Citizen Access to eHealth Services in County of Blekinge

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ABSTRACT

In the presence of challenges arise from ageing populations, increasing incidence of chronic diseases, high health care cost, rapid changes in technological equipment and medical knowledge, eHealth offers tremendous abilities to develop and deliver health care services to the end user that is both seamless and integrated according to the needs and requirements of individuals. Even though the prospective of eHealth is accepted in academia as well as among policy-makers, health care planners and health care practitioners, the implementation of its applications has appeared to be difficult then expectations. In order for successful implementation of eHealth, it is necessary to offer eHealth services according to the citizens and patients expectations.

The purpose of this study was to investigate citizens’ accessing the eHealth services in the county of Blekinge by identifying the accessible, currently accessed, projected and imagined eHealth services. The knowledge from this study would be supportive to the regional health authorities to understand the citizens’ needs and requirements for a successful delivery of eHealth services in county of Blekinge. In the first phase through extensive review of the literature the eHealth services which are more in health care practices within European countries were identified. On the basis of findings of first phase interviews were conducted to know strategies plans regarding eHealth services. After analysis of interviews, questionnaire was conducted to know the citizens opinions about eHealth services.

The authors find that, after understanding the success criteria of effectively running eHealth services within European countries, many eHealth services could be implemented successfully in the county of Blekinge. The rules of interoperability among Hospitals, GP’s, Primary Cares and Dental Services would provide substantial benefits to citizens and they can access the eHealth services whenever and wherever they want. Moreover in future citizens would have eHealth services according to their expectation.

Keywords: Blekinge County Council, County of Blekinge, eHealth, eHealth services, Citizens access.
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# Contents

Abstract ........................................................................................................................................ iii  
Acknowledgement ......................................................................................................................... iv  

Introduction .................................................................................................................................. 1  

Chapter 1: Background .................................................................................................................. 4  
1.1 eHealth Concepts ..................................................................................................................... 4  
1.2 National Strategy for eHealth - Sweden ...................................................................................... 5  
1.3 County of Blekinge .................................................................................................................... 6  
1.4 Health Websites Interfaces ......................................................................................................... 7  
1.5 HCI Concepts ............................................................................................................................. 8  

Chapter 2: Problem Definition/Goals ............................................................................................. 9  
2.1 Research Questions ..................................................................................................................... 9  
2.2 Goals and Measures for the Study ............................................................................................ 10  

Chapter 3: Research Methodology ................................................................................................ 12  
3.1 Overview .................................................................................................................................. 12  
3.2 Literature review ....................................................................................................................... 14  
3.3 Informal Discussion ................................................................................................................... 14  
3.4 Interview .................................................................................................................................. 14  
3.5 Questionnaire ........................................................................................................................... 15  

Chapter 4: eHealth Study Areas ..................................................................................................... 16  
4.1 eHealth .................................................................................................................................... 16  
4.2 ICT and eHealth ......................................................................................................................... 17  
4.3 The 10 e’s in eHealth ................................................................................................................. 17  
4.4 eHealth Tools ............................................................................................................................. 19  
4.5 eHealth Services ......................................................................................................................... 20  
4.6 The European eHealth Action Plan ............................................................................................ 24  
4.7 eHealth Needs ............................................................................................................................ 34  
4.8 HCI Study Area .......................................................................................................................... 34  
4.9 Website Interface Design Guidelines .......................................................................................... 35  
4.10 Interface Design Practices ........................................................................................................ 37  
4.11 Principles of User Interface Design .......................................................................................... 38  
4.12 User Interface Design Guidelines ............................................................................................ 38  

Chapter 5: Interview ....................................................................................................................... 40  
5.1 Purpose ..................................................................................................................................... 40  
5.2 Selection of Interviewees .......................................................................................................... 40  
5.3 Interview Execution Planning ..................................................................................................... 40  
5.4 Designing and Conducting the Interview ................................................................................... 41  
5.5 Data Collection ......................................................................................................................... 41  
5.6 Interview Analysis ..................................................................................................................... 41
Introduction

In the light of challenges emerging from high health care costs and elderly population, eHealth provide many opportunities for private and public healthcare providers around the world to improve the quality of health care services being offered to patients. eHealth services and tools help citizens in obtaining care, they would usually face great difficulty in accessing. Due to the world wide implementation of eHealth the need of eHealth services and tools has been increased that would help to prevail over the health care accessing barriers. There have been different extensive standards and processes for eHealth tools or solutions proposed by EU Action Plan to make the implementation and development more and more quality oriented.

We have solid background knowledge of Human Computer Interaction (HCI) and different interaction methodologies used for efficient development of a product. Moreover we have worked on different small development and research projects during our professional career.

The citizen accessing the eHealth services in county of Blekinge is an interesting area of research that gives an opportunity to get deeper into implementation of eHealth services at regional level. It also supports to implement HCI concepts when citizens access the eHealth services.

The eHealth is a relatively recent term for healthcare practice which is supported by electronic processes and communication [42]. According to G Eysenbach it is a growing field in the HCI discipline that intersect public health, medical informatics, and business, referring to health services and information [34].

Commission of the European Communities says eHealth market is currently some 2% of total healthcare expenditure in Europe, but has the potential to more than double in size [8]. European Council in 2006 it is stated that the health systems of the European Union are a “fundamental part of Europe's social infrastructure” [35]. At present Information and communications technologies (ICT) are predicted to contribute considerably to the development of eHealth systems in a future not only in the Europe but other parts of the world also [9].

Karl A. Stroetmann et al., identified, there are significant benefits of ICT based eHealth applications in Sweden and other parts of the world. The benefits range from improvements in quality, efficiency, availability and accessibility of health services as well as cost advantages. [10]

In EU Action Plan, each Member State should develop national strategies for eHealth [11]. Guohua Bai in” Guide to Regional Good Practice EHealth” explained that the national eHealth strategies will
not be sufficient enough in most of the countries where health is a responsibility of regional and/or local authorities. For targets to be achieved according to EU Action plans there is a need for regional strategies and regional decisions because it is in the regions that eHealth services mainly should be realised. The county of Blekinge is one of the regions in Sweden where our research conducted on citizens accessing the eHealth services [12].

According to strategy maker the Blekinge hospital has units in Karlskrona and Karlshamn which provides in-patient and out-patient care involving specialised medical resources. The technical equipment or other specialised treatment such as ear-nose-throat, etc is not found in primary care or psychiatry. [3]

Blekinge hospital’s services includes Emergency medical care, Intensive care, Surgery, Child and young people’s medical care, Habilitation, Clinical physiology, chemistry and microbiology, Women’s health services, Medical clinic, Orthopedics (treatment of musculoskeletal injury), Rehabilitation, Eye and ear health care.[3] [5]

There are different eHealth services that are available in Blekinge hospitals and Primary Care. The availability of these services in Blekinge hospitals and primary cares are depends upon the type of patients. Some Blekinge hospital contains three eHealth services; some contain four eHealth services and so on. [5]

According to health service planner at present eHealth services on e-portal are Cancelling appointments, Renew prescriptions, First contact before travelling abroad, First contact with physiotherapy, Book planned appointments, Change booked appointments, Advice how to help yourself, Common information, Follow-ups.[5]

The purpose of the research is to perform an analysis to evince that if the county of Blekinge citizens are satisfied with the current eHealth services on web portal and what will be the future eHealth services are for citizens on web portal to fulfil their need. In addition this research will support health authorities and health managers by helping health authorities to manage properly the ongoing re-organisation of health delivery systems in the county of Blekinge. This research addresses to citizens, strategy makers, health services planners and health services operators as well as health services providers which are involved in eHealth services development projects. The research also targets future eHealth services development project groups. Moreover this research addresses the citizen communication and interaction aspects regarding eHealth. Some suggestions based upon HCI concepts that may support the Blekinge health web portal interface development team to make an effective
interaction between citizens and eHealth web portal. This research may support health authorities in understanding the citizens need and requirement.

According to Dr. Rory O’Connor the HCI is concerned with how interactive systems such as web portals are designed. HCI involves the application of principles, development, methods and guidelines to support the design, interface and evaluation of interactive systems to fulfil the user needs. In HCI interface, the most important point is to establish contact between the user and computer system. The interface is always designed taken in the consideration of Principles of user interface design”. An important point in it is that the success or failure of the system depends upon the user’s experience with the interface. [13]

Ronald M. Baecker et al., explained that “HCI is put simply the study of people, computer technology and the ways these influence each other. We study HCI to determine how we can make this computer technology, more usable by people.” [1].

HCI systematically applies knowledge about human purposes, human capabilities and limitations as well as machine capabilities and limitations in order to enable users to do things that they could not do before. [1]

This documentation starts by introducing the background and domain. After that, a separate section is dedicated to have a clear understanding of the problem existing in the area. Then there is a description of the research methodology based on interviews and Questionnaire. This research methodology progressed towards the goal of the thesis.
Chapter 1: Background

1.1 eHealth Concepts

Elizabeth Sillence et al. explain, that eHealth refers to information and health services delivered using the internet or related technologies. Whereas the eHealth usage figures propose that the main issues in the success of eHealth are increasing the quality of medical information, effective user interaction, and personalization of patient data according to need and requirement. [14]

Moreover Elizabeth Sillence et al. claim that [14] there are different factors influencing peoples’ decisions regarding trust in eHealth web portals. In the At first impression they may be influenced by the interface of the website. For example, trusting on those sites that has visual appeal and mistrusting on those sites that have poor visual designs or with professional errors. Secondly, the users may be influenced by the branding of the website or by presence of the well-known images or renowned trusted logos. Thirdly, the users may be influenced by the quality of information presented on the site and fourthly, the users may be influenced by the degree to which the advice is personalized to the individual - i.e. the degree to which the advice appears to come from and be directed to similar individuals. [14]

Claudia Pagliari stated that in terms of eHealth functional scope, the majority definitions conceptualize eHealth as a broad collection of medical informative applications used for facilitating the management and delivery of health care. Purported applications include inter-professional communication, distribution of health-related information, computer-based support, patient-provider interaction, storage and exchange of clinical data and service delivery, education, health service management, health communities as well as telemedicine etc. [36]

In eHealth Action Plan 2004, the EU Commission defined eHealth as: “eHealth tools or solutions include products, systems and services that go beyond simply Internet-based applications. They include tools for health authorities and professionals as well as personalised health systems for patients and citizens. Examples include health information networks, electronic health records, telemedicine services, personal wearable and portable communicable systems, health portals, and many other information and communication technology-based tools assisting prevention, diagnosis, treatment, health monitoring, and lifestyle management.” [15]
Over the last 15 years, the application of information and communications technology (ICT) in health care has grown exponentially on the other side its potential to improve effectiveness and efficiency has been recognized by governments worldwide [33].

According to Claudia Pagliari, [37] the strategies for eHealth aimed at developing health information infrastructures are emerging across North America, Australia, Europe and elsewhere. All of these strategies are united by a vision to improve the safety, efficiency and quality of patient care by enabling access to electronic health records (EHR) and also by supporting, service management clinical practice, research and policy though availability of appropriate evidence and data. [37]. These strategies also emphasize the importance of different standards and policies for ensuring interoperability of data among different health care organizations and the data security. Many incorporate a commitment to facilitate consumer empowerment and patient self-care through provision of electronic information and/or telemedicine facilities [37].

1.2 National Strategy for eHealth - Sweden

The National Strategy for eHealth 2006 was made by the National High-Level Group for eHealth. Since its appointment in early 2005 by the Ministry of Health and Social Affairs, the group has invited opinions on the National eHealth strategy’s contents on from a wide range of actors and stakeholders in the sector. [16]

The development of a national eHealth strategy comprises the first phase of a long-term undertaking aimed at attaining a higher degree of collaboration at national level on these issues. The second phase had been launched in 2006, which involved around acquisitioning support for the eHealth strategy among the country’s counties council, municipals council and other actors and stakeholders. [16]

According to The National Strategy for eHealth 2006, Sweden has a decentralised health care system, with 20 county councils and 290 municipal councils as principals and care providers. Their responsibility as principals includes the provision of standard care services and the development requirement, quality-assure and finance all care activities. Both county and municipal councils employ the services of private care providers to a greater or lesser extent. [16]

Both at regional and local level, the decision to adopt and implement the strategy must be taken independently and separately by each county and municipal council.

In the National Strategy for eHealth 2006, it is stated that in Sweden there is a Health and Medical Services Act, under this the county councils are required to provide health and high standard of medical care to all resident in the county. Health and medical care planning must be focused on the
inhabitants’ care needs and include health and medical care services offered by private and other care providers. The specific group are also targeted in this Act according to this Act municipals council require to offer health and high standard of medical care to specific groups, such as the elderly and the disabled. [16]

According to Strategy Maker of county of Blekinge, Swedish government is developing one web portal at national level that will be available in future. The one common web portal will be available for all citizens no matter where patient lives. Citizens can access eHealth information, eHealth services and also book the appointment with the doctor. [3]

In The National Strategy for eHealth 2006 it is said that in Sweden there are some projects currently in progress under “National Strategy for eHealth Sweden”. Those projects are “Sjunet” and “info VU” as well as more projects is preparing to launch in future. [16]

**Sjunet** – The National IT Infrastructure for Healthcare in Sweden

According to Mats Larson et al., In the research and development (R&D) programme “ITHS” Seven county councils started Sjunet as a project in 1998 it is funded by the Federation of County Councils and The Swedish Knowledge Foundation. Sjunet is the Swedish Health Care Network containing an infrastructure for communication among primary care centres, hospitals, and home care. It provides secure transmission of health care data and applications on an IP-network and that IP-network is separate from the Internet. The network is used for remote access to applications, e-learning, secure email, teleradiology, database access, telemedical videoconferences, IP telephony and EDI-messages.[17]

**InfoVU-project**
The InfoVU-project which is devising classifications, quality indicators and nomenclature to be used in care documentation.

**1.3 County of Blekinge**
Blekinge County Council or Landstinget Blekinge is a municipal entity that is independent but coterminous with the County Administrative Board. The Strategy maker explains that Blekinge is one of the county council in Sweden where 150,625 people live in an area of 2,941 square kilometres. It is right in the middle of the expanding Baltic Sea region. It is closer to Northern Germany half of Denmark and the coasts of the Baltic States [3]. He identified that county council is responsible for the county’s health care services (the county council’s principal role), dental care, advice and support to the disabled, offer education and training via Blekinge’s folk high school. It is responsible to promote
regional development in culture, health promotion and the environment as well as contribute to Blekinge’s development by supporting trade and industry. [3]

According to health service planner in 2007 all units in primary care has web services as compare to clinics because at present in Blekinge only 3 clinics have web services. In the current situation there are different eHealth services that are available in Blekinge hospitals and patients are accessing these eHealth services. [5]

Strategy maker said at present eHealth strategy of county of Blekinge is dependent on Sweden National strategy for eHealth and Sweden National strategy for eHealth is dependent on European Union strategy. In current situation they have different standards in counties because in the beginning all county councils started the implementation of IT in their own way. [3]

This research aims is to study the current eHealth services presented on “http://www.ltblekinge.se/” that how much extent these eHealth services are beneficial for the citizens. How current and projected eHealth services would be beneficial for the citizens. Our research may support health authorities and health managers by suggesting how to manage properly the ongoing re-organisation of health delivery systems in the county of Blekinge.

1.4 Health Websites Interfaces
In "Designing effective health websites" B Pamela Briggs explained that over the last few years, the number of people seeking online health information has increased dramatically. Worldwide, there about 4.5% of all Internet searches are stand on health queries [18]. The majority of the published studies assessed the quality of content on health related websites in terms of medical accuracy. But they concentrated little or nothing about how real patients wanted such information on the internet. In general the ordinary users evaluate web content in a different way than experts do. For example, they pay much more interest to the visual design and appearance of the websites. They usually use general portals and search engines for searching and these search strategies on the internet certainly depict non-experts to poor-quality health information and advice. [18]

Elizabeth Sillence et al. in “eHealth” identified that in spite of internet unregulated and sometimes unreliable nature with the passage of time the internet is changing its entity quickly as a new “object of trust”. The research specifies that internet users’ rate trust as a vital aspect within the online health content domain [14]. Still less than half of the available online health information has been reviewed by doctors for evaluation of health website. A systematic Meta analysis of health website evaluations noted that 70% of the studies reviewed concluded that quality is a main problem on the internet. The
internet users are paying attention in health advice which is independent and unbiased as well as they want websites to be easy to use. [14]

1.5 HCI Concepts
According to Dr, Rory O’Connor in “Introduction to Human Factors in Computing”, over the last few decades HCI has increased its worth in user interface designing. Different fields are increasing their participation in HCI such as Computer Sciences, AI, Philosophy, Art, Design, Psychology, and engineering [13]. HCI has a very vital role in web designing and development. HCI areas such as interface planning interface designing, usability testing, and evaluation are main concern in the designing and development of web. There are many challenges in web designing such as communicating your message to users, providing a good user experience while communicating with web and ensuring the user returns. [13]
Chapter 2: Problem Definition/Goals

According to the Claudia Pagliari, eHealth refers to information and health services delivered using the internet or related technologies. [37] Over the last few years applications of information and communication technology (ICT) in health care have grown exponentially and functioning very effectively and efficiently. ICT based eHealth applications have implemented in Sweden. These applications are providing quality of health services and better access of all Sweden’s citizens to health care. [37] In Sweden all counties have responsibilities to provide the standards health care services, the development requirements, quality-assure and finance all care activities. Each county has own health web portal for eHealth services e.g.: county of Blekinge web portal name is “LANDSTINGET BLEKINGE, www.ltblekinge.se”.

The ICT based systems support the county of Blekinge citizens in accessing trouble-free, easy and reliable access to health care services. It can be assumed that Blekinge citizens want to use safe methods for monitoring, checking the progress of their own illnesses, routine tests, information and guidance on an individual basis. These are the opportunities for the citizens to become more actively involved in their care and treatments as well as take more decisions of their own. [16]

One main motivation for the public health care is that elderly citizens receive assistance and medical attention in their own homes and it also helps citizen’s living in remote rural areas etc. In the county of Blekinge as well as on the other places citizen’s need easy access and health-related information to interact with the health care services in multiple ways. Even in future, citizens will seek individual, personalized solutions to their problems, take initiatives and make their own choices. [16] But there is a lot of more work require to be done and to figure out how new eHealth services will work. We feel that it is necessary to know about the accessible eHealth services for county of Blekinge citizens and for their projection we have focused on the following research questions in our study.

2.1 Research Questions

- What are the accessible eHealth services for citizens presented in literature?
- What eHealth services are currently accessed and utilized by the citizens in the county of Blekinge?
- How are the citizens future eHealth services projected and imagined in the county of Blekinge?

These research questions contribute the important role in our research. The discussed eHealth solutions include products, systems and services that go beyond simply internet-based applications [35]. Citizens can access eHealth services whenever and wherever they need. According to our 1st
research question, literature review presents the detail description about the eHealth services in the next chapter. There are some eHealth services which are more in health care practices within European countries for example: Electronic Patient Records (EPR), Electronic Health Records (EHR), e-Prescription, Health Cards, Health Portals, Patient Identifiers, Personal Wearable and Portable Communication systems, Telemedicine Services, Online Health Information Services, Online Information about Available Health Services, Health-Related Administrative Transactions, Online pharmacies, Websites of GPS/Public Health Clinics and Specialists, Online interaction with one’s doctor, Availability of Online Diagnosis and Telephone Consultation.

According to our 2nd research question, there are few eHealth services are accessible to the public from primary cares, health care centers’ and hospitals in county of Blekinge. County of Blekinge citizens can access these eHealth services through Blekinge County Council website. Some of Primary cares, health care centres and hospital units are providing eHealth services according to available resources and patients categories. At present eHealth services on county of Blekinge website are Recipes Renewal, Cancellations the Visit, Book Visit, Ordering Certificates, Travel Vaccination, Universal Access Card, Self-Referral to Physiotherapy, Self-Referral to Occupational Therapist and Ask the Doctor.

In 3rd research question, according to the National Strategy for eHealth 2006 - Sweden citizens need quick, problem free, simple procedures for medical consultations and routine tests access to primary care services. In future citizens will look for individual and customized solutions to their problems [16]. They will use internet to learn about health care information, medicines, ill health and self treatment. National portal like Sweden health portal will provide the update and quality assured information at local, national and international level. [16] According to the questionnaire analysis in section 6.6, County of Blekinge citizens want book or change appointment with health care professional, renew prescription from other primary care or clinic. They want to direct communications with the doctors to discuss the specific problem through county of Blekinge web portal. We believe that in future, county of Blekinge web portal will provide the health records of citizens and overview of the relevant medicines. To increase the interaction of eHealth Services Form’s user interface, we suggest HCI related principals’ of user interface design to modify it.

2.2 Goals and Measures for the Study
To get the better delivery of health care, eHealth act as a vital role with the information and communication technology. Information and communication technology based tools provide the patient safety, support management functions and resource distribution. We assume that in future county of Blekinge citizens will get more safer, secure, adequate and good quality eHealth services
and treatment according to their abilities and circumstances. [16] The goals of the study are listed below:

- List of eHealth services that will provide easy, trouble-free and secure health care access via internet based application.
- According to HCI related principles and user interface guidelines, eHealth services will develop the effective interaction of citizens with computers in performing the operation tasks.
- In interviews and questionnaire we will identify the currently accessed and utilized eHealth services by the citizens in county of Blekinge.
- Interviews and questionnaire will highlight some current pros and cons of eHealth services through the county of Blekinge web portal.
- In a questionnaire result, identify the citizens’ needs (what they want and what they will do as a result of eHealth care system) and possible ways to access this system.
- Questionnaire from the county of Blekinge citizens will supports the findings based on data collected through the interviews.
- eHealth care system will also support reliable health care services whenever and wherever citizen need.
- This study will create intersection of medical informatics, public health and business that will supports the health care services.

Our study may support health authorities and health managers to manage properly the ongoing re-organization of health delivery systems in the County of Blekinge.
Chapter 3: Research Methodology

This chapter illustrates the research methodology carried out for the thesis. Overview of the research methodology is defined in section 3.1. The phase of literature review is given in section 3.2 and informal discussion in section 3.3. The Section 3.4 describes the interviews that were conducted with three interviewees and section 3.5 explains the questionnaires that were conducted with citizens.

3.1 Overview

Research methodology is the method to organize and conduct the research. It helps to think about, how is the data collected or generated and how is it analyzed. We adopted a combinational approach using qualitative and quantitative research methodology [13]. This research was carried out on multiple phases. In starting phase, we studied literature review to understand “what is eHealth”, “what are eHealth services and standards”, “how can citizens access eHealth services”, etc. It identifies the most important things which are necessary for county of Blekinge eHealth services. This literature review helped to adopt the valuable method of questionnaire conduction, guidelines and analysis of questionnaire. In this research, interviews used to ask detail questions as well as follow-up questions with eHealth strategy maker, health service planner and health care service operator about eHealth services. After conducting the interviews, analysis of data was performed. In final phase questionnaire was designed on the basis of findings through the interviews.
Figure 3.1 - Overview of Research Methodology
3.2 Literature review

Literature review was the starting phase to get the current state of research in eHealth services. This review helped us to solve different ambiguities in our minds, work flow and methods/procedures for different tasks. Authors used the distinct key search terms relevant with the topic to search the material published by several renowned researchers and scholars. The basic theme of literature review was to provide a proper context to a research and educate the researchers from the previous work done by other researchers. [2]

Blekinge Institute of Technology (BTH) Electronic Library Information Navigator (ELIN) was used as net surfing tool to search the eHealth related data. The authors selected research papers, journals and documents related to eHealth and HCI that were ACM, IEEE, Master thesis reports, eHealth reports and Ph.D thesis reports.

A literature review process guided to learn the system and its functioning. It also identified the important factors where there is a need for further research. In this research study, authors identify the accessible eHealth services for citizens presented in literature.

3.3 Informal Discussion

The authors started informal face to face discussion with master, P.hD students and with different county of Blekinge citizens to discuss the topic in parallel with literature review. A positive response is received from fellow students and especially from county of Blekinge citizens. Their responses were also helpful to design the interviews and questionnaires.

3.4 Interview

After the literature review and informal discussions, we designed the interviews and invite the strategy maker, health service planner and health care service operator to express their opinions about the eHealth services for county of Blekinge citizens. These three interviews were conducted and recorded at three different times. First interview was conducted with the strategy maker of county of Blekinge, second one with health service planner and third one with health care service operator. The objective of the interviews was to collect the qualitative data and identify the frequently used eHealth services, their factors and possible short comings regarding the eHealth services for county of Blekinge citizens.

During the interviews, authors asked the formal and informal questions with interviewees. In formal approach, authors designed some set of pre-planned questions to ask about the eHealth services. In the informal approach, questioned were not pre-planned instead questions were framed during the
discussion based on the reply given by strategy maker, health service planner and operator. In those conversations, authors recorded, observed and noticed the important eHealth services.

3.5 Questionnaire
The authors designed a questionnaire on the basis of interviews’ findings and distributed to the 10 (Ten) county of Blekinge citizens of different age groups. They were the regular users of eHealth services through the county of Blekinge web portal. The objective of this questionnaire was to get the quantitative and qualitative data to support the findings based on data collected through the interviews. Questionnaire was formulated with open-ended and close-ended questions that provided the opportunity to the citizens to express their opinions and ideas about the eHealth services through the county of Blekinge web portal.
Chapter 4: eHealth Study Areas

eHealth comprise of different technological applications and technologies that can be used in any health care system to exchange and process information. From the beginning to advancement, highly developed eHealth services and tools are used by peoples related to health care systems around the world. Public and private health care providers are involved to enhance the quality of care and provide more efficient health care delivery system to the patients. Sweden is one of the countries which are involved in the implementation of eHealth delivery systems. At present in Sweden some projects such as Sjunet and InfoVU are running as a National strategic goal towards the eHealth delivery system. All counties council in Sweden are involved at regional level to accomplish the National strategic goals towards the advancement of health care delivery system and the county of Blekinge is one of them.

4.1 eHealth

In eHealth 2005 Conference, Petra Wilson explained that the term eHealth is not only about computers on doctors’ desks. The term eHealth contains a huge variety of tools, devices, applications and procedures as well as methods of work. eHealth covers a wide range of applications from the availability of health information to citizens over the internet to the implantation of devices in the human body to obtain complex bio-signal data and control the working of the human body. [40]

According to Vernon K. Smith et al. “E-health” is a term used to describe any health care practice supported by electronic processes and communication, including health information technology (HIT) and electronic health information exchanges (HIEs). Across the nation, states have taken on the challenge of promoting eHealth policies and initiatives, encouraging a wide variety of public and private sector efforts [19]. States are motivated by their interest in improving performance, assuring quality and obtaining greater value in their roles as health care purchasers, providers, regulators, and as protectors of public health and catalysts for private-sector action. [19]

In eHealth journal G Eysenbach explained that “eHealth is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology”. [34]
4.2 ICT and eHealth

The information and communication technology (ICT) has become one of the core building blocks of modern society [20]. L. A. Ogunsola claim that Information and Communication Technology is basically an electronic based system build on information transmission, reception, processing and retrieval, which has radically altered our thinking approach, the way we live and the environment in which we live. Information and communication technology revolution is the fundamental and driving force that leads to globalization and the dynamic change in all aspects of human existence. Furthermore with the rapid change in the environment the ICTs are significantly playing an important role in organizations and in society's ability to access, adapt, apply and produce information. It is not as ICT is the only cause of changes we are seeing in today's business environment, but the rapid developments in ICT have boost up the current wave of globalization. [38]

In National strategy for eHealth 2006 – Sweden, it is stated that ICT offer various potential benefits in health care in terms of improvements for patients, health care planners, health and elderly care professionals, health care service operators and strategy makers [16]. The health care authorities and other bodies responsible for care provision require ICT for effective implementation of patient safety and quality attributes as well as to support management functions and resource distribution. [16]

There are major benefits of ICT based eHealth applications in all over the world. The benefits range from better access of all citizens to health care and improvements in quality of health services as well as cost advantages [21]. The patients are also able to contact care services through the internet for advice or help with self-treatment and get assistance. More over health and elderly care professionals have access to interoperable, efficient eHealth solutions that make it easier to perform their routine work while guaranteeing patient safety.

4.3 The 10 e's in eHealth

According to G Eysenbach [34], the "e" in eHealth does not only stand for "electronic" but it involves a number of other "e's," which together can best describes what eHealth is all about. The following 10 e's could be one of the supporting ideas to understand the advantages of eHealth that how eHealth implementation could be beneficial in different areas. [34]

1. Efficiency: One of the aims of eHealth is to enhance and increase efficiency in health care, in that way decreasing costs by prevail over unnecessary or duplicative therapeutic or diagnostic interventions.
2. **Enhancing Quality of Care**: eHealth can improve the quality of health care such as by making the comparisons between different providers then as a contribution including users as additional power for quality assurance and directing patient flow to the best suitable quality providers.

3. **Evidence based**: eHealth interventions should be evidence-based by nature in a sense that their efficiency and effectiveness should not be assumed but it can be proven by accurate scientific evaluation.

4. **Empowerment**: One aspect is the empowerment of consumers and patients by allowing the personal electronic records and knowledge bases of medicine accessible to consumers through internet.

5. **Encouragement**: There is a new way of relationship between the patient and health professional towards a proper partnership where decisions are made in a shared manner with mutual understanding.

6. **Education**: The advanced method of education for physicians through online sources (continuing medical education) and consumers (health education, tailored preventive information for consumers).

7. **Enabling**: The eHealth enables communication and information exchange in a standardized way between health care establishments.

8. **Extending**: eHealth extended the health care accessing ways it enables consumers to easily obtain online health services from global providers. These services can be a simple such as an advice to more complex interventions or products such as pharmaceuticals.

9. **Ethics**: The eHealth initiated new forms of patient-physician communication and bring new challenges and threats to ethical issues such as online informed consent, professional practice, equity and privacy issues.

10. **Equity**: The main issue in eHealth is the equal accessibility of eHealth services to all citizens. The digital divide currently runs between rural vs urban populations, rich vs poor, young vs old, male vs female people and between neglected/rare vs common diseases.
4.4 eHealth Tools

eHealth involves citizens, health care practitioners, public and private health care providers, health service operators. The eHealth tools provide support to health care service operators and health care practitioners to perform tasks such as for information gathering, sharing and administering etc. There are many eHealth tools used successfully world wide to support the eHealth delivery system. The eHealth tools could be very supportive for efficient delivery of eHealth services to County of Blekinge citizens.

In eHealth 2005 Conference, Petra Wilson said that the eHealth tools play a significant role across the healthcare related activities from the administration and planning of health services to the execution of surgical procedures. eHealth can also be defined as the tools that can facilitate the capturing, processing, sharing and transfer of data and information across the whole range of citizens, patients, health professionals, health service operators and health administration interactions. [40] In report of WHO Global Observatory for eHealth, the following 9 eHealth tools and services are identified for citizens. [22]

1- Patient Information Systems (PIS)

Patient Information Systems (PIS) used to support both the administrative and clinical activities in a hospital; PIS contain information about a hospitalized patient. They are usually use to support the whole hospital but it could be restricted to single or multiple departments. PIS contain textual and numeric data about the patient as well as the basic administrative data which distinguishes them from hospital information systems. PIS usually do not contain multimedia data distinguishing them from an electronic health record system (EHR). [22]

2 - Hospital Information Systems (HIS)

Computer based information systems that support information processing inside a hospital in areas such as: budgeting, billing, planning, administration, appointments and personnel. [22]

3 - General Practitioner Information Systems (GPIS)

The ICT-based systems that support the functionality of a general practitioner (GP)/primary health care practitioner are called General Practitioner Information Systems (GPIS). The scenarios where the GP is part of a primary health care team the system may also be recognized as a Primary Care Information System. Their main functions are to share and manage data about patients. Sometimes they connect to other health care systems such as GP reimbursement or laboratory results reporting and billing systems etc. [22]
4 - National Electronic Registries
National electronic registries are the electronic databases of related records on specific medical subjects. They contain data on cancer, births, diabetes, mortality or other subjects of medical or epidemiological interest. These electronic registries can be accessed by authorized users through the use of ICT. [22]

5 - National Drug Registries
The National drug registries are the electronic databases that contain national pharmaceutical information. The content of the register varies depending on the purpose of the registry. [22]

6 - Directories of Healthcare Professionals and Institutions
Electronic databases of institutions and individuals providing health care. These are usually searchable by specialization, location, professional association or credentials. They are often associated with accreditation and registration status. [22]

7 - Decision Support Systems (DSS)
The Automated or semi-automated systems supports in making decisions in a clinical environment. [22]

8 - Geographical Information Systems (GIS)
The different computer-based applications that support capturing, integrating, analyzing and displaying data related to geographic coordinates. [22]

9 - PACS
The development of PACS (Picture Archiving and Communication Systems) initiated in Austria. José Luis Monteagudo et al. identified that large pilot PACS systems are particularly in the university clinic in Graz and in a Vienna hospital. Those PACS today supports many hospitals and in many cases also support radiologists in private practice. PACS share patient records, images and diagnostic resources. [23]

4.5 eHealth Services
eHealth covers a wide range of accessible health care services and health information to the citizens. The Health information is more than website. [40] Following sections provide the detail overview of 16 eHealth services:
4.5.1 Electronic Patient Records - EPR
The Electronic Patient Records (EPR) is the patient record in electronic form. It is the new form of
advances in medical informatics. [39] According Nikula RE, nowadays in health care organizations of
Sweden and Denmark EPR is working as a tool in health care to lead the better quality and service for
patients [24]. It also offers new methods of data storing, manipulating and medical information of all
kinds for example: text, images, video, sound or etc. Strategy maker of county of Blekinge said in
interview EPR is working very efficiently in regional areas because EPR develop the better
relationship between doctor and patient. [3] Patient can share and discuss his or her special disease
with the doctor through computerized notes. For example: in America, clearinghouses of medical data
sell medical data in computerized notes form to the insurance companies, police departments and so
on. [39]

4.5.2 Electronic Health Records - EHR
The Electronic Health Records (EHR) is the electronic form of the treatment’s information. EHR
follow the requirements and interest of different bodies for example: patients and medical personnel,
care services, rescue services and pharmacies or scientific institutions. [23]

“The Electronic Health Record (EHR) is a longitudinal electronic record of patient health
information generated by one or more encounters in any care delivery setting. Included in
this information are patient demographics, progress notes, problems, medications, vital
signs, past medical history, immunizations, laboratory data, and radiology reports. The
EHR automates and streamlines the clinician's workflow. The EHR has the ability to
generate a complete record of a clinical patient encounter, as well as supporting other
care-related activities directly or indirectly via interface—including evidence-based
decision support, quality management, and outcomes reporting.”

An EHR is generated and maintained within an institution, such as a hospital, clinic, integrated
delivery network, or physician office. [43]

4.5.3 e-Prescription
e-Prescription system like other effective procedures is used for recommending, providing and
distributing medicines offers direct, positive benefits for patients and care professionals. e-Prescription
has positive benefits such that efficient, secure, fewer prescriptions to decipher, pharmacies accessible
24h/day. In addition time saving and short wait time for customer at the pharmacy. [44]
4.5.4 Health Cards
According to José Luis Monteagudo, e-card is a smart card which is the alternative of all health insurance vouchers [23]. When will this system implement it will beneficial for both the insured patients and their dependents in accessing the planned medical treatment. Its functionalities are very similar to electronic health insurance voucher. It use as an electronic signature and in future use as a citizen card. This e-card provides the advantages to all associate bodies. These advantages are possible access of medical treatment and more privacy. [23]

4.5.5 Health Portals
Public health service institutions provide education about the health care through the health portals and also using the internet as one communication channel [45]. County of Blekinge health web portal provides the broad variety of health care services related to health care which are mention in 4.16. In Sweden each county has internet portal (even private ones) which provide useful health information for citizens and health professionals. [46]

4.5.6 Patient Identifiers
Patient identifiers identify the patients accurately and their correct treatment to safe them [45]. Some time it is very challenging to identify the correct patient in fast-paced nature of medical care. Normally patient identifiers identify the two patient and appropriate care before any treatment or service is provided. The same two identifiers must be verified from two locations before treatment begins. For example, if a nurse is giving a patient medication, he or she would match the name and medical record number on the patient's wristband to the name and medical record number on the medication administration record. [45] For inpatient units, the two patient identifiers must have the patient's name and medical record. In outpatient areas two patient identifiers have patient's name, social security number, medical record number, facial recognition and date of birth. [45]

4.5.7 Personal Wearable and Portable Communicable Systems
José Luis Monteagudo said in eHealth strategy and implementation activities in Austria, Civilizing the standard and quality of life of elderly people is an up and coming issue in information society for research and development. Nowadays new technologies including ambient intelligence technologies providing the daily life support in everywhere. It is necessary to protect the elderly from emergency situations and provide the rapid assistance whenever they need. [23] Sometime it is not easy to adopt new technology because elderly people have some extra problems due to its complexities. Today important issue is that of delayed calls to emergency medical services. It can lead to increased hospitalization and elderly people to move into nursing homes. [23]
4.5.8 Telemedicine Services
Telemedicine interactions often occur between two health care sites, such as a clinic and a hospital. However, the advanced technological options involved in telemedicine permits providers and patients to be almost anywhere, such as at home or at work. Physicians can even able to attend the emergencies from their homes, using ICT, instead of visiting the hospital to care for a patient. [25]

4.5.9 Online Health Information Services
Nowadays health care websites have dedicated portions to health campaigns with important issues such as smoking, alcohol, food and nourishment, vaccinations for children, cardiovascular risks and AIDS. [26]

4.5.10 Online Information about Available Health Services
According to Gregorio Mercurio et al, Online information about health services is available on the main area of websites. These website regions are available to provide the health services to the citizens. This information is changed according to the new health care information. [26]

4.5.11 Health-related Administrative Transactions
According to health-related administrative transactions, health services requirements are organized at the regional level. It also provides a list of downloadable forms for health-related administrator transaction such as request of cancellation from general practitioners or children doctors' lists, request of certification for ability of work in another EU country and declaration of willingness to donate organs etc. [26]

4.5.12 Online Pharmacies
Online pharmacy is an online sales channel. These online pharmacies are allowed only for non prescription medicines that has very low potency. [26]

4.5.13 Websites of GPS/Public Health Clinics and Specialists
Health care services from family doctors and general practitioners are known as basic assistance services. Sometimes family doctors and general practitioners have not websites but their services are in some cases provided. Nowadays specialists and general practitioners are online available to provide the assistance services. For example, ANMCO is the nonprofit professional medical association of the Italian National Health Service's Cardiologists. Its website name is www.anmco.it. [26]

4.5.14 Online Interaction with one’s Own Doctor
Nowadays patient can do online interaction with own doctor. Doctor can aware the patient’s actual condition of health and needs through online communication. [26]
4.5.15 Availability of Online Diagnosis

Nowadays online diagnosis health services are available on commercial websites that provide healthcare related information. Patients can post their suggestion, ideas and can also ask for health opinions of a specialist. [26] In online diagnosis practitioners and specialists can also contribute in these websites. Mostly these websites provide these services for registers users.

4.5.16 Telephone Consultation

In this eHealth service, doctor can decide they want to offer telephone consultation with patient or not. Nowadays some doctors are providing the telephone consultation during certain hours of the day. Telephone services are also available for emergencies such as request of an ambulance. [26]

4.6 The European eHealth Action Plan

“In 2004, the European eHealth action plan initiated a commitment by all EU member states to develop a national or regional roadmap for eHealth.” [27]

In the eHealth ERA report 2007 it is stated that the collaboration among Member States and the European Commission both in deployment strategies as well as in research programmes has already resulted as a big achievements and concrete benefits for European citizens. [27] Europe continues to lead in the deployment of high-quality eHealth solutions and trying to ensure that these eHealth solutions fulfil the patients', consumers', and health professionals' needs. These solutions have direct impact on access, quality, cost, and safety of healthcare as well as reinforce the industrial potential and innovation that eHealth offers. [27]

The Health systems are a primary part of Europe's social infrastructure. Maintaining citizens health and if unwell then regaining their health is the first priority for European citizens. The health sector is a leading growth sector for European countries economies; it is growing faster and creating more new jobs than almost any other sector. The European eHealth Action Plan has encouraged its Union Member States to develop a national or regional roadmap for eHealth. [27]

4.6.1 eHealth and Union Member States

According to eHealth ERA report 2007, the Union Member States countries like Denmark, Norway and Finland had already adopted primary eHealth policies during the second half of the 1990s. On the other hand Germany started public discussions involving a large variety of stakeholders during the same era. On a general level, this timeline is broadly consistent with the aim addressed in the
European eHealth Action Plan that each Member State should have a national or regional roadmap(s) by the end of 2005. [27]

In eHealth ERA report 2007 it is identified that there are not yet many broad national eHealth activities that are in routine operation. Most of them are on a way of development pilots or larger tests. There are five operational national health web portals for citizens, two countries with fully implemented e-Prescribing systems and three in which electronic messages (discharge letters, referrals etc.) are exchanged between health providers on a regular basis. The three Scandinavian countries Denmark, Sweden and Norway have already implemented fully operational national ICT infrastructures specifically for supporting communications in the health sector. [27]

4.6.2 Sweden Strategic Perspective

In eHealth ERA report 2007 it is stated that the eHealth solutions in Sweden were until recently adopted via co-operative voluntary arrangements between national and regional authorities (counties) and without a national eHealth Strategy. The link between regional initiatives, advancing the use of IT in healthcare was assigned to the organisation “Carelink” that was established in 2000. The members of its board of directors are representatives from counties, municipalities, the National Board of Health and Apoteket AB (Swedish Pharmacy Chain). [27]

In National strategy for eHealth Sweden 2006 it is identified that in 2005 the Swedish Association of Local Authorities and Regions, the Medical Products Agency, the Ministry of Health and Social Affairs, the National Corporation of Swedish Pharmacies, the National Board of Health and Welfare, and Carelink established a National High Level Group for eHealth to work towards a national eHealth strategy. This strategy was published in March 2006 and established a common vision of how eHealth should be used to support and enhance healthcare. Moreover the Social care is also included in the National Strategy for eHealth, and will be a central area for the next step in the work carried out nationally. [16]

The national eHealth strategy is grouped in six action areas these areas will provide substantial opportunities and benefits for eHealth solutions of all types: [16]

- Bringing laws and regulations into line with extended use of ICT
- Creating a common information structure
- Creating a common technical infrastructure
- Facilitating interoperable, supportive ICT systems
- Facilitating access to information across organizational boundaries
- Making information and services easily accessible to citizens
The National strategy for eHealth for Sweden lead to commitments of the parties involved, and supports the formulation of local operational strategies such as in counties to guide the progression and direction of change. This local focus helps the principals involved to make sure that the local measures taken can be positioned in a national perspective and that ICT use will function effectively and efficiently from a strategic operational perspective. [16]

4.6.3 Implementation Perspective in Sweden

Since 2002 all primary care centres and hospitals have been connected via Sjunet that is administered by Carelink and dedicated to health care. Stated in eHealth ERA report 2007 this network also links together county councils, regions, pharmacies and many other healthcare enterprises. At present it connects all 80 public hospitals, 800 primary care centres, 950 pharmacies and a number of private health care institutions. [27]

According to Mats LARSON et al., the Sjunet is a fibre-optical network separate from the internet which makes it possible for the reliable and secure exchange of confidential data including images. It also provides the video conferencing facility [27]. Other features include a national phone directory, order entry, clinical care planning, knowledge database, clinical care planning and remote diagnostic services (at present some of these diagnostic services are in the preparatory phase). The scalability of Sjunet makes it simple to connect new organizations and institutions. “Sjunet won the eEurope award for eHealth in 2003. In 2004 the Sjunet broadband infrastructure reached about 85% of the population”. [17]

In eHealth ERA report 2007 it is identified that variety of eHealth services supported by Sjunet includes the e-Prescription. The percentage of e-Prescriptions reached 55% in April 2006. The e-Prescription system is being further enhanced by Apoteket AB with the addition of a national database of medicines sold on prescription. Telemedicine has been tested and/or used in over 100 applications and more than 75% of hospitals have tested or are already using telemedicine applications. A secure email system is also in use in many counties. [27]

Moreover several other major projects or activities were initiated and undertaken on a regional and/or national level during the last five years supporting different aspects of eHealth applications and/or services. Some of the projects stated in eHealth ERA report 2007 are defined below: [27]

- An ongoing review of legislation on the handling of information in the health care sector by the Patient Data Inquiry.
• The InfoVU-project which is devising nomenclature, classifications and quality indicators to be used in care documentation. (The national Board of Health and Welfare has established a National Centre for Patient Classification Systems).
• Suitability assessment of SNOMED is being supported by the government.
• A National Patient Summary has been piloted and is being diffused into use and broadened.
• The CarelinkPLUS project has developed a reference architecture to enable the communication of systems in different organisations.
• The Carelink RIV project is establishing common standards for eMessages in the health care sector.
• The SITHS-project has developed secure IT authentication solutions for health care professionals.
• The National Patient Advice project has developed a Health Portal for citizens.
• e-Lak, a network led by Carelink is supporting the further development of electronic communication between the health service, care and pharmacies.

4.6.4 ICT Trend in Sweden
The ICT is one of the growing areas in Sweden. The usage of mobile phone is increasing rapidly after 90’s till at present. The utilization graph of landline telephones is remains steadily after the slight fluctuation between the years 2000 to 2001. [28] The graph below identifies the interest of citizens regarding utilization of ICT and it also shows citizens are well aware of ICT benefits. In future substantial benefits would be achieved in Sweden through the utilization of ICT in eHealth delivery systems.

![Figure 4.1 - ICT Trends](image)

Figure 4.1 - ICT Trends [28]
4.6.5 County of Blekinge

Blekinge County is a county in south of Sweden. Its county seat is located in Karlskrona. [46] The county council’s main task is health care and medical services. It takes up to 80 % of the total organization. Through the responsibility for a good health and medical services the county council contributes to supporting and developing regional welfare. County council of Blekinge or Landstinget Blekinge is a municipal entity that is independent but coterminous with the County Administrative Board.

Municipalities

In Blekinge, there are five independent municipalities which also provide the basis for the county organisation. Those are the municipality of Olofström etc. Most of the primary care services are located in a number of centres within all the municipalities.

1. Olofström Municipality
2. Sölvesborg Municipality
3. Karlshamn Municipality
4. Ronneby Municipality
5. Karlskrona Municipality

Health care service planner identified that the county council is Responsible for the county’s health care services, dental care, advice and support to the disabled, offer education and training via Blekinge folk high school, Promote regional development in culture as well as health promotion and the environment. [5] At the moment Blekinge County Council is providing nine eHealth services at certain clinics and all clinics do not have the same eHealth services. The following 9 eHealth services are currently available in the county: [46], screen shorts of Blekinge County Council are also available in appendix 4.

1 - Recipes Renewal

County of Blekinge citizens can renew some prescriptions through website and phone. Blekinge county council take a charge of 60 crowns on the recipe renewal on the website or on the telephone for those citizens who are 20 years and older.

2 - Cancellations the Visit

Citizens can cancel the visit through telephone and on internet. All women in Blekinge between 23 and 59 years offered cervical screening every three years up to 50 years and every five years. If the patient does not wish to be called continue and after three non visits patient will be taken away from the record and patient need to contact the hospital if patient want to be called again.
3 - Book Visit
Citizens can book the appointment through telephone and on the internet. Normally citizens book the appointment through telephone because this facility available Monday – Friday as compare to internet its timing is Monday – Tuesday.

4 - Ordering Certificates
Citizens can order the certificates through internet or by visit the hospitals. Blekinge county council send patient’s order certificate by post.

5 - Travel Vaccination
If patient are planning a trip to tropical countries then he or she need vaccination because risk of diseases is greater. Blekinge county council website provides the important information about the travel vaccination for example: what vaccination do you need, how your basic look. You may need to fill in any of the vaccinations that you did as a child and how long to be gone or etc.

6 - Universal Access Card
Blekinge county council is providing three types of universal access card eservices: Universal Access Card asthma, Universal Access Card diabetes and Universal Access Card stoma.

7 - Self-Referral to Physiotherapy, Self-Referral to Occupational Therapist
Patients can access this service to support in managing routine work such as activities of dressing – living, cooking, etc. Citizen can also get benefit from Referral to Physiotherapy service through Blekinge county council.

8 - Ask the Doctor
Through this service citizens can ask the doctor many important things for example: what medicines you are taking, whether you are over-sensitive to any particular medicine (läkemedel) or kind of food, what illnesses you have had and so on. Citizens can ask the question about health.
4.6.6 The County Council Organisation
The follow chart shows the county council’s organisation structure within several departments. Our project is concern with the department which are in grey colour.

Figure 4.2 - County Council Organisations [47]
According to strategy maker, the Blekinge hospital has units in Karlshamn and in Karlskrona that provide different care facilities, the primary care is ideally the first place where patient visit when he/she feeling any health care problem. Although this is the policy of the county, many citizens make a first visit to hospital clinic, especially to the emergency care unit. One aspect is that the technical equipment or other specialised treatment not found in primary care or psychiatry. Blekinge hospital’s services includes emergency medical care, intensive care, surgery, Child and young people’s medical care, Habilitation, Clinical physiology, Chemistry and Microbiology, Women’s health services, Medical clinic, Orthopaedics (treatment of musculoskeletal injury), Rehabilitation, Eye and ear health care.[3]

Health service planner explained the availability of these eHealth services in Blekinge hospitals are depends upon the type of patients. Some Blekinge health care centres contain five eHealth services, some contain four eHelath services and so on. [5] The following health care centres are currently providing eHealth services through Blekinge county council website: [46] Screen shorts of eHealth services are also available in appendix 4.

1 - Children and Youth Clinic
Children Reception Karlshkrona and Karlshamn: Cancellations time, Universal Access Card asthma, diabetes Utilities Short, Short incontinence aids, aids Short stoma, Certification and Renewal Recipes.

2 - Brunngårdens Vårdcentral
District reception: Cancellations Time and Incontinence Aids Cards
Medical: Cancellations Time, Universal Access Card Diabetes and Prescription Renewal

3 - Bräkne-Hoby Medical Center
Medical: Cancellations time, Recipe Renewal and Travel Vaccination

4 - Cellprovtagning: Book or change the time for Cervical Screening

5 - Health Source Medical Center, Kyrkhult: Cancellations time, Universal Access Card Diabetes and Prescription Renewal

6 - Infection and Hudkliniken
Hudmottagning Karlshamn and Karlskrona: Cancellations time and Prescription Renewal
Infection Reception Karlshkrona: Ask Doctor
7 - Jämjö Medical Center

Barnavårdscentral: Cancellations time
District Labor Therapist: Cancellations time and Self-Referral
District Physical: Cancellations time and Self-Referral Physiotherapy
Family: Cancellations time, Recipe Renewal and Travel Vaccination
Curator: Cancellations time and Self-Referral
Barnavårdscentral Torhamn and Avian Mara: Cancellations time

8 - Kallinge Medical Center

District Physical: Cancellations time
Medical: Cancellations time, Recipe Renewal and Travel Vaccination

9 - Kungsmarkens Vårdcentral

District Nurse: Cancellations time and incontinence aids Cards

10 - Lyckeby Medical Center

Barnavårdscentral: Cancellations time
District Labor Therapist: Cancellations time and Self-Referral
District Physical: Cancellations time and Self-Referral Physiotherapy
Family: Cancellations time, Recipe Renewal and Travel Vaccination
Curator: Cancellations time and Self-Referral
Barnavårdscentral Kättelmåla: Cancellations time

11 - Nättraby Medical Center

District Nurse: Cancellations time, Universal Access Card diabetes, incontinence aids Cards and Means Short stoma
Medical: Cancellations time, Universal Access Card diabetes and Prescription Renewal
District Nurse Hasslö: Cancellations time, Universal Access Card diabetes, incontinence aids Cards and Means Short stoma

12 - Olof's Clinic: Cancellations time, Universal Access Card diabetes, Recipe Renewal and Travel Vaccination and appointment

13 - Pollen Forecast: During pollensäsongen you can get a daily pollen forecast-tion in Bräkne-Hoby via e-mail, text message or on this website.
14 - Rehab Department Linden

*District Education, District Physical therapy, and Lymph Psychologist:* Cancellations time

15 - Mardan Medical Center

*Family:* Cancellations time and Prescription Renewal

16 - Rodeby Medical Center

*District District Physical and Occupational Therapist:* Cancellations time

*District Nurse:* Cancellations time, Universal Access Card diabetes, incontinence aids Cards and Means Short stoma

*Medical:* Cancellations time, Universal Access Card diabetes and Prescription Renewal

*District nurse Clamp:* Cancellations time, Universal Access Card diabetes, incontinence aids Cards and Means Short stoma

*District nurse Holmsjö:* Cancellations time, Universal Access Card diabetes, incontinence aids Cards and Means Short stoma

*Medical Holmsjö:* Cancellations time and Prescription Renewal

17 - Samaritens Vårdcentral

*Districtsköterske-Mottagning Asarum, Mörrum and Svängsta:* Cancellations time, Universal Access Card diabetes and incontinence aids Cards

*Medical:* Cancellations time and Prescription Renewal

18 - Sölvesborg Medical Center

*Midwives:* Cancellations time and Tidbok

*District Labor Therapist:* Cancellations time and Self-Referral

*District Physical:* Cancellations time and Self-Referral Physiotherapy

*District Nurse:* Universal Access Card asthma, diabetes Utilities Short, Short incontinence aids and aids Short stoma

*Family:* Cancellations time, Recipe Renewal and Travel Vaccination

19 - Trossö Medical Center

*District Labor therapist Karlskrona and District Physical Karlskrona:* Cancellations time

*District Nurse:* Cancellations time and incontinence aids Cards

*Curator:* Cancellations time and Self-Referral

*Medical:* Cancellations time, Universal Access Card diabetes and Prescription Renewal
20 - Customs Yard Clinic

District Nurse: Cancellations time and incontinence aids Cards
Curator: Cancellations time and Self-Referral
Medical: Cancellations time, Universal Access Card diabetes and Prescription Renewal

21 - Ear-Nose-Throat Clinic

Medical Karlshamn and Karlskrona: Cancellations time, certificate, Recipes and Renewal Tidbok

4.7 eHealth Needs

In eHealth 2005 Conference held in Norway Petra Wilson claim that to get maximum benefit from eHealth the following eHealth needs must be taken in consideration: [40]

- **Proper Investment:** It is generally acknowledged that to get the maximum benefits from eHealth 5% of all health investment should be dedicated to eHealth infrastructure and change management.
- **Full Interoperability:** In order to achieve the benefits of eHealth across all health services and across the EU we must develop and adopt common standards which allow health professionals to work together in a more professional way.
- **Adaptation of Legal and Regulatory Responses:** In order to achieve the full integration of eHealth systems the existing legal framework must be adapted to fit the new tools. The regulatory and legal issues are matters of considerable public concern, and must be addressed in a straightforward and cooperative way.
- **Systematic User Involvement:** Systematic User Involvement applications must minimise effect on workflow and provide additional value. The early involvement of the system users, in all development processes will make possible the development of most ideal systems.
- **Integrated and Responsive Change Management:** This addresses not only the possibilities but also the fears in users associated with eHealth such as concerns about differences in workloads and changes in professional work habits.

4.8 HCI Study Area

Laurence Alpay et al. explained that one of the significant challenges for HCI in the development of computer-based healthcare systems is the design of effective user interfaces. The main functionality of these interfaces is to support communication for patients and health care professionals. In HCI, specialists insist on designing interfaces before taking any initiatives in programming because user behaviour during interaction with the system is very important. User must be taking in consideration in interface designing since software interface is essential tool for them to perform their activities. [41]
Brad Myers et al. said that HCI is the area of study that how people design, implement and make use of interactive computer systems. It also provides better ways to access the information and creating more powerful and feasible forms of communication. In addition it also entails input and output devices and the interaction techniques how information is presented and requested, how the computer’s different actions are controlled and monitored in different situations. It also covers all forms of help, documentation and training, the multiple tools used to design, build, test, and evaluate user interfaces as well as the processes that developers follow when creating interfaces. [29].

Another researcher Daniel Fallman explained that HCI is the principally concerned with understanding how people and computers can interactively perform tasks and how interactive systems are designed [42]. HCI may be supportive in understanding the people need in the development of eHealth web portal. HCI has appeared as the principal strand within computing-related research that seems to have at its heart the design of novel information, interaction and communication technology. [30]

We assume that, HCI research can make eHealth web portal more useful, usable and provide citizens satisfaction according to their specific background knowledge and objectives. According to Daniel Fallman, in the present scenario the challenge in an information-rich world is not only to make information available to people whenever and wherever they need and in any form but specifically to say the right thing at the right time in the right way. [30]

4.9 Website Interface Design Guidelines
The county of Blekinge citizens are accessing the eHealth services through eHealth web portal. According to National strategy for eHealth Sweden - 2006 [48], one of the strategic aim is to provide all citizens expected level of interaction whenever they access the eHealth services through eHealth web portal. There are 8 website’s interface design guidelines suggestions by “Web Style Guide” [48] that may support to make an effective interaction whenever citizens access eHealth services through eHealth web portal.

1 - User-Centered Design
The Graphic user interfaces were designed to give people an effective interaction. Now users expect a standard level of design sophistication from all graphic interfaces including web pages. The goal is to provide the needs of all your potential users by adapting web technology to their expectations. Testing the designs of website and then get a feedback from a variety of users is the best way to see whether your design ideas are up to the user requirements. [48]
2 - Clear Navigation Aids
Mostly web pages involve navigating hypertext links between documents. The consistent and clear icons, graphic identity schemes and text-based or graphic overview and summary screens can give the user confidence that they can find out what they are searching for without wasting time. The “home” page and other major navigation points with consistency should be visible. The graphic buttons create a graphic identity that educates the users they are within the site domain. [48]

3 - No Dead-End Pages
The Web pages often appear with “Home” page and with subsection pages deep in the hierarchy of the website. In this situation if your subsection pages do not contain links to the home page or to local menu pages, the user will be locked out from the rest of the Website pages. So make sure all pages in your site have a link back to the main "home" page or the website “home” page has a link to the other sub sections of the website. [48]

4 - Direct Access
The website visitors want to get information in the fewest possible steps. This means that efficiently design a hierarchy of the website so that it minimize the steps through menu pages. The users prefer such menus that present at least five to seven links to avoid complexities. The users prefer to have few very dense screens of choices to many layers of simplified menus. It is preferable that the real content is only a click or two away from the main menu pages of website in the design hierarchy. [48]

5 - Bandwidth and Interaction
The web users will not tolerate long delays. For most computing tasks the threshold of frustration is about ten seconds. Web page designs that are not well "tuned" to the network access speed of typical users will only frustrate them. When designing the Web page the web designer take into consideration their user accessibility to minimum internet speed such as the users have dial-up modem connections, access to Web server at Ethernet speed, DSL or cable modems. [48]

6 - Simplicity and Consistency
Avoid highly unusual interfaces to attract and keep a large audience. The metaphors that you are using have to be familiar, simple and logical for example if you want a metaphor for contact information, choose a type familiar to user such as “envelope or a phone”. Highly unusual, "creative" home page and navigation metaphors always fail in its functionality because they enforce an unfamiliar, unpredictable interface burden on the site user. [48]

For maximum legibility and functionality, the page and website design should be according to a consistent structure and pattern of modular units that all share the same layout graphic themes, grids,
editorial conventions, and hierarchies of organization. The aim is to be predictable and consistent
website contents. The users should feel comfortable visiting and exploring your site and confident that
they can find what they are searching. [48]

7 - Design Integrity and Stability
To convince your users that the contents are accurate and reliable, the website should be made on high
editorial and design standards. Many well known websites are inherently interactive with many links
to local pages within the sites as well as links to other useful related sites on the Web. After designing
the website we have to check regularly that all of your links work properly. Nowadays information
changes rapidly on the web both in your site and in everyone else's. After the site is established and
uploaded we have to check that our website links are still working properly and that the content they
inherit remains relevant. [48]

8 - Feedback and Dialog
The web design should have constant visual and functional confirmation of the user's options and
whereabouts, via navigation buttons, graphic design or uniformly placed hypertext links. Feedback
means to respond to your users' comments and inquiries. Well-designed Websites provide direct links
to the Webmaster or Website editor responsible for running the site. This step is towards the long-term
success of the enterprise. [48]

4.10 Interface Design Practices

According to Perlman 1988 “It is difficult to develop good user interfaces. We know this
because there is no shortage of bad user interfaces even in products where developers
tried to incorporate “user friendliness””. [31]

The weakly designed features that badly affect the interfaces are common targets of criticism but their
origins are largely not studied. Steven e. Poltrock et al. stated at present many organizations that
develop interface; they originally developed systems that did not have a significant human-computer
interface. Now the computational power allows more media to be combined in more ways and on the
other side of the interface with the passage of time the nature of user is changing very frequent. So,
finding an appropriate solution is a challenge. Principles and methods for developing good interactive
systems are known and are rapidly being advanced so it is a matter of execution. [31]

The Guidelines vary in content: some specify general principles, others explicitly enumerate interface
details, some address performance characteristics of the interface in use while others focus on the
presentation and behaviour of the interface. [48]
The purpose of user interface guidelines is to enable the development of usable, consistent, reliable applications that conform to designated standard. The county of Blekinge citizens are interacting with the interface whenever they access eHealth services. The suggested user interface design principles may support to make eHealth applications more usable, consistent and reliable according to citizens need and requirements.

4.11 Principles of User Interface Design

There are number of different classes of the interactive discussion and each of these has advantages/disadvantages on the situation in which they are used. According to Dr, Rory O’Connor the major principles can be summarized into five categories: [13]

1 – Naturalness
In this approach user perform the specific task without disturbance of other tasks because ordering of the options is important. It is more important user understand the natural language.

2 – Consistency
Consistent layout for different screens, colours, fonts, symbols, lines and many options that ensure the user where to look for instructions and norms.

3 - No Redundancy
In which, it is best approach provide the different options or different techniques where users uses the actual data or minimizes the unnecessary data automatically. E.g. if user enters the digits (00010) and software convert into 10.

4 – Supportiveness
In supportiveness, user interface of software provide the more assistance to user during the performing the tasks. e.g.: Error message some time helpful but some time so hard like line number 30.

5 – Flexibility
In this approach, user interface provide different options to provide the more flexibility to the use to enhance the performance and interactions with the interface.

4.12 User Interface Design Guidelines
The following user interface design guidelines may support to provide an efficient, effective, structured and usable design of eHealth applications.
**Use of Colour:** Colours are the main part of the user interface which set the blind interface into the radiance interface [49]. Use colour according to the user specifications and try to avoid those colours that create difficulties in differentiating texts.

**Menu Design:** Menu designs approaches vary applicable to application, in some application user feels convenient in hierarchal menus and in other vertical menu. In menu design consistency and ease of use must take in consideration. Provide small number of items in menu list to avoid confusion. [49]

**Information Presentation:** Information on the interface can be present in different forms like symbols or text. E.g. upper cases/lower cases, images and symbols. Such as “envelope sign” represents email and “phone sign” represents contact. It will be supportive for user to interact with information items that resembles with real life environment. [49]

**Design of Windows:** To best design it is good approach divide the information into the different sections and into the different windows. Windows size should remain same according to specific structure of information presentation. Use standard size of windows for information presentation. [49]
Chapter 5: Interview

According to Seaman, C. B. (1999), Interview is one of the techniques used for collecting qualitative data. It is an indirect method because it does not evaluate the eHealth services directly through county of Blekinge health web portal. In our study, we invited the selective interviewees to express their domain knowledge, experiences and opinions about the eHealth services through county of Blekinge health web portal. Interviews require more time of both interviewer and interviewee but being more flexible, it gives opportunity to interviewers to explain the difficult questions in depth for better understanding of the interviewee (Nielsen J., “Usability Engineering” 1993).

5.1 Purpose

In this study we made three extensive interviews with the purpose to identify, what eHealth services are currently accessed and utilized by the citizens and how the future eHealth services are projected and imagined in the county of Blekinge.

5.2 Selection of Interviewees

According to research question no two & three, we chose three people to had interviews with them naming Thomas Pehrsson, Kathrine Alriksson and Miss Maria.

Thomas Pehrsson is an eHealth Strategy Maker of county of Blekinge. He makes the health strategies to implement in hospitals, at primary and health care centres. His office is in Wämö Center – Karlskrona. Kathrine Alriksson is a Health Service Planner and Project Manager of county of Blekinge. She belongs to operational planning and evaluation department at hospital in Karlskrona. Maria is a Health Service Operator belongs to Ear, Nose and Throat Clinic department in at hospital in Karlskrona. She is working in this hospital since September 2006. She deals with patients who use and access three types of eHealth services: 1- Renew a Prescription, 2- Best all Certificates, 3- Cancel Visit through county of Blekinge health web portal. She also deals those patients who use telephone for booking or cancellation or to postpone the appointments

5.3 Interview Execution Planning

The three interviews were conducted and recorded at three different times at Wämö Center - Karlskrona. Time duration of first interview was 45 minute, second interview was 60 minute and third interview was 50 minute. As an introduction, the background of research and objective of interview were explained to the interviewee at the beginning of interview.
5.4 Designing and Conducting the Interview
In interviews we put the formal and informal questions to identify frequently used eHealth services, their projection, imagination utilization and possible short comings regarding the eHealth services for the citizens of the county of Blekinge. In formal approach, authors had designed some set of pre-planned questions to ask about the eHealth services. In the informal approach, questioned were not pre-planned, instead of it the questions were framed during the discussion based on the reply of the strategy maker, health service planner and health service operator. In interviews we recorded, observed and noted the important eHealth services, their factors and possible shortcomings regarding the eHealth services.

5.5 Data Collection
In data collection procedure observations were drawn from the interviews with the strategy maker, health service planner and health services operator. The interviews were done by the authors for gathering the information about most frequently used eHealth services, their projection, imagination, utilization and possible short comings regarding the eHealth services for county of Blekinge citizens.

The data during the interviews and the observations were video recorded and documented. Video recording was done very carefully during the discussion between the authors and interviewees with their permission to review later. Documentation also helped us to further analyze the data.

While collecting the data regarding eHealth services, Thomas Pehrsson helped in getting the data about the eHealth strategies in county of Blekinge for the citizens. He also explained their plans about eHealth services at national level for citizens. [6] Kathrine Alriksson helped in getting the data about the operational planning of eHealth services and their evaluation. [7] Maria helped in getting the data about current eHealth services through county of Blekinge health web portal and their strengths and weaknesses. [4]

5.6 Interview Analysis
During the interviews, data collected through video recordings of interviewees (strategy maker, health service planner and operator) were converted into text format. According to Creswell [23], we separated all document’s information into sections for comparisons and analysis purpose. These sections are County Council, Private Sectors, eHealth Strategy, eHealth Services, Electronic Patient Record, eHealth Services Form, Citizen Access, New System and Statistics. Analysis from the interviews and observations led us to find the missing information’s during the observations and documentation. The analysis was ended with the indication of findings on the basis of it we made a
sense of the commonalities and differences found across the interviews. The answers of these three interviews are provided in appendix 1.

5.6.1 County Council
According to strategy maker in interview’s questions 1 and 4, county council is responsible for Hospitals, GP’s, Primary Cares and Dental Services. Blekinge county council services are advising disables, dental care and educational training. It involved in promotion of regional development in culture, promotion in health and environment as well as it also contributes to Blekinge development by supporting trade and industry. Most of the counties council run on taxes but they have also support from state and towns.

When the citizens go to (General Practitioners) GP’s and hospitals for treatments they have to pay some charges for the health care services.

5.6.2 Private Sectors
Strategy maker said in interview’s questions 2 and 3, there are many private health care organizations in county of Blekinge. At present there are about 15 to 20% private health care organizations and they are increasing very rapidly. They are following the government rules but at the moment they are not following the eHealth standards. So it indicates that, to follow the eHealth standards at public and private levels there is a need to implement eHealth standards at national levels.

5.6.3 eHealth Strategy
According to interview’s question 6, strategy maker said county of Blekinge eHealth strategy is dependent on European Union (EU) eHealth strategy. But at present county councils are not following the EU eHealth strategy because from the beginning all counties had IT systems in their own way. He said in interview’s question 11, two years ago in 2006 - Swedish government had launched National Strategy for eHealth. The six core action areas of National Strategy for eHealth - Sweden are defined below:

- Bringing laws and regulations into line with extended use of ICT
- Creating a common information structure
- Creating a common technical infrastructure
  - Ex: Electronic Identification Card, National e-directory (HSA)
- Rules for interoperability
- Facilitating interoperable, supportive ICT systems
- Facilitating access to information across organizational boundaries
  - Ex: National Patient Summary
Making information and services easily accessible to citizens

Ex: Patient and care provider portals

Strategy Maker identified in interview’s question 14 that after the implementation of the National Strategy for eHealth “Rules of Interoperability” will be common standard in all counties of Sweden. This indicates that National Strategy supports the commitment among the parties involved and directs the formulation of local operational strategies. He said, next year in 2009 National Patient summary will be available in county of Blekinge but in 2011 National Patient summary will be available in all Sweden.

5.6.4 eHealth Services

At present on county of Blekinge health web portal www.ltblekinge.se, 9 eHealth services are available for citizens from different hospitals, primary cares and health care centers. The availability of eHealth services from different hospitals, primary cares and health care centers is according to the patient needs and requirements. According to health service operator in interview’s question 1, they are providing 3 services at the hospital in Karlskrona. These three services are “Book/Cancel visits”, “Re-new a Prescription”, “Order Certificate”. Health service planner explained during discussion about these 3 eHealth services, that they conducted a questionnaire from the citizens to get aware the access of health care services over the internet. In their questionnaire they asked the questions: [7]

What would you like to communicate with medical care about over the Internet?

- Test Results
- Medical Sheet
- Renew Prescriptions
- Booking
- Information
- Follow-up
- Payment
- Doctors Certificates
- Patient Information
- Health Questions
- Relative
- Health Care Units

In interview’s question 8, strategy maker identified current health care services available for citizens at Blekinge hospitals.
Emergency medical care  
Intensive care  
Surgery  
Child and young people’s medical care  
Habilitation  
Clinical physiology, chemistry and microbiology  
Rehabilitation  
Eye and ear health care  
Women’s health services  
Medical clinic  
Orthopedics (treatment of musculoskeletal injury)

5.6.4.1 e-Prescription

In interview’s question 16, health service planner explained that the most common eHealth service in all health care centers is “e-Prescription”. County of Blekinge is the first one in Sweden which is using “e-Prescription” from last ten years. So far as the popularity of the services is concern “e-Prescription” comes first place with the 83% and “Booking Cancelation” comes at second place. She told further that they are making plans to add email feedback service to their patients as soon as the “e-Prescription” is suggested by the doctor.

During the discussion, the health care operator identified that the “e-Prescription” would be beneficial to the peoples who are not accessing our direct treatment. She identified that in the beginning there were many patients from other primary care centres who wanted to get “e-Prescription” but it was not possible for our system to issue such prescription without first visit. The procedure for the renewal of the “e-Prescription” is the patient must have to get “e-Prescription” in his first personal visit to the clinic then the patient can access the service of re-newel of “e-Prescription” without a meeting with the doctor.

According to health care service operator they are facing extra load of work in both cases of e-Prescription/re-new e-Prescription requests. When health care service operator received a Prescription/re-new e-Prescription request they have to first open the software and write into patient summary then forward it to the doctor.
5.6.4.2 Book/Cancel Visits

According to health care service operator in interview’s question 18, 19, 21, 31, citizens can “Book/Cancel Visits” by using county of Blekinge health web portal and telephone. The citizens have few hours to book the appointment every Monday and Tuesday of the week. Through the web portal, patient can book the appointment only before 24.00 hours for the next day but the same day booking is not available for the patients. The patient has an alternative to book the appointment through telephone. Patient has more hours (9.00 - 16.00) in five days a week (Monday – Friday) to book the appointment by telephone. So it indicates that citizens belong to their clinic and other clinic mostly makes a phone call to book the appointment and it will increase their work load.

She also explained that, there would be many patients who could use that system because the clinic has an attractive timing i.e. from 8.00 – 12.00 and 14.00 – 16.00 hours as compare to private clinics because these private clinics do not offer their services for such a long timing but their patients can use Blekinge health web portal. Those patients who have referrals from other clinics/primary cares he/she can’t book the appointment directly into the system.

5.6.4.3 Order Certificate

According to health care service operator in discussion, patient can order the certificate through web portal or by visiting the hospital. We received his/her request and send them “Order Certificate” by post. But some of the patients face problems in reading the certificate because the language of certificate is Swedish. So this indicates that citizens need other languages too.

5.6.5 Electronic Patient Records (EPR)

In interview’s question 7, strategy maker explained EPR is the basic step towards the eHealth to incorporate the new methods of data storing and manipulating. Nowadays EPR is also implementing on regional levels. He explained that, Blekinge hospitals are using 88% EPR and primary cares are using 100% because EPR enhance the efficiency, privacy in accessing the patient records.

Following scope and aims are defined EPR:

- Improve access to care documentation
- One Patient, One Medical Record
- Efficient recording of patient events - Less time consuming
- Improve service for patients
- Increase patient security
- Improve co-operation in the care process
- Better tool for development of quality and content in our operation
He said that, at the moment Sweden is not following common standards of EHR to generate a complete record of a clinical patient.

5.6.6 eHealth Services Form

In interview’s question 4, 10, 12, 8, health care service planner explained that “eHealth Services Form” has a common and simple interface. It fulfils the user expected needs to some extent and at the moment our developers are working to make it more users friendly. She said that they don’t have any “Citizens Comments Section” to receive the citizen’s response whether they are satisfied with the interface of “eHealth Services Form” or not. At the moment citizens can send email or drop their messages in suggestion box when they visit to the hospital.

She assumed that “eHealth Services Form” is according to the citizen need and requirements. According to health care service operator in interview’s question 23, citizen wants “eHealth Services Form” must be available in different languages. e.g.: English, Arabic, Persian and so on. Moreover to avoid misuse citizen needs verification policy for their personal number when they enter personal information in the “eHealth Services Form”. She also said there is no possibility to reply against citizens emails when patients try to know about their illness through email. In interview’s question 9 health service planner said that, there is no auto responder facility available when the patient submit the “eHealth Services Form”.

5.6.7 Citizen Access

In interview’s question 20, 9, 10 health service operator identified, we are dealing with all patients who belong from county of Blekinge. Most of the citizens are young who are using eHealth services because they have accessibility of internet. She thinks that patients who are using eHealth services can only reply against the satisfaction of eHealth services. According to health care service planner in interview’s question 7, citizens don’t have direct communication with the doctor because in Sweden normally patient has a direct communication with the clinic not with the doctor.

According to strategy maker in interview’s question 10, at the moment patient cannot access his or her health record at national level. But in future patient can access his or her health record at national level. He said we have planned to provide login facility to the citizens with special “id's” that id will also identify their treatment clinic. At the moment, this facility is already in use since 1st July 2008, but unfortunately it is not for patients. It will be applicable for patients in 2009.
5.6.8 New System
In interview’s question 13, strategy maker identified they are developing one web portal at national level for all citizens of Sweden. Citizens will access eHealth services whenever and wherever they want. The name of web portal will be www.117.se.

In interview’s question 13, health service planner said at the moment their system is not connected with the national database but they are planning to connect it in future. She assumed that at current stage their system is strong enough to fulfil the security needs. According to health service operator in interview’s questions 14, 15, 6 and 26 she explained there is a need of connectivity among all health care organizations. It will facilitate the patient who belongs from other health care centers to book the appointment time directly into their system. In interview’s question 14, health service planner said, we are also planning to introduce more eHealth services at national level. Health service operator identified in interview’s question 22, the possibility to add more eHealth services mainly depend upon younger peoples as they are the most frequent user of eHealth services because of internet facility at home.

In discussion strategy maker and health service planner explained that 11 counties council are using common standards of eHealth services at national level but county of Blekinge follows own standards because it is pioneer. From last 2-3 years, county of Blekinge is not developing new eHealth services because in the future sooner or later they will connect with eHealth services at national level.

5.6.9 Statistics
In interview’s question 15, health care planner identified in 2007, they received 3,000 e-messages and this year 2008 they have received 2,400 e-messages until august, so it will be probably 4,000 at the end of this year. In discussion with strategy maker, he said in county of Blekinge 88% - 90% documentations are in digital format as compared to other counties.
Chapter 6: Questionnaire

Questionnaire is an inexpensive way together data. A well-designed questionnaire can be used effectively together information on specific components of the system.

6.1 Conduction of Questionnaire

This chapter explain the questionnaire that we had conducted with county of Blekinge citizens for our thesis. The planning of questionnaire is given in section 6.2. The section 6.3 describes the questionnaire design and section 6.4 identifies the questionnaire distribution to the county of Blekinge citizens. The selection of questionnaire is given in section 6.5 and questionnaire analysis in section 6.6.

6.2 Questionnaire Planning

After the conduction of interview we planned a questionnaire with the county of Blekinge citizens. The questionnaire purpose was to collect the quantitative data and qualitative data to measure the eHealth services but our questionnaire was heavily relying on close ended questions. For a successful conduction of interview we visited areas around, Blekinge Tekniska Högskola Karlskrona Campus, Ronneby Campus and Wämö Center in Karlskrona. In questionnaire we discussed frequently used eHealth services and their strengths and weakness with the Blekinge citizens. Once the questionnaires were completed then statistical analysis was done to analyze the final results of questionnaires.

6.3 Questionnaire Design

After getting the findings from the interviews analysis and formal discussions with our supervisor we designed a questionnaire. In design of questionnaire, the questions were short, simple and easily understandable to the citizens. The questionnaire form has three parts i.e. first part was based on the close ended questions about eHealth services. The second part was based on the open ended questions to get aware the citizens personal views and ideas about current and future eHealth services. The third and last part was based on the scaling questions to know about the citizen understanding with the interface of “eHealth Services Form”. The purpose of the scaling questions was to identify the efficiency, effectiveness and user satisfaction with the interface of “eHealth Services Form”.
<table>
<thead>
<tr>
<th>Sr.</th>
<th>Questions</th>
</tr>
</thead>
</table>
| 1   | Are you satisfied with “Health Care Services” from county of Blekinge website?  
|     | • Yes  
|     | • No  
|     | • Not very much  
| 2   | Have you experienced “eHealth services” from county of Blekinge website?  
|     | • Yes  
|     | • No  
| 3   | What is your idea if “eHealth Services” are also available in other languages? e.g.: English, Arabic, etc.  
|     | • Yes  
|     | • No  
| 4   | In current situation you can “Book Appointment” in just two times per day, Are you satisfied with this or you want more “Appointment Booking” time per day?  
|     | • Yes  
|     | • No  
| 5   | Do you prefer to have “Appointment Booking” facility even you belong to other clinic or primary care in county of Blekinge?  
|     | • Yes  
|     | • No  
| 6   | What is feasible for you if “Appointment Booking” is available from?  
|     | • County of Blekinge health web port  
|     | • Telephone  
|     | • Both  
| 7   | What is your opinion about the “Appointment Booking” facility?  
| 8   | Are you satisfied with the contact between you and doctor through “eHealth Services”?  
|     | • Yes  
|     | • No  
|     | • No Experience  
| 9   | Do you want “Suggestion Box” to give your suggestions and ideas about “eHealth Services”?  
|     | • Yes  
|     | • No  
| 10  | Do you prefer to have a “Patient ID/Special Number” that identifies your treatment clinic or primary care?  

11 Is it good for you if county of Blekinge health web portal verify your “Personnel Number” to access the eHealth services?
   - Yes
   - No

12 Is it good for you, if you check your “Health Related Data” through login facility?
   - Yes
   - No

13 Do you prefer to have “Re-new Recipe” facility even you belong to the other clinic or primary care?
   - Yes
   - No

14 Do you want more “eHealth services”?
   - Yes
   - No

15 What is your idea about current “eHealth services”?

16 What is your idea about future “eHealth services”?

17 What is the most interesting “eHealth service(s)” you found on county of Blekinge website?

18 Which one is most difficult/not understandable part of “eHealth services”?

19 What is your idea about the interface of “eHealth Services Form”?

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Statements for Questions</th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It is easy and simple to use</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>It is user friendly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>It’s help educate me, how to use it</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I can use it successfully at every time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>It requires few information from patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>It saves my time when I use it</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. It meets my needs and requirements
8. It gives me more control to access eHealth services
9. It is reliable source
10. Sequence of forms remain the same
11. Reading text on the screen very effective
12. Structure of the information remain the same on every page

Table 6.2 - Relationship of Questions with the Selected Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Questionnaire Questions (1 - 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Website health care Service</td>
<td>1 , 2</td>
</tr>
<tr>
<td>2  Languages</td>
<td>3</td>
</tr>
<tr>
<td>3  e-Booking</td>
<td>4 , 5 , 6 , 7</td>
</tr>
<tr>
<td>4  Contact with Doctor</td>
<td>8</td>
</tr>
<tr>
<td>5  Suggestion Box</td>
<td>9</td>
</tr>
<tr>
<td>6  Patient ID/Special Number</td>
<td>10</td>
</tr>
<tr>
<td>7  Personal Number</td>
<td>11</td>
</tr>
<tr>
<td>8  Login Facility</td>
<td>12</td>
</tr>
<tr>
<td>9  Renew Recipe</td>
<td>13</td>
</tr>
<tr>
<td>10 Future eHealth services</td>
<td>14 , 16</td>
</tr>
<tr>
<td>11 Current eHealth services</td>
<td>15</td>
</tr>
<tr>
<td>12 Drawback of eHealth services</td>
<td>1 , 2</td>
</tr>
</tbody>
</table>
Table 6.3 - Relationship of Sub Questions of Question 19 with Selected Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Questionnaire Questions (1 - 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 User Friendly</td>
<td>1, 2</td>
</tr>
<tr>
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<td>3, 4, 5, 6</td>
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<td>10, 12</td>
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<td>7 Effectiveness</td>
<td>11</td>
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6.4 Questionnaire Distribution
After designing the questionnaire it was distributed to the 10 (Ten) county of Blekinge citizens. Experienced people who are well aware about eHealth services were selected for questionnaire conduction. Print outs of the questionnaire were distributed to all subjects at different times. As an introduction, the purpose of the questionnaire was explained to the subjects at the beginning of questionnaire conduction. It is worth mentioning here that all questionnaires duly filled by the subjects were collected in time for the analysis.

6.5 Selection of Questionnaire
The Questionnaire is economical to manage in terms of design time and interpretation as compared to other data collection techniques. The questionnaires are inexpensive to administer and good selection when money and resources are limited. Many people can respond in a few days if the questionnaire is self administrated such as online questionnaire. In self administer questionnaire confidentiality can be easily maintain.

6.6 Questionnaires Analysis
To get the concrete results, authors perform the quantitative analysis of questionnaires. Citizen’s response against open ended, close ended and scaling questions is calculated and given in percentage in Appendix 2. Key facts are described below.

6.6.1 Close Ended Questions
In questionnaire’s question 1, 90 % citizens are satisfied with health services available at county of Blekinge health web portal on the other hand the citizens who are satisfied to some extent is just 10%.
In questionnaire’s question 2, the percentage of participants is 100% who experienced “eHealth services” from county of Blekinge web portal. High experience level of participants is necessary for a successful conduction of all questions in questionnaire.

In questionnaire’s question 3, 100% citizens are agreed if “eHealth Services” are also available in other languages on the web portal such as English, Arabic, Persian and so on. Citizens strongly believe this facility is a need of globalization.

In questionnaire’s question 4, 30% citizens are satisfied in current situation where they can “Book Appointment” in just two times per day and with opposite opinion 70% citizens want more time per day to “Book Appointment”. It indicates that citizens at present need to have more time per day to “Book Appointment”.

In questionnaire’s question 5, the percentage of citizens is 100% who prefer to have “Appointment Booking” facility even they belong to other clinic or primary care in county of Blekinge. This indicates that citizens who belong to the other clinic/primary care are facing difficulties in “Appointment Booking”.

In questionnaire’s question 6, according to 100% citizens it is very ideal condition to have “Appointment Booking” facility available from county of Blekinge health web port as well as by telephone. It means that citizens want health services by both accessible sources.

In questionnaire’s question 8, 40% citizens are satisfied in contact with the doctor through eHealth services, where as 30% citizens are not satisfied and with the same percentage citizens have no experience about it.

In questionnaire’s question 9, 90% citizens think it is a good idea to include “Suggestion Box” for them but on the other side 10% citizens believe there is no need to have any “Suggestion Box”. This percentage gives us an idea, citizens have some queries and inquire about the eHealth services and they want to post their queries to the information department.

In questionnaire’s question 10, 90% citizens believe that it is good idea to have a “Patient ID/Special Number” to identify patient treatment clinic or primary care and 10% citizens have different opinion they believe at present there is no need to have a “Patient ID/Special Number”. This explains majority of citizens want “Patient ID/Special Number” for their health care centre identification.
In questionnaire’s question 11, the percentage of citizen is 100% who prefer if county of Blekinge health web portal can verify “Personnel Number” to access the eHealth services. This indicates that, citizens want to have a secure connection over County of Blekinge health web portal.

In questionnaire’s question 12 and 13, all citizens strongly agreed if they can check their “Health Related Data” through login facility as well as they can “Renew Recipe” even they belong to the other clinic or primary care. This discovers citizen need privacy in their health related data as well as accessibility to health care services whenever they need.

In questionnaire’s question 14, after experiencing eHealth services 80% citizens want more “eHealth services” where as just 20% citizens have a different opinion they have no need to add more eHealth services for them. It identifies that, the majority of citizens are well aware of eHealth services benefits.

![Figure 6.1 - Citizens Response against Close Ended Questions](image1.png)

![Figure 6.2 - Citizens Response against Close Ended Question No.6](image2.png)
6.6.2 Open Ended Questions

According to questionnaire’s question 7, citizens generally have a good idea about the “Appointment Booking” facility. Some of them are thinking it could be extended by adding more appointment booking times. They believe appointment booking facility satisfies user needs, save time and travelling cost. They raise important point about elder people who face problems with “Appointment Booking” facility because they are not familiar with computers. They believe there should be something to facilitate elder people.

In questionnaire’s question 15, citizens believe that current “eHealth services” are good to some extent and it can be extended in better manner. Some of them have a different opinion they believe eHealth services are very pre-mature and need to be more user friendly. Generally citizens believe people are not well aware of the eHealth services so they never try to use eHealth services.

In questionnaire’s question 16, different age group of citizens have different views regarding the future eHealth services. Usually citizens need on spot accessibility of eHealth services and information security. They are interested to see their data and medical history as well as there would be eHealth services that will beneficial for elders. They believe future eHealth services should be secure and user friendly. They believe that health care centres should be available for everyone and share patient data. They want connectivity among primary cares, hospitals and clinics. Some of them want eHealth service such as “Net Doctor” for online health care advice.

In questionnaire’s question 17, the “Booking appointment” is most interesting eHealth services that mostly citizen found on county of Blekinge web portal and the second one is e-Prescription.
In questionnaire’s question 18, the most difficult thing, citizens found in eHealth services is few hours to book appointment. Moreover some citizens believe it is difficult to find doctors, nurses, and other professionals. They need a secure personal information.

6.6.3 Scaling Questions

In questionnaire’s sub question 1, 60% citizens strongly agreed, that the interface of “eHealth Services Form” is easy and simple to use but only 10% citizens have different opinion they are not strongly disagree and 30% citizens believes to some extent it is easy and simple to use. This indicates that “eHealth Services Form” is easy and simple to fulfill the citizen needs but there is a need of enhancements.

In questionnaire’s sub question 2, 60% citizens strongly agreed, that the interface of “eHealth Services Form” is user friendly, 20% citizens found it is not very user friendly, whereas the percentage of citizens is very low who strongly disagree and who not strongly disagree. This shows that at the moment interface of “eHealth Services Form” is friendly enough to fulfil citizen needs.

In questionnaire’s sub question 3, 20% citizens are strongly agreed, the interface of “eHealth Services Form” help to educate them how to use it and 60% citizens are agreed to some extent where as 20% citizens have not strongly disagree.

In questionnaire’s sub question 4, 40% citizens are strongly agreed, they can use “eHealth Services Form” successfully at every time, on the other side 30% citizens are not strongly disagreeing. Only 20% citizens are agreed to some extent whereas with an opposite opinion 10% citizens completely disagree.

In questionnaire’s sub question 5, half of the citizens are strongly agreed, the “eHealth Services Form” requires little information from patient. 40% citizens are agreed to some extent and just 10% citizens are not strongly disagreeing. It indicates that citizens prefer to give minimum information on the form.

In questionnaire’s sub question 6, 80% citizens are strongly agreed, the “eHealth Services Form” saves their time when they use it. Whereas the percentage of the citizens is 10% who agreed to some extent and who are not strongly disagree. It shows that “eHealth Services Form” is working efficiently.

In question 7, only 10% citizens are strongly agreed, the “eHealth Services Form” meets their needs and requirements. 60% citizens are agreed, it meets their needs and requirement to some extent. On the other hand, 10% citizens are strongly disagreeing and 20% citizens are not strongly disagreeing. It
shows to some extent “eHealth Services Form” is successful to fulfill the citizen’s need and requirements.

In questionnaire’s sub question 8, 60% citizens are agreed to some extent, the “eHealth Services Form” gives them more control to access eHealth services, whereas 20% citizens are strongly agreed and with same percentage citizens are not strongly disagree.

In questionnaire’s sub question 9, 40% citizens are agreed to some extent, the “eHealth Services Form” is a reliable source to use but 10% citizens are strongly disagreed about its reliability and 50% citizens are not strongly disagree. These percentages identify that, citizens want to have more reliable source for their personal information.

In questionnaire’s sub question 10, 20% citizens are strongly agreed, the sequence of “eHealth Services Form” remains same and 50% citizens are agreed to some extent. Remaining 30% citizens have different opinion because they believe that “eHealth Services Form” not remain the same. This indicates that citizens are satisfied with the structure of the “eHealth Services Form”.

In questionnaire’s sub question 11, 30% citizens are strongly agreed, the “eHealth Services Form” is effective in reading text on the screen whereas 70% citizens agreed to some extent. This percentage identify that citizens believe “eHealth Services Form” is effective in reading text on the screen.

In questionnaire’s sub question 12, 40% citizens are agreed to some extent the structure of information on “eHealth Services Form” remains the same on every page. On the other hand 30% are strongly agreed and with the same percentage citizens are not strongly disagree. This identify that the structure of “eHealth Services Form” is strong enough to fulfil citizen needs.

**Figure 6.4 - Citizens Response to Scaling Questions**
Chapter 7: Discussion and Validation Assessment

This chapter illustrates the discussion and validation assessment of the thesis. In Section 7.1, the authors discuss different issues, factors and possible short comings regarding the eHealth services for county of Blekinge citizens. Section 7.2 explains validity assessment of the results. Section 7.3 summarizes the available, currently accessible eHealth services for staff and Blekinge citizens.

7.1 Discussion

The eHealth services available at county of Blekinge web portal are studied and analysed to know about their role in context with citizens. To study and analyze the eHealth services in a better way, the authors adopt a well structured approach. In this section, the authors study the eHealth services for citizens available at county of Blekinge web portal in terms of National Strategy for eHealth – Sweden.

7.1.1 Blekinge County Council and Private Sectors

According to the authors’ point of view it will be good idea if Blekinge County Council also engages the private parties for the promotion of health care and educational activities. At the moment there are 15 to 20% private health care organizations and they are increasing very rapidly and it is suppose that in future private parties will cover a big part of health care systems [3].

Due to the rapid growth of private parties there is a need to implement new rules by the government to follow the eHealth standards at national level. There will be substantial benefits in the future for example:

- It will avoid extra re-organization cost in the implementation of eHealth standards at national levels.
- It will allow interpretability between public and private health care organizations.
- Citizens will access eHealth services at standard level even in private health care organization.
- The e-Prescription/re-new e-Prescription eService will also be available in private health care organization.
- Citizens will access health related data even from private health care organizations.
- It will provide revenue to the government from private health care organizations against the health care service.
- People who belong to rural areas will access eHealth services at standard level from private health care organizations.
7.1.2 eHealth Strategy

According to the Blekinge health care Strategy Maker, at present counties council are not following the EU eHealth strategy because from the beginning all counties had IT systems in their own way [3]. In authors point of view all counties council must follow the EU eHealth strategy because eHealth strategy of Sweden is dependent on EU eHealth strategy. In future we observe there will be considerable benefits if all counties council follow the EU eHealth strategy:

- It will allow the interoperability among EU countries.
- People will share health related data even when they are out of the country.
- People will have many alternatives for their medical treatments.
- People will access eHealth services whenever and wherever they need.
- EHR accessibility among EU countries.
- Verification of Electronic Identification Card (EIC) in EU countries.

7.1.3 eHealth Services

According to the authors’ point of view and observations, at present there is a need to know what are the citizens’ need and requirements regarding the eHealth services.

- How many citizens are aware of eHealth services in county of Blekinge?
- The Blekinge citizens are satisfied or not with the available eHealth services.
- What are the difficulties citizens are facing while using eHealth services?
- Accessibility issues of eHealth services regarding all age groups and special group of patients.

According to authors point of view the elderly people and children would be one of the main beneficiaries of eHealth services.

7.1.3.1 e-Prescription

According to the health service operator to re-new e-Prescription patient should have e-Prescription earlier from one of the Blekinge hospital units (Karlshamn and Karlskrona), then patient can re-new e-Prescription without a personal meeting with a doctor [4]. She said, there are many patients from other primary care centers who want to get e-Prescription but it is not possible in Blekinge hospital units (Karlshamn and Karlskrona). [4] So according to the authors’ observations, if all health care organizations systems can interoperate with each other then e-Prescription would be more beneficial to Blekinge citizens who are under medical treatments in any health care organization.

According to the health service operator, they are facing extra load of work when the patient made e-Prescription/re-new e-Prescription request. [4] According to the authors’ point of view, if e-prescription service is connected directly to patient summary then it will reduce the work load of
health care service operator. Because whenever patient made e-Prescription/re-new e-Prescription request then it will directly go into patient summary.

At the moment, doctor has five days to response against patient request of e-prescription/re-new e-prescription but according to the authors’ point of view the doctor can reply to the patient through email once the e-prescription/re-new e-prescription has made by the doctor.

7.1.3.2 Book/Cancel Visits

According to health service operator, citizens have few hours to book the appointment per day Monday and Tuesday. [4] According to authors’ observation from questionnaire analysis, most of the citizens are facing difficulties with few hours for appointment booking because it is difficult to take out time for treatment when they have few hours for appointment booking. If booking hours will increase then it will convenient for the citizens and they can book the time whenever they are free from work.

Health service operator said, at present patient can book the appointment only before 24.00 hours for the next day. Patient can’t book the appointment for the same day. [4] According to the authors’ point of view, there is a need to provide same day booking facility because there are many patients who have serious illness and they want appointment booking for the same day. Emergency facilities for citizens are available but it will be a good idea to facilitate the patients whenever they need medical treatment.

According to the health service operator, if patient who has referrals from other clinics/primary cares he/she can book the appointment directly into the system of hospital then there would be many patients who can use eHealth web portal for appointment booking. [4] Karlskrona hospital has a very good timing from 8.00 – 12.00 and 14.00 – 16.00 hours as compared to other clinics that they don’t have such long timings.

Health service operator explained citizens who belong to hospital and other clinic mostly make phone calls to book the appointment and it increases their work load. [4] According to the authors’ opinion, if they will increase appointment booking time per day on Blekinge health web portal same as appointment booking through phone calls then it will reduce work load of health service operator. After this most of the citizens will make appointment booking through Blekinge County Council web portal because it is cost effective for them.

It is also observed that citizens prefer to have “Appointment Booking” facility available from Blekinge County Council health web portal as well as by telephone. According to authors point of view the
“Appointment Booking” eService with the same booking hours must be available for citizens from Blekinge County Council health web portal as well as by telephone.

According to the authors point of view, there is a need to update appointment booking calendar at run time on Blekinge health web portal to increase the accessibility of appointment booking and it also make the positive effect on people who use web portal for appointment booking.

According to questionnaire analysis, patients who belong to other clinic or primary care in county of Blekinge, they are facing problem in “Appointment Booking” facility in Karlskrona hospital. Authors observed that the “Appointment Booking” facility must be available for the patients even they belong to other clinic or primary care in the county of Blekinge.

7.1.3.3 Order Certificate
According to health service operator, many patients whose native language is not Swedish, they are facing problem in reading the certificate which they received against “Order Certificate” service because the language of certificate is in Swedish. [4] So according to authors observation it will be a good idea if eHealth services that are directly connected with the patients will also be available in other languages not only in Swedish.

7.1.4 More eHealth Services
After the questionnaire analysis it is observed that citizens who are well aware of eHealth services benefits want to have more eHealth services. It is suggested that there is a need to add more eHealth services to provide accessibility, accountability, authority, transparency, concurrency, privacy, reliability in health care system.

After the questionnaire analysis authors observed that citizens are facing difficulties in finding doctors, nurses, and other medical professionals so it is suggested by authors it is a good idea to add list of available doctors, nurses, and other medical professionals with their duty hours on the Blekinge web portal.

7.1.5 eHealth Services Awareness
It is observed that normally citizens are not well aware of the eHealth services. According to the authors opinion it is suggested that there is a need to aware citizens through advertisement about eHealth services benefits.
7.1.6 Electronic Patient Records (EPR) & Electronic Health Records (EHR)

As strategy maker identified in county of Blekinge a calculated average of 88% - 90% documentations are in digital format as compared to other counties [3]. According to the authors point of view there is a need to implement same EPR standards in all county of Blekinge health care organizations. Same EPR standards leads to all systems can share medical data of patients with each other. According to the interview analysis, at the moment Sweden is not following common standards of EHR to generate a complete record of a clinical patient. It will be a good idea if Sweden will follow the common standard of EHR to allow the automation and efficiency in clinical workflow.

7.1.7 eHealth Services Form

In interview analysis health service planner explained, “eHealth Services Form” has a common and simple interface and to make it more user friendly their developers are working on it. Authors observe from questionnaires analysis, Blekinge citizens experience that “eHealth Services Form” is easy and simple to fulfil their need but they are thinking there is a need of some improvements in interface design and its functionalities. Author’s suggested that it will be good idea to follow the HCI design principles to improve the interface and functionalities of the “eHealth Services Form”. Screen short of eHealth Services Form is also available in appendix 4.

7.1.7.1 Principles of User Interface Design

1 - Visibility

According to the statistical analysis of questionnaires it is suggested that there is a need to improve the visibility of “eHealth Services Form” by adding more visible font, labels, text fields, buttons and drop down menus.

- Use attractive font size, font colour and font type.
- Text field must be more visible in 2D or 3D style.
- Use red asteric sign with mandatory fields for example: Personal number, Telephone number, email address or etc.
- Create the focus of user on the required field or buttons.
- The step numbering (e.g.: Step 1 of 3) of the form must be right top on the page.

2 - Feedback

In a simple way ‘Clear and immediate Feedbacks are always given to the user whenever user initiate event/action in “eHealth Services Form”. For example: If user types the wrong personal number or email address or Telephone number or etc then error message must be generated near to the concerning field.
3 - Affordance
According to the authors’ point of view, affordance is an entity that suggests the user to perform event/action. For example:

- Do use "mouse-overs" appropriately and with care such as when the user moves the mouse arrow over the personal number, name, address, telephone number, e-mail address field or etc.
- Do use page location to help communicate that an item is clickable
  - Left or right margins of “eHealth Services Form”
  - Top or bottom of the “eHealth Services Form”
- Do use the term "click here" when appropriate such as when the user moves the mouse arrow over the link.
- Do use graphical buttons that look like real-world pushbuttons such as next and cancel buttons of the form.
- Do use clear, descriptive labels inside text fields such as personal number, name, address, telephone number, email address field or etc.

4 - Simplicity
“eHealth Services Form” is already simple, easy to learn and use but there is need to provide access to all functionalities such as verification of personnel number. According to authors’ observations, citizens need “eHealth Services Form” must also be available in different language e.g.: English, Arabic, Persian and so on.

5 - Structure
According to the authors’ point of view structure of “eHealth Services Form” need some modification in overall user interface architecture such as putting associated things together (e.g.: Personal and medical information) and separating unrelated things (e.g.: Help Information).

6 - Fault Tolerance
“eHealth Services Form” must be fault tolerant and flexible to reduce the chances of mistake by the users such as:

- Use asteric sign with compulsory fields for example: Personal number or email address.
- Restrict the user to enter the characters in text field such as “Name” field.
- Restrict the user to enter the numeric data in text field such as “Telephone Number” field.
- Restrict the user to enter the email address according the standard format such as emailid@gmail.com or emailid@yahoo.com
• There must be “Back” button in stage 2 and 3 of “eHealth Services Form” before the submission.

7 - Consistency
According to the authors point of view “eHealth Services Form” must remain consistent in structure when user enters the personal and medical information. The size of text fields, drop down menus, text style and size, colours schemes and window size must remain consistent.

7.1.8 Personal Number Verification and Auto Responder
At present the “eHealth Services Form” is unable to verify the personal number. According to authors’ point of view to avoid misuse, there must be a verification policy of personal number on “eHealth Services Form”. At present, there is no email auto responder facility available when the patient submit the “eHealth Services Form”. So as a suggestion of authors, there must be an email auto responder facility available for user as an acknowledgement when the patient submit the “eHealth Services Form”.

7.1.9 Citizen Access
According to the health service operator most of the citizens are young who are using eHealth services because they have accessibility of internet [4]. Authors identified after questionnaire analysis there is a need to make eHealth services accessible to all citizens not only to young peoples. The elderly peoples could be one of the main beneficiaries of eHealth services because they are at the stage of life in which they need more treatment as compared to other age groups.

Author identified after questionnaire analysis citizens are not completely satisfied in contact with the doctor through eHealth services. Authors suggested that there is a need to simplify the contact between doctor and patient using eHealth services to increase the satisfaction level of county of Blekinge citizens.

According to strategy maker, at the moment patient cannot access his or her health record at national level [4]. Authors identified after interviews and questionnaire analysis there must be login facility for citizens with special "id's" to access their medical data as well as to identify their treatment clinic(s).

7.1.10 New System
Health service planner said at the moment their system is not connected with the national database. According to authors after interviews and questionnaire analysis there is a need of connectivity among
all health care organizations to facilitate all patient whenever and wherever they need medical treatment.

7.1.11 Citizen Suggestions Box
According to health service operator and questionnaire analysis it is observed that at the moment there is no any “Citizen’s Suggestions Box” to receive the citizen’s response whether they are satisfied with the eHealth services or not. According to the citizens need and authors observations there must be “Citizen’s Suggestion Box” for citizens to know there awareness and ideas about eHealth services.

7.2 Validity Assessment
Validation assessment of research results is an important part in research work. In this thesis, authors adopted mix approach of research (qualitative and quantitative). The research results are assessed according to the Trochim 2006. This validity assessment is base on four criteria’s: Creditability, Transferability, Dependability and Conformability. These criteria’s are discussed in the following subsections. [6]

7.2.1 Credibility
According to the Trochim 2006, creditability means results must be realistic and beleivable by the participants’ point of view [6]. To attain thesis creditability, the authors plan a mix approach of research methodology. In first phase, we studied the literature review & informal discussion with the BTH students and Blekinge citizens. On the basis of findings of first phase, three interviews were designed and conducted with three different people. All of the three interviews’ findings had been translated seperately into the text format and were sent the concerned text to concerned interviewee separately for confirming the creditability of each interview. After analysis of interviews we designed the questionnaire and conducted with ten Blekinge citizens of different age groups. Authors, statistically analyse the questionnaire findings. The detail of interviews and questionnaires are in appendix 2. After adopting the analysis techniques for interviews and questionnaire results, authors are confident about the credibility of the study.

7.2.2 Transferability
According to the Trochim 2006, transferability means that the research results are generalized for some other context of setting [6]. In case of this thesis, Blekinge County Council health web portal is like the other county council health web portal. Health system of Blekinge County Council has same application tools and interfaces that other health systems have in general. The context of interviews and questionnaire is also described in detail in this thesis.
In questionnaire, one possible threat can be same cultural background of the Blekinge citizens. The questionnaire results may be different if this questionnaire is conducted with citizens having different gender, educational and cultural backgrounds. Second possible threat is that all citizens have almost same experience level with the eHealth web portal. The questionnaire results may be different if this questionnaire is conducted with citizens having different level of experience with health web portal. Third possible threat is that all selected citizens were regular users. If this questionnaire is conducted with immigrants whose native language is not Swedish, special group of people and parents of children then questionnaire results may be different. Another possible threat is that the Blekinge County Council health web portal does not provide some eHealth services that other counties council health web portal provide. It can also affect to generalize the results for other Counties Council health web portal that provide some other eHealth services.

7.2.3 Dependability

According to the Trochim 2006, dependability means occurring of alteration in the context of research over time. In dependability, researchers identify the alteration in context and their effects on research. Three interviews were conducted in three different timings (two interviews at morning and one interview at afternoon) according to the availability of interviewees. Third interview with health service operator was conducted after two weeks of first two interviews. Health service operator was very busy and she had not longer time for interview as compare to first two interviewees’ (strategy maker and health service planner). Her English language was also not very good so there is a possibility that health service operator’s answers may get affected during interview due to her busy schedule and English language.

The questionnaires were distributed after two and half weeks of the interviews. The design of the questionnaire depends on findings of interviews. It can be a validity threat because sometime citizens don’t understand the logical terms in questionnaire and don’t exactly remember different features of the Blekinge County Council health web portal. So in order to minimize this validity threat it is suggested that visit the Blekinge County Council health web portal before filling out the questionnaire.

7.2.4 Conformability

According to the Trochim 2006, conformability is the degree in which results can be confirmed by the other researchers [6]. To attain thesis conformability, each interview is converted into the text format and then separated into sections for comparisons and analysis purpose. After the interviews, authors designed a questionnaire as mentioned in section 6.3 on the basis of interviews’ findings as described in section 5.4 and literature review.
7.3 Summary of eHealth Services

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Table 7.1 - eHealth Services
Chapter 8: Epilogue
The epilogue contains conclusion, recommendations, and future work.

8.1 Conclusion
The main aim of this thesis is to identify accessible eHealth services to the citizens within European countries and classify currently accessed and imagined eHealth services in county of Blekinge. To support the main aim of the thesis, extensive review of the literature is done to explore eHealth services which are being utilized in health care practices within European countries. Three interviews were conducted to know county of Blekinge and Sweden National strategies plans regarding eHealth services. Analysis of interviews was performed to find the missing information during the observations and documentation. The designing of questionnaire was based on interviews’ findings and distributed to a number of citizens belongs to county of Blekinge to know their opinions and ideas about eHealth services. The statistical analysis of questionnaires was done to get the concrete results regarding eHealth services.

According to first research question, we came to know that there are number of eHealth services which are running successfully in health care practices within European countries. After understanding their success criteria, the implementation of these eHealth services could provide substantial benefits to the citizens of county of Blekinge in future. To the second research question, at the moment Blekinge County Council is providing nine eHealth services at certain clinics but all of the clinics are not equipped with these services. However after the analysis of interviews and questionnaires it is observed that there are some limitations in the accessibility of eHealth services because of the lack of interoperability among Hospitals, GP’s, Primary Cares and Dental Services. Moreover citizens need privacy through login facility with special "id's” for their health related data as well as accessibility of health care services whenever and wherever they need.

According to Blekinge citizens’ experience observed in questionnaire the “eHealth Services Form” is simple, easy and also fulfills their expectations but they are of the opinion that some enhancements are needed in the interface design and its functionalities. Moreover according to third research question in future, citizens need simple, problem free, quick procedures for medical consultations, e-prescriptions, appointment booking and routine tests etc.

8.2 Recommendations
The authors have following recommendations that might be supportive in improving the delivery of eHealth services in county of Blekinge. These recommendations are based on the observations and findings of interviews, citizens’ comments during questionnaire and questionnaire results.
The Private health care organizations are increasing very rapidly so it will be good idea if Blekinge County Council also engage the private sectors for the promotion of health care and educational activities. In addition to this there is also a need to implement new rules and regulations by the government to follow the eHealth standards at national level. To access the future eHealth services benefits in all counties council have to follow the EU eHealth strategy because eHealth strategy of Sweden is dependent on it.

At present there is a need to know, what the citizens’ are expectations regarding the eHealth services and their issues concerning all age groups and special groups of patients. It is suggested that, if all health care organizations systems can interoperate with each other then e-Prescription would be more beneficial to all Blekinge citizens. To reduce the work load of health care service operators the e-prescription service must be directly connected to the patient’s summary.

To increase the satisfaction level of citizens against e-prescription the doctor must reply to the patient through email as soon as the e-prescription/re-new e-prescription has made by the doctor. Appointment booking hours to be increased because most of the citizens are facing some difficulties to have time for treatment as they have very few hours for accessing appointment.

The patient who has referrals from other clinics/primary cares must be able to book the appointment directly into the system of the hospital because there are many patients from other clinics who can use eHealth web portal for appointment booking. To make the positive effect on people who use web portal for appointment booking and to increase the accessibility of appointment booking there is a need to updated booking calendar at run time on web portal.

The eHealth services those are directly connected with the patients such as “Order Certificate” should be available in other languages such as English, Arabic, Persian, etc because many of the patients who are living in Sweden are not Swedish. Swedish language is not their first language and they have to face problems in reading the certificate. There is a need to add list of available doctors, nurses, and other medical professionals with their duty hours on the web portal because citizens have to face difficulties regarding these issues.

There is a need to implement same EPR standards in all county of Blekinge health care organizations because same EPR standards leads to all systems can share medical data of patients with each other. It is identified that eHealth web portal developers can improve the visibility of “eHealth services Form” by adding more visible font, labels, text fields, buttons and drop down menus because font,
labels and text fields of “eHealth services Form” are not well visible. The “eHealth services Form” must have to verify the personal number to avoid its misuse.

To provide an expected standard of structure the “eHealth services Form” is needed some modification such as putting associated things together (e.g.: Personal and medical information) and separating unrelated things (e.g.: Help Information). The access of eHealth services must be available to all age group of citizens not only for young people but for old aged people when they reached at the stage of life where they are needed more attention and in time quality treatment as compare to other age groups.

To increase the satisfaction level of the citizens there is a need to simplify the contact between doctor and patient. To know citizens awareness and ideas about eHealth services there is also a need to have “Citizen’s Suggestions Box”.

8.3 Future Work

This thesis is an effort to contribute in the area of eHealth services. The authors believe that the recommendations given in this thesis might be supportive for a successful delivery of eHealth services in county of Blekinge. Though some work related to this thesis as explained below needed to be taken as future work. Some suggestions for future research are explained. These are based on the findings from different sections of thesis as well as on the limitations identified in the previous sections. In this thesis the questionnaire was distributed among the citizens of county of Blekinge of diverse age groups to know their comments and ideas about eHealth services. Due to short time the questionnaire was distributed to limited people who were already using and have some experience about the services.

The future research is needed to explore the interoperablity issues among the different health care organizations. More over the research is needed to conduct the questionnaire with immigrants whose native language is not Swedish, special group of patients and normal from young to old one. To conduct and distribution of questionnaire with these groups will support in gathering facts from all communities of Blekinge. There is also a possibility for the future research by conducting more interviews in health care organizations in the county of Blekinge such as Karlshamn hospital, primary cares and health care centers. Another research area would be “Usability evaluation of Blekinge County Council webportal”. This study might be more supportive for a successful delivery of eHealth services in county of Blekinge.
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Appendix 1: Interview

A - Interview with Strategy Maker

Question 1: Is county council responsible for hospitals, GP’s, Primary Cares and Dental Services?
Answer 1: Yes

Question 2: According to your knowledge, do private sectors follow the government rules or not?
Answer 2: Yes

Question 3: In county of Blekinge, do private sectors follow the eHealth standards or not?
Answer 3: No, at the moment they are not following the eHealth standards.

Question 4: What are the responsibilities of the Blekinge county council.
Answer 4: County council is responsible for advising disables, dental care, promotion of regional development in culture, health promotion.

Question 5: Are there any common standards of Electronic Health Record (EHR) in Sweden?
Answer 5: No

Question 6: What do you think eHealth strategy of county of Blekinge is dependent on European Union eHealth strategy?
Answer 6: Yes, but in starting all county councils had IT in their own way.

Question 7: What do you think Electronic Patient Record (EPR) is the basic step towards eHealth to incorporate the new methods of data storing and manipulating.
Answer 7: Yes, nowadays EPR is also implementing on a regional levels.

Question 8: What are the Blekinge hospital’s health care services?
Answer 8:
- Emergency medical care
- Intensive care
- Surgery
- Child and young people’s medical care
- Habilitation
- Clinical physiology, chemistry and microbiology
- Rehabilitation
- Eye and ear health care
- Women's health services
- Medical clinic
- Orthopedics (treatment of musculoskeletal injury)

**Question 9:** What are the scope and aims of eHealth services in county of Blekinge?

**Answer 9:**
- Improve access to care documentation
- One Patient, One Medical Record
- Efficient recording of patient events - Less time consuming
- Improve service for patients
- Increase patient security
- Improve co-operation in the care process
- Better tool for development of quality and content in our operation

**Question 10:** Can patient access his or her health record in other county?

**Answer 10:** No, at the moment patient cannot access his or her health record at national level. But in future we will have it at national level.

**Question 11:** What is the national strategy for eHealth by the Swedish government?

**Answer 11:** Two years ago in 2006, Swedish government took National Strategy for eHealth.
- Bringing laws and regulations into line with extended use of ICT
- Creating a common information structure
- Creating a common technical infrastructure
  - **Ex:** Electronic Identification Card, National e-directory (HSA), Rules for interoperability
- Facilitating interoperable, supportive ICT systems
- Facilitating access to information across organizational boundaries - **Ex:** National Patient Summary
- Making information and services easily accessible to citizens - **Ex:** Patient and care provider portals

**Question 12:** What do you think in future citizens will access login facility, e.g.: Through personal number or other special number.

**Answer 12:** Yes, we have a plan to provide login facility to the citizens with special "id's".
**Question 13:** Are you developing one web portal at national level?

**Answer 13:** Yes, all citizens will use same web portal, no matter where patient will live. Citizens will access eHealth services in anywhere and anytime.

**Question 14:** Is there any common eHealth standard in all counties of Sweden.

**Answer 14:** Yes, there is common standard in all counties, its name is "Rules for interoperability".
B - Interview with Health Service Planner

Question 1: Is it possible all primary cares can “cancel booking appointment” and “renewal prescription”?
Answer 1: Yes

Question 2: What is the concept of health care for citizens?
Answer 2:
- Booking and changing appointments
- Renew prescriptions
- Health care guidance, advice how to help you.
- Make appointment for professional care
- Information, service hours, rates, telephone numbers…
- Test results, copy of case sheet, admission notes.…
- Waiting period …and so on

Question 3: Are you providing eHealth services according to patient need and requirements?
Answer 3: Yes

Question 4: What do you think interface of “eHealth Services Form” is common interface?
Answer 4: Yes

Question 6: What do you think interface of “eHealth service's Form” is same in all counties?
Answer 6: We have no idea.

Question 7: What do you think citizens have direct contact with doctor through “eHealth Services”?
Answer 7: No

Question 8: What do you think citizen have “Comments Sections” to send suggestion or ideas through web portal.
Answer 8: No, they can send email for their suggestion and ideas.

Question 9: Is there any auto responder to the patient when patient submit the “eHealth Service Form” to get the eHealth service.
Answer 9: No, there is not auto responder to the patient.
Question 10: What do you think layout of “eHealth Services Form” is user friendly?
Answer 10: The layout of the eServices form is not very good. We are working on it.

Question 11: What do you think citizens are satisfied with this interface?
Answer 11: We don't know very much, because we have not patient's comments section on the web portal.

Question 12: What do you think “eHealth Services Form” educates the users, how to use it?
Answer 12: Layout of the web portal is very simple so that’s why we don’t need to more educate the patient, how to use it.

Question 13: Is your system connects with the national database?
Answer 13: No, our system is not connected with the national database.

Question 14: Are you planning more eHealth services in future?
Answer 14: Yes, we are planning to add more eHealth services at national level.

Question 15: What is the statistics of eHealth services in county of Blekinge?
Answer 15: Last year we got 3,000 e-messages and this year we have received 2,400 until august, so it will probably 4,000 in this year.

Question 16: Is there any common eHealth service in all health care’s.
Answer 16: Yes, its name is e-Prescription.
C - Interview with Health Service Operator

**Question 1:** What type of “eHealth services” are you providing to citizens?

**Answer 1:** We have cancel appointments, renew recipe, book timings but it target to a very small group.

**Question 2:** How many years since you have been working with this system?

**Answer 2:** Since September 2006, when this system was started in our clinic.

**Question 3:** What is your personal experience with this system?

**Answer 3:** I think it is very good but now this system is not so good when the patient go in and book the time.

**Question 4:** What is your personal ideas and experiences regarding eHealth services through web portal?

**Answer 4:** My personal ideas are good, people can go in whenever they need.

**Question 5:** What do you think patient has good communication with doctor through web portal?

**Answer 5:** No

**Question 6:** When will you implement new system?

**Answer 6:** It will take time to implement new system.

**Question 7:** What is the experience of your colleagues with the system?

**Answer 7:** We are three nurses here in this department. I think we have same opinion and suggestion about this system.

**Question 8:** What is a citizen response for the appointment booking?

**Answer 8:** We have not many users who use this eHealth service.

**Question 9:** What do you think more and more patients are using this system?

**Answer 9:** Younger peoples use this system because younger peoples usually have this facility.
Question 10: Do you think citizens are satisfied with this system?
Answer 10: Yes those who use this service, may be have a good idea about it.

Question 11: Have you any platform for the citizens to know their ideas and suggestion about “eHealth services”?
Answer 11: On Blekinge health web portal there is no suggestion box facility. But patient can email to us.

Question 12: What is the main problem of eHealth service when citizens use it?
Answer 12: There are many patients at the start who want recipe, then we write them back and say that you have to go to the doctor you were going earlier, if you are a patient here and you have recipe earlier then you can renew your recipe without the doctor can see you.

Question 13: Is there any big change that citizens want in this system?
Answer 13: This time, patients have only two times to book the appointment through the web portal. They want more time to book the appointment.

Question 14: What is your idea about the future eHealth services?
Answer 14: I want that patient can book the time directly in our booking calendar system. We want that even if the patients belong to another clinic then they can themselves can go in and book the time directly.

Question 15: Have you any personal opinions about the new system?
Answer 15: The main thing is that, both systems should work together.

Question 16: Does your system verify the citizen’s personal number when citizens use “eHealth Services Form”?
Answer 16: No

Question 17: What are the criteria for those citizens who don’t know about the eHealth services?
Answer 17: They can call us and we will book time for them
**Question 18:** What is your idea, there is a very small group of peoples who are using web portal for appointment booking?

**Answer 18:** Yes, because we have only two timings of appointment booking per day Monday and Tuesday.

**Question 19:** What do you think, most of people like phone call to book the appointment?

**Answer 19:** Yes

**Question 20:** Are you dealing with all peoples who are living in Blekinge?

**Answer 20:** Yes

**Question 21:** There is any other way to use eHealth services instead of web portal?

**Answer 21:** No, there is no other way to use eHealth services but most of the time patients make call.

**Question 22:** Are you thinking to add more eHealth services?

**Answer 22:** It depends on younger peoples that they want more eHealth services or not because they have internet facility at home to use these.

**Question 23:** Are you satisfied with the interface of the “eHealth Services Form”?

**Answer 23:** No

1) You can add other language options because right now it is in Swedish.

2) You can also give links of other sites that can translate this site in other languages.

**Question 24:** Is this system easy for you?

**Answer 24:** The older system that we had earlier did not connected with the local system of the hospital but now the booking and local system are working together. Now we can go from the local system directly into the patient booking system.

**Question 25:** What is your personal opinion about this system?

**Answer 25:** The system is good but it can be better

**Question 26:** What is your idea new system will be according to the citizen’s need and requirements?

**Answer 26:** Yes
Appendix 2: Questionnaire

Results of Close Ended Questions (1 - 14)

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Appendix 3: Unpublished Documents

A - Strategy Maker – Slides

1 - County Council Organization

2 - Blekinge Hospital

Blekinge hospital has units in Karlskrona and in Karlshamn. It provides in-patient and out-patient care that requires specialised medical resources, technical equipment or other specialised treatment not found in primary care or psychiatry.

3 - Exemples of Blekinge hospital’s services

- Emergency medical care
- Intensive care
- Surgery
- Child and young people’s medical care
- Habilitation
- Clinical physiology, chemistry and microbiology

- Women’s health services
- Medical clinic
- Orthopedics
- Rehabilitation
- Eye and ear health care
4 - Scope and Aims
- Improve access to care documentation
- One Patient, One Medical Record
- Efficient recording of patient events - Less time consuming
- Improve service for patients
- Increase patient security
- Improve co-operation in the care process
- Better tool for development of quality and content in our operation

5 - National strategy for eHealth - Sweden
- Bringing laws and regulations into line with extended use of ICT
- Creating a common information structure
- Creating a common technical infrastructure
  Ex: Electronic Identification Card, National e-directory (HSA), Rules for interoperability
- Facilitating interoperable, supportive ICT systems
- Facilitating access to information across organizational boundaries
  Ex: National Patient Summary
- Making information and services easily accessible to citizens
  Ex: Patient and care provider portals
1 - Why do the citizens call health care?
- Booking and changing appointments
- Renew prescriptions
- Health care guidance, advice how to help your self.
- Make appointment for professional care
- Information, service hours, rates, telephone numbers…
- Test results, copy of case sheet, admission notes….
- Waiting period …and so on

2 - We Asked the Patients
- What would you like to communicate with medical care about over the Internet?
  - Test results
  - Medical sheet
  - Renew prescriptions
  - Booking
  - Information
  - Follow-up
  - Payment
  - Doctors certificates
  - Patient Information
  - Health Questions
  - Relative
  - Health care units

3 - Example of Web Services
- Renew prescriptions different units, non-institutional and institutional
- Change and cancel bookings different units, non-institutional and institutional
- Book planned appointments at the children's reception, using authorization.
- Contact before travelling abroad, f ex vaccinations
- Contact physiotherapist or occupational therapist
- Book educational visits and participation in conferences at the youth reception
- Order an doctors certificate from the children's reception

4 - Status Today and Nearby
- 2007 all units in primary care has web services.
- All units in The hospital are next, today 3 clinics have web services.
- The units gets approximately 370 e- messages per month all together.
- Make it easier to find the web services in a near future
Appendix 4: Screen Shots of LANDSTINGET BLEKINGE

Screen 1. Main Page
### Screen 2. eHealth Services

#### Avboka tid

**Information**

- I meddelandefältet kan du ange orsaken till avbokningen och om du önskar en ny tid.
- Information om hur tjänsten avboka tid fungerar.
- Det är viktigt att du fyller i formuläret så noggrant som möjligt.
- Fält som är markerade med "*" måste fyllas i för att du ska kunna skicka meddelandet.

**Personuppgifter**

- Personnummer (ÅÅÅÅMMDD-XXXX) =
- Namn =
- Adress =
- Telefonnummer dagtid =
- E-postadress =

**Steg 1 av 3**

[Avboka tid]

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**Screen 3. eHealth Services Form**