations*, 34 (2), 29-34.
- Epstein, R. M. and Street, R. L. (2011). The values and value of patient-centered care. *Annals of Family Medicine*, Vol. 9, No. 2, March/April.
- Flint, D. J., Larsson, E. Gammelgaard, B., Mentzer, J. T. (2005). Logistics innovation: A Customer Value-oriented Social Process. *Journal of Business Logistics*, Vol. 26, No 1 pg. 113.
- Gottlieb, L. K., Stone, E. M., Stone, D., Dunbrack, L. A., & Calladine, J. (2005). Regulatory and policy barriers to effective clinical data exchange: Lessons learned from medslInfo-ED. *Health Affairs*, 24(5), 1197-1204.
- Greene, S. M., Tuzzio, L. and Cherkin, D. (2012). A Framework for Making patient-Centered Care Front and Center, *The Permanente Journal*, Vol. 16. No. 3.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3442762/> [Accessed in 23/03/2013]
- Henderson, j. C. and Venkatraman, N. (1993). Strategic alignment: leveraging information technology for transforming organizations. *IBM Systems Journal*, January, Volume 32 Issue 1.
- Jayadevappa, R. and Chhatre, S. (2011). Patient Centered Care - A Conceptual Model and Review of the State of the Art. *The Open Health Services and Policy Journal*, 4, 15-25.
- Kohlbacher 2010. The effects of process orientation. *Business Process Management Journal*

- Krist, A. H. and Woolf, S. H. (2011). A Vision for Patient-Centered Health Information systems, Commentary in *Journal of American Medical Association*, January 19, Vol. 305 No 3.
- Kotter, J. P. (2007). Leading Change. Why Transformation Efforts Fail. *Harvard Business Review*. Jan, Vol. 85 Issue 1, p96-103.
- Ledderer, L. (2010). Bringing about change in patient-centred preventive care. *International Journal of Public Sector Management*, Vol. 23 No. 4, 2010 pp. 403-412.
- Lin, V. (2001). Public health: What it is and how it works. Book Review. *Australian and New Zealand Journal of Public Health*, Volume 25, Issue 1, pages 100–102, February.
- Low, C. and Chen, Y.H. (2012), Criteria for the Evaluation of a Cloud-Based Hospital Information System Outsourcing Provider, *Journal of Medical Systems*, December 2012, Volume 36, Issue 6, pp 3543-3553.
- Magoulas, T. and Pessi, K. (1998). *Strategic IT Management*. Doctorial Thesis. Department of informatics. University of Gothenburg. Vasastadens tryckeri.
- Magoulas, T, Hadzic, A, Saarikko, T and Pessi, K. Alignment in Enterprise Architecture: A Comparative Analysis of Four Architectural Approaches. *The Electronic Journal Information Systems Evaluation*. Volume 15 Issue 1, pp 88-10, available online at www.ejise.com
- Majchrzak, A., and Wang, Q. (1996). Breaking the functional mind-set in process organizations. *Harvard Business Review*, 74, 5, 93–99.
- Mitchell, R. K., Agile, B. R. and Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management Review*, Vol. 22, No. 4, 853-886.
- Nilsson, A. G. (2005). Information Systems Development (ISD): Past, Present, Future Trends in Information Systems Development, *Advances in Theory, Practice, and Education*, pp 29-40
- Osterhaus, L. C. (2010). Cloud Computing and Health Information. B Sides, *Journal University of Iowa School Library and Information Science*, Spring 19. <http://ir.uiowa.edu/bsides/19> [Accessed in 21/02/2013]
- Orlikowski, W. J. (2002). Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. *Organization Science*, May/June, Vol. 13 No. 3 pp. 249-273.
- Qi Zhang · Lu Cheng · Raouf Boutaba (2010). Cloud computing: state-of-the-art and research challenges. *Journal of Internet Service Application* 1: 7–18 <http://cloud.pubs.dbs.uni-leipzig.de/sites/cloud.pubs.dbs.uni-leipzig.de/files/fulltext.pdf> [Accessed in 21/02/2013]
- Ranerup, A. (2010). Transforming patients to consumers: evaluating national healthcare portals. *International Journal of Public Sector Management* Vol. 23 No. 4, 2010 pp. 331-339

Rubin, H. (2010). Risk and reward: Health IT SAAS licensing models. *Licensing Journal*, 30(1), 13-15.

Van Gemert-Pijnen, J.EWC, Nijland, N., van Limburg, M., Ossebaard, H. C., Kelders, S. M., Eysenbach, G. and Seydel, E. R. (2011). A Holistic Framework to Improve the Uptake and Impact of eHealth Technologies. *Journal Medical Internet Research*. Oct-Dec; 13(4): e111.
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278097/> [Accessed in 28/02/2013]

Verma, D. C. (2004). Service level agreements on IP networks. *Proceedings of the IEEE* Volume 92, Issue 9 pp. 1382 – 1388.

Yuan, D., Cody, L., Zhong, J., (Oct. 2011), *Developing IP Telephony Laboratory and Curriculum with Private Cloud Computing*, Proceedings of the 2011 conference on Information technology education, ACM.

Young, H. (May 31, 2003). "Challenges and Solutions for Care of Frail Older Adults". Online Journal of Issues in Nursing. Vol. 8 No. 2, Manuscript 4.
<http://www.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Volume82003/No2May2003/OlderAdultsCareSolutions.aspx> [Accessed in 28/02/2013]

Books

Burnes, B. (2009). *Managing Change: A Strategic Approach to Organisational Dynamics*, 5th Ed. Prentice Hall.

Carincross, F. (1997). *The death of distance. How the communications revolution will change our lives*. Harvard Business School Press. Texere Publishing Ltd., London, England.

Castells, M. and Cardoso, G. (2005). *The Network Society: from knowledge to Policy*. Johns Hopkins Center for Transatlantic Relations.

Davenport, T. (1993). *Process Innovation: Reengineering Work through Information Technology*. Harvard Business School Press, Boston, MA, 337 pp.

Holme, Idar. & Solvang, Bernt Krohn (1997). *Forskningsmetodik – om kvalitativa och kvantitativa metoder*. Lund: Studentlitteratur. (In Swedish)

Järvinen, P. (2004). *On Research Methods*. Tampere: Opinpajan Kirja.

Kvale, S. (1996). *InterViews: An Introduction to Qualitative Research Interviewing*. Thousand Oaks, CA: Sage.

Langefors, B. (1995). *The Infological Equation: Essays in Honor of Börje Langefors*. B. Dahlbom (Ed.). Department of Informatics, School of Economics and Commercial Law, University of Göteborg, Sweden.

Riessman, C. K. (2008). *Narrative methods for the human sciences*. London: SAGE

Reports

Andreasson, S. and Winge, M. (2012). *Innovationer för hållbar vård och omsorg värdeskapande vård- och omsorgsprocesser utifrån patientens behov*. VINNOVA Rapport VR 2009:21.

Bowin, Rolf, Gurner, Ulla, Krohwinkel Karlsson, Anna and Rognes, Jon (2012). *Icke värdeskapande episoder i äldres vårdkedjor. En analys av komplexa flöden*. Report. Leading Healthcare, Nr 11.

CeHis (2012). *Handlingsplan 2013-2018. Landstings, regioners och kommuners samarbete inom eHälsa-området*. Center för eHälsa i samverkan. Stockholm.

Enquist, H. Magoulas, T., Bergenstjerna, M. and Holmqvist, M. (2001). *DELTA Meta Architecture for Proactive Management of Coordinated Development in Complex Enterprises and Information Systems*. Final Report May. Project P10525. NUTEKs program for Complex Technical System.

Ejenäs, M. (2012). *Friska System - eHälsa som lösning på hälso- och sjukvårdens utmaningar*. VINNOVA Analys VA 2012:03, Mars, VINNOVA – Verket för Innovationssystem.

ETC Kommunikation (2012). *Kort om kommuner, landsting och regioner*. Sveriges kommuner och landsting. Avdelningen för kommunikation. LTAB.

Horrigan, J. B. (2008). *Use of cloud computing applications and services*. The Pew Internet & American Life Project.

<http://pewinternet.org/Reports/2008/Use-of-Cloud-Computing-Applications-and-Services.aspx>
[Accessed 01/20/2013]

Patientdatalagen (2008:355), *Svensk författningssamling*, Regeringskansliet, Lagrummet
http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Patientdatalag-2008355_sfs-2008-355/ [Accessed 09/02/2013]

Rainie, L. (2010). *Internet, broadband, and cell phone statistics*. The Pew Internet & American Life Project.

<http://www.pewinternet.org/Reports/2010/Internet-broadband-and-cell-phone-statistics.aspx>
[Accessed 07/02/2013]

Piai, S. and Duffy, J. (2012). *Cloud in the Western European Healthcare Sector: Trends and Strategies For 2012 and Beyond*. IDC Health Insights report, document overview.

<http://www.idc-hi.com/getdoc.jsp?containerId=HIOH02U> [Accessed 07/02/2013]

Statistics Sweden (2013). *Use of computers and the Internet by private persons*. Statistics Sweden, Investments, R&D and IT Unit, Stockholm, Sweden.

White-papers

Warren, C., Leung, E. and Pili, H. (2012). *Enterprise risk management for cloud computing*. Research by Committee of Sponsoring Organizations of the Treadway Commission. June. Crowe Horwath LLP. <http://www.coso.org/documents/Cloud%20Computing%20Thought%20Paper.pdf>
[Accessed 02/03/2013]

Denjoy, N. (2012). *COCIR eHealthToolkit*. European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry, May.

Habte, M. L., Karlyn, M. A., Overly, M. R. and Kalyvas, J. R. (2012), *United States: Cloud Computing For Health Care Organizations - A Practical Framework For Managing Risks*, Foley & Lardner LLP.

<http://www.mondaq.com/unitedstates/x/209906/Healthcare/Cloud+Computing+For+Health+Care+Organizations> [Accessed 02/03/2013]

Smyth, P. (2009). *Cloud Computing. A Strategy Guide for Board Level Executives*. Kynetix Technology Group © 2009.

<http://dastikop.blogspot.se/2012/08/cloud-computing-strategy-guide-for.html#.UULG0VvC-Ns> [Accessed 02/03/2013]

Intel (2013). Industry Brief. Healthcare Cloud Security. An Overview of Cloud Security Issues Facing Healthcare Organizations. Intel® Technologies for Securing the Healthcare Cloud. Intel Corporation. January.

<http://www.intel.com/content/dam/www/public/us/en/documents/solution-briefs/cloud-computing-security-healthcare-brief.pdf> [Accessed in 02/03/2013]

Web-sites

Hurwitz, J., Bloor, R., Kaufman, M., Halper, F., (June, 2012), *Hybrid Cloud for Dummies*. John Wiley & Sons, Inc.

<http://www.dummies.com/how-to/content/comparing-public-private-and-hybrid-cloud-computin.html> [Accessed 07/02/2013]

LGS Innovations (2013), *Healthcare Technology Solutions from LGS Innovations*. LGS Bell Labs Innovation <http://www.lgsinnovations.com/solutions/healthcare> [Accessed 04/02/2013].

Oxford Dictionaries

<http://oxforddictionaries.com/>

Peter, M. & Tim, G. (10 July 2009). *The NIST definition of Cloud Computing*, Version 15. Information Technology Laboratory.

<http://www.hexistor.com/blog/bid/36511/The-NIST-Definition-of-Cloud-Computing> [Accessed 10/03/2013]

Webster's Dictionary

<http://www.merriam-webster.com/>

Wikipedia

http://en.wikipedia.org/wiki/Main_Page

Appendix A: Interview guide

Background information

What is your name?

What is your organization name?

What is your current position in your organization?

What is your roll and responsibility in the organization?

Cloud computing in healthcare

Does your organization recommend adopting CC? If yes, what do you think are the main reasons behind adopting CC?

What are the issues to involve in deployment of CC?

Which form of CC (private, public, hybrid cloud) do you recommend for saving patient and hospital data? Why?

What are the major security issues in CC? Do you think it is safe and secure to save all patient data in a cloud structure? How is this?

Cloud computing for information sharing among stakeholders in a patient-centred healthcare process

What is the affect of CC on information sharing in a patient-centred healthcare process?

How can cloud services improve information sharing and communication in a patient-centred healthcare process?

How can cloud services support healthcare decision makers and professionals in a patient-centred healthcare process?

What are the limiting factors for using cloud based health services?

What is the role of service level agreements (SLA) in cloud? What is the regular information included in SLA? Regarding the continuous availability of the service what could be the best way for saving the rights of both providers and users in the SLA?

Alignment in stakeholder information sharing and communication

Do you involve everyone affected by a decision in the decision making process? Why and how?

Do you instruct the taking care staff to build a strong relationship with the patient/care taker and his/her family?

To what extent do you and your sub staff focuses on technological devices to promote a patient-centred healthcare process where patients become more of a consumer of care?

What electronic devices do staff at the clinic/in welfare care use to keep patients/peoples data saved?

In your view, what are the roles of the mobile devices such as phones, laptops, iPads, iPhones etc. in patient-centred healthcare?

How can we balance patient care processes needs with information technology?

How can authority in patient care processes be reflected in information systems?

How can cultural differences in patient care be reflected in information systems?

How can we promote stakeholder (staff, patient, care taker, family) understanding and comprehension of information systems and information technology?

Did you note a positive reaction because of strong relationship between you as a tacking care staff and the patient?

Who do you evaluate the personal variation of patient (social, emotional needs, patient families circumstances, etc.)?

Do you have an access to the information, which created to the patient?

Do you feel that there is an important difference between home healthcare and primary care?

Management of patient-centered healthcare process development

What type of support do you have for developing an enterprise based on cloud service, for instance a patient-centered healthcare process? Type of support: method, technique, tool, model, framework etc.

What guiding principles should support management in developing such a process?

Appendix B: Acronyms

API	Application Programming Interface
ACM	Association of Computer Machinery
CC	Cloud Computing
CIO	Chief Information Officer
CMIO	Chief Medical Information Officer
FLA	Functional Level Agreement
HIT	Health Information Technology
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
IT	Information Technology
NIST	National Institute of Standards Technology
PaaS	Platform as a Service
SaaS	Software as a Service
SAL	Service Level Agreement
SAM	Strategic Alignment Model
SPDA	Swedish Patient Data Act
VGR	Västra Götalands Regionen
VVP	Den Värdeskapande Vårdprocessen

Appendix C: Letter to respondents

BREV TILL INTERVJUDELTAGARE

Jag är studerande på *IT Management masterprogram* vid Göteborgs universitet, Institutionen för tillämpad IT på Lindholmen. Som avslutning på programmet skriver jag just nu ett examensarbete på avancerad nivå.

Syfte med min studie är att stödja berörda människor inom såväl vård som omsorg på vägen mot nyare sätt att arbeta i en tid när antalet äldre i samhället förväntas öka samtidigt som kostnader och resurser inte automatiskt tillåts följa med i samma takt.

Studier visar att det finns behov av förbättrad information och kommunikation mellan patient och olika personalkategorier inom vård och omsorg, men också mellan personal och anhöriga till de äldre. Min studie fokuserar därför på hantering av information och kommunikation i en patient-orienterad vårdprocess och hur modern informationsteknologi kan bidra till ökat värde.

Insamling av data kommer bland annat att ske med hjälp av intervjuer med personer inom vård och omsorg, som distriktssköterska, hemtjänstpersonal, utvecklingsansvarig samt med representanter för IT-företag.

En intervju beräknas ta cirka 30-45 minuter och genomförs avskilt under arbetstid antingen på arbetsplatsen eller via telefon. Intervjun spelas, med personens medgivande, in med iPhone för att sedan skrivas ut ordagrant. Vid publicering kommer allt material att vara avidentifierat. Deltagandet i intervjun är frivilligt och kan avbrytas utan förklaring.

Jag ser fram mot att få göra en intervju med dig och hoppas på ditt deltagande.

Mitt examensarbete handleds av nedanstående handledare.
Kontakt mig gärna vid eventuella frågor.

Göteborg, 26 mars 2013.

Jwan Khisro
masterstuderande
guskhijw@student.gu.se

Handledare
Maria Bergenstjerna
Universitetsadjunkt
Institutionen för tillämpad IT
Göteborgs universitet
Maria.Bergenstjerna@ait.gu.se