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eHEALTH AS A FACILITATOR OF TRANSNATIONAL COOPERATION ON HEALTH

A report from the Interreg III B project "eHealth for Regions"

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WITH eHEALTH THIS IS NOT A BIG PROBLEM
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ABSTRACT

Beck Thorsten, Bruun-Schmidt Henning, Kitinoja Helli, Sjöberg Lars, Svensson Owe and Vainoras Alfonsas 2007. eHealth as a facilitator of transnational cooperation on health. A report from the Interreg III B project ”eHealth for Regions”. Publications of Seinäjoki University of Applied Sciences B. Reports 29, 54 p.

This report is the result from work, exchange of experiences, and ideas conceived during the “eHealth for Regions” project. The purpose of this report is, in the context of different ongoing initiatives and developments in the area of eHealth, to reflect ideas and experiences on how eHealth can facilitate and be the necessary tool for transnational co-operation on health.

The report comprises three parts, with the first part describing and giving examples on transnational co-operation on health within the European Union. It describes co-operation in border regions and patients going abroad for treatment. EU citizens travel for many reasons, and co-operation is required when they need medical service. Another area of co-operation is rare diseases, where Competence centers do not exist in every country, and where transnational co-operation is needed for patients to find state of the art treatment. The report also describes, for example, co-operation over the border in order to fill gaps in competence capacities and to move competences by virtual means to rural areas.

The second part describes a vision on how eHealth would facilitate transnational co-operation on health. The vision takes the patients’ and their families’ perspective and the medical professions’ perspective. Ethical and managerial aspects, as well as the impact of eHealth in developing evidence-based methods in health care practice, are also discussed. The vision is that eHealth will have a pervasive character like electricity has today. It is a natural element of everyday work in health care that you do not recognise it before it is not there. Appropriate information as well as competence will be available on the right time and place when need, due to the extensive use of eHealth.

The third part deals with the challenges we will face when bringing the visions to become a reality and with the important actions that have to be taken in the short and longer perspective.

Important topics to be treated, regarding transnational cooperation, are:

- Health solutions for the moving citizens for the distribution of nearby care over the borders.
- The user interface of the clinical platform.
- Clinical rounds, meetings, and conferences over distance.
- Learning, education, and research on eHealth
- A seamless European communication network for Health
- Interoperability issues

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INTRODUCTION

Citizens of today move for various reasons over national borders. Such examples are business people, tourists, students, and persons with long time missions, and pensioners that stay for long periods in areas with comfortable climates. We can anticipate that providers of health care services will cooperate transnationally and offer their services on an international market. Moving citizens in the EU have the right to get acute care in any member country and to get planned care abroad, if the specific treatment can't be offered in their home country at all, or within reasonable time. The health care services abroad, to which citizens are entitled to, should of course be supported by eHealth solutions, and eHealth will as well be an important tool for cooperation between health care institutions and for the development of transnational health care services.

Provision of health care is unfortunately unevenly distributed across the world, and there is a great need of support to health care in developing countries. eHealth is, and will be, more and more important in this work. The World Health Organisation (WHO) has recognised the importance of eHealth development and has designated a specific programme on eHealth to analyse when and where eHealth is most efficient, in order to create country-specific guidelines and to provide tools for policy makers, when to select eHealth solutions. One action taken recently was to establish a Global Observatory on eHealth that recently published the report "eHealth Tools & Services". A global questionnaire showed that "there was a significant demand for the provision of generic tools to support the clinical and administrative function of the health care services". Based on this, it was recommended to start actions to facilitate the development of those generic eHealth tools, to raise awareness of existing eHealth tools, to develop an international knowledge exchange network, and to promote the use of eLearning programmes [http://www.who.int/kms/initiatives/ehealth/en/].

The European Commission has, mainly through the directorates "Health and Consumer Protection" and "Information Society", dealt with the need for an IT strategy for the EU, and especially focused on the need for interoperability. The EU Commission published a report [eHealth – making healthcare better for European citizens], where member states are encouraged to set up national IT strategies for both health care and action plans, and to boost investment in eHealth. A so-called Stakeholders Group was also established as a consequence of the Action Plan. The Stakeholders Group recently published a report, in which priority areas on interoperability are defined as: "Patient summaries, patient and health practitioner identification, and an emergency data set". A group called "eHealth Interoperability Ad Hoc Group" has recently been established within the framework of the "Com-

mon Interest Preparatory Activities" funded by the eTEN programme, with the aim to address the above-mentioned areas as well as ePrescribing. The task is to: "1. Contribute to advising on the necessary requirements at a European level for achieving interoperability, 2. Advise the commission on the conception of a Call for proposals on large scale pilots for the Innovation Framework programme 2007 - 2013, and 3. Contribute to the implementation of interoperable eHealth solutions". [Connected Health 2006.]

European Space Agency (ESA), World Health Organization (WHO), and International Telecommunication Union (ITU) have carried through a project within the EU's 5th Framework Programme under the project name Telemedicine alliance (TMA). The project produced two reports concerning eHealth; a vision for a personal health care network by the year 2010, and a strategy for transnational eHealth interoperability [Telemedicine 2010]. The vision of the TMA–group puts the citizen in the centre and identifies key issues, driving forces, impediments, and an action plan for the successful development of eHealth. Key support actions for eHealth development are the addressing of the legal framework, confidentiality, consent, privacy, patient empowerment – and finally – liability, risk, and responsibilities. The impediments for development are costs, bad interoperability, lack of infrastructure, non-adherence to adequate standards, fear of change, business aspect on telesupport, and the fact that electronic health record systems are missing in many places. The strategy lists eleven strategies – among them are ways to address legal issues, disseminate good practices, and adopt standards and interoperability in a wide sense, including political, social, organisational incompatibilities, as well as technical problems.

The project "eHealth for Regions" is one of many projects, partly financed by the European Union that deals with eHealth. The Baltic eHealth project is another project belonging to the same program as ours (Interreg III B) and conduced parallel in time. These two projects have connections and try to benefit from each other's experiences. A common final conference will take place in Stockholm in May 2007, where the results from both of these projects are presented.

This report is the result from work, exchange of experiences, and ideas conceived during the Interreg III B project "eHealth for Regions". The purpose of this report is to, in the context of different ongoing initiatives and developments in the area of eHealth, reflect ideas and experiences on how eHealth can facilitate and be the necessary tool for transnational cooperation on health. The report constitutes of three parts, with the first part describing and giving examples on transnational cooperation on health within the EU. The second part shows a vision on how eHealth would facilitate transnational cooperation on health. The vision will take the patients' and

their families' perspective, the medical professions' perspective, and will treat ethical, managerial aspects, and the impact of eHealth in developing evidence-based methods in health care practice. The third part deals with challenges we will face in bringing the visions to become a reality and with important actions that have to be taken in the short and long perspective in order to obtain the vision.

Intended target groups for this report are people dealing with transnational cooperation on health care issues, such as health care professionals, educators and decision makers, as well as IT-companies looking for new business fields in the eHealth area. The report focuses on European conditions, but most results will, most likely, be possible to extrapolate for global cooperation.

TRANSNATIONAL COOPERATION ON HEALTH IN EUROPE

Health care is, to a high degree, a national issue. Nations strive to offer their citizens as complete health care as possible. It is of course favourable for the citizens to have access to a complete and competent health care service for all diagnosis, at a close distance, and offered by a staff talking the patient's own language. From the health care authorities' perspective, in most cases, it is probably economically favourable to organise health care nationally, compared with buying such service from abroad. Although, it could be economically favourable to organise some health care services with international cooperation, or to buy them from abroad, it might still be politically favourable to organise health care systems on a national basis. This has, of course, implications on the development of eHealth services to support transnational cooperation. This description does not, however, tell the whole story. Many different factors influence where and to whom health care is supplied to. We will describe here examples of existing transnational cooperation on health care, as well as trends and emerging areas for cooperation.

Euroregions

A Euroregion is a border region where the citizens have a common (or similar) language, similar culture, and well-developed social and work networks. These exist along the borders of Europe, such as the Öresund region, Sweden, and the Åland islands; along the German borders to Denmark, Netherlands, Luxembourg, France; along the French border to Spain, Italy, Germany, Luxembourg, Belgium; the Republic of Ireland/Northern Ireland border, as well as other border regions. People living in such regions might have a much closer access to specialised care by crossing the border than visiting a national centre. An example of this is the Cerdania/Cerdanya, on the French/Spanish border, in the Pyrenees. The hospital on the Spanish side offers emergency and maternity care nearby and cross-border to French citizens, who otherwise should have a two-hour drive to the French care facilities. Another example is the Valka city on the Estonian/Latvian border, where the hospital on the Estonian side offers medical service cross-border to Latvian citizens. Health services provided to cross-border patients constitute only a small part of the country's health care provision, but there are still several examples of bilateral agreements made between countries to facilitate cross-border health care provision. The agreements are signed to assure that health care providers are reimbursed and that patients don't need to pay out of their own pockets, when attending the health provider cross-border. Despite EU regulation, it is in practice shown that health care providers (especially private) don't accept the European health insurance card,

because they are not familiar with the regulations, or because they think it takes to long for them to get reimbursed. One such example is the agreement between the sickness funds AOK, in Germany and CZ Actief in Gezondheid, in the Netherlands. The agreement facilitated the provision of health care to cross-border commuters, made access to care with a shorter waiting list cross-border, and offered health care nearby and cross-border for citizens living in the proximity of the border [Rosenmöller, McKee & Baeten 2006.] There are also examples from Jutland, Denmark, and Schleswig-Holstein, Germany of agreements made to facilitate ambulance service or cross-border helicopter-based first aid to trauma patients.

In cases where patients pay a bigger part of treatment costs out of their own pockets, there is a cause for patients to go cross-border for treatment, since the new EU member countries often offer care at competitive prices. This is, for example, the case in dental care and various cosmetic operations. Another example of cross-border care, which is discussed nowadays, is abortions. This practise is expected to become even more frequent, as Poland has adopted a very strict abortion law that prohibits abortion more or less completely, while abortions are still allowed in neighbouring countries.

Health care service providers in Euroregions cooperate also for a mutual benefit. Good understanding of the language makes it easy to establish cooperation that aims at levelling out resources i.e. in such cases where overloaded clinics can send patients to a hospital on the other side of the border. In the Öresund region there exists, for example, agreements on high-risk pregnancies, and on neonatal intensive care places. Other examples of cross-border agreements are the contracting of highly specialised care. One example of this is the Skåne/Copenhagen agreement on the treatment of problematic twin pregnancies and on the provision of a second opinion on foetal ultrasound. Another example of highly-specialised Euroregion cooperation is the agreement between university hospitals in Strasbourg (France), Luxembourg (Luxembourg), and Liege (Belgium). The cooperation has a focus on human resources, which includes training, development of guidelines for operations, exchange of information etc. Cooperation also deals with technology during which a common IT-network is established, a joint medical record is developed for liver transplant patients, and videoconference facilities are established to facilitate the cooperation. Medical focus areas for cooperation are liver transplants, cell therapy, haematology, and oncology. New methods of care for schizophrenia and Alzheimer's disease have been developed. [Rosenmöller, McKee & Baeten 2006.]

Rehabilitation might be another area for cross-border cooperation, since the new EU members are price competitive and especially well reputed in this area. One example of this, is the agreement between a German insurance fund and rehabilita-

tion centres in the Czech republic. [Rosenmöller, McKee & Baeten 2006.] When considering wellness in general, the medical field of rehabilitation is probably a growing international business, in addition to ordinary health care service.

The EU-patient

Patients today have formal rights to get medical care in another EU-country, paid from their national funds. This is the result from the judgement of the European Court of 28 April 1998, where the so-called Raymond Kohll case states the right to get medical treatment in another EU country [Judgment of the court of 28 April 1998, Raymond Kohll v Union des caisses de maladie]. In practice, however, the right is constrained only to treatments that are not available nationally or to those that are not available within due time. The national authorities establish regulations to control the patients' free search for care in order to control the cost. The main rule is that the national authority should approve the treatment given abroad, before the patient goes there for treatment. The treatment given must be based on evidence, and the national medical profession must agree on the fact that the treatment is motivated. The main treatment given abroad is of a highly specialised type, which might not exist nationally, or where there is very long access time for the national care. This type of care has, today, a very low volume.

There are, however, examples of transnational agreements where patients are sent abroad for treatment, in greater numbers. UK and Malta have, for a long time, been bound to agreements where Malta sends its patients for highly specialised care to the UK. There are many factors that facilitate this agreement, for example, language and similarities in the health system organisations. A Treatment Abroad Advising Committee evaluates referrals from Maltese doctors assessing the need for treatment abroad and manages the treatment process. Another example is an agreement between Belgium and the UK on knee and hip replacements. Belgium performed the operations in order to shorten waiting times for English patients'. The agreement was temporary, and is now finished. The referring doctor did the diagnostics, and the patient could choose to be treated abroad to shorten the waiting time. The Belgian operating doctor then went to London to see the patient to prepare the patient for the operation. [Rosenmöller, McKee & Baeten 2006.]

Available medical services for EU-patients vary from country to country. In countries where health care is financed through taxes, there is a main rule that the national health care should primarily serve its citizens, the taxpayers. However, in certain medical fields, there might be a need to establish centres with a specific set-up of equipment and staff, to be able the offer the demanded qualified specialised care.

The EU-Patient

Depending on the incidence of the diseases to be treated, there might be some over-capacity at such centres. This over-capacity can then be offered to foreign patients. That fact that it is only in cases of over-capacity that care is offered to foreigners, reduces the use of transnational health care services.

The intention for public service providers to offer medical services to foreign patients is based on political decisions. The policy deals with the problem of maintaining the principle of equity. On the one hand patients might circumvent waiting lists by going abroad for treatment. On the other hand there might be a risk that the service provider is favouring foreign patients over domestic patients if, for example, the tariff is favourable. The main rule from political decision makers is, thus, not to create incitements for public service providers to offer medical service to foreign patients. Independent private hospitals have, however, economic incitements for offering care independently of national borders, and can expand service provision to adapt to the available market.

The incitement to build service provision centres, with high reputation, is not only economical. For the professional it offers an opportunity to work in an interesting environment and to work for a centre renown for giving highly qualified treatment. The creation of such centres might need to concentrate on building a service capacity that is based on a larger population than is available within their normal uptake area. It might even be needed to cross the border in order to obtain a necessary population base. Such initiatives probably will be supported from the political level, also. Cooperation between such centres might increase the value further for staff and patients. The "High Level Group on Health Services and Medical Care", a group organised by the DG Health and Consumer Protection, has started actions to organise the network between European Centres of Reference. The group states:
"Respecting the principle of subsidiarity, and the responsibility of Member States for the organisation and management of their healthcare systems, European Centres of Reference could bring a *concrete added value* for citizens, through cooperation between Member States. European centres of reference could:

- Improve access for EU citizens to treatment requiring a particular concentration/pooling of resources (structures, equipment, financial, knowledge) or expertise and to offer patients the highest possible quality of care; Help small countries with an insufficient number of patients to provide a full range of highly specialised services of the highest quality.

More broadly, European centres of reference can help to foster research activities and to keep Europe at the forefront of medical developments, to facilitate medical education and training, and can help to foster a sense of common European citizenship and solidarity. Centres of reference should provide equal access for all citizens,

regardless of their country of origin and personal resources, in accordance with the principles of equity, universality of access, and solidarity". [Overview of Current Centres of Reference on rare diseases in the EU 2005.]

This initiative might increase the options for the EU-patients to get the type of qualified care they need regardless if the service provider is outside or inside their country. It is interesting to notice that the High Level Group widened the principles of equity to be a European concern rather than merely a regional or national concern.

Moving citizens

European citizens move today for several reasons over the borders, and European health care services need, thus, to be available for people staying abroad. Movements are of course especially intense in the Euroregions, where commuters travel from job or studies to living areas on the other side of the border, but also for cultural events, and for visiting friends and relatives during spare time. The moving citizen concept includes also, however, travelling for business purposes, tourism, and people living for long periods of time abroad for study purposes at foreign universities, for job missions, or for spending retirement time at the Mediterranean area. Movements might increase further, when low-price airlines give the opportunity to new citizen groups to make short trips to European metropolises for touring and so-called Euroshopping.

Popular tourist resorts attract large tourist groups to concentrate on specific areas, such as beaches or sites for downhill skiing. The visits are to a high degree seasonal. Due to this, popular tourist resorts have seasonal variation in terms of its population distribution and during high-season the number of tourists might reach peaks that are several times of the native population. This means that the health care provider must scale the provision of care to manage the fluctuations of the population, and to be able to handle the regulations of reimbursement from most of the European countries. The strategy to provide care for tourists differ for beach and ski-tourism, where tourists concentrates on reasonably well defined areas, compared to cultural tourists who move around in the country. On beaches and skiing resorts, special health facilities are established, and extra human resources are engaged to offer care to the tourists. The main task for the health care system related to visiting tourists is to handle accidents and medically acute conditions. Citizens with different chronic diseases will, however, also need support. A typical example of this is the opportunity for dialysis patients to obtain dialysis treatment, while visiting the tourist resort. Although we have European rules that regulate the economical part of the health care provision for the tourists, there are examples of specific agree-

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Moving Citizens

ments between insurance funds and service providers that are made to facilitate health care for their customers. The German insurance fund AOK and Techniker Krankenkasse have signed agreements with insurance funds in the Netherlands (CZ Actief in Gesondheid) and Belgium (Chriselijke Mutalitet) for German tourists visiting Netherlands and Belgium. The benefits of the agreement for the service provider are to get faster reimbursement and a telephone hot line to the insurance fund to handle deviations. One advantage for the patients' is that the Belgian and Dutch service providers should be able to offer German-speaking staff to facilitate communication with the patient. Similar agreements have been made for skiing tourists in Austria. [Rosenmöller, McKee & Baeten 2006.]

It is not only tourist activities that cause big concentration of people from foreign countries. Big conferences, exhibitions, not to mention huge sport events such as World Championships, Olympic Games etc. are examples of enormous concentrations of foreign visitors to relatively small areas. The difference compared to tourist resorts is that the places for such events change from event to event. Experiences gained from one place are, of course, transferred in one way or another to the persons responsible at the next place, but mainly at a theoretical level. Practical local experiences gained by local staff, will remain at the place of the finished big event, but managers of tourist resorts have the possibility each year – based on previous experience – to improve the management of foreign citizens in the need for health care at the places where tourists concentrate. Another difference is, for example, that major sporting events may attract hundreds of thousands of foreign citizens to a relatively closed area for a very short time, maybe two to four weeks, while tourist resorts have longer and repeated seasons. Significant changes in the number of potential patients' require very high requirements on capacity adaptation.

Another category of moving citizens is constituted by retired people who stay for long periods of time in the comfortable Mediterranean climate. It is mainly pensioners from northern Europe, who typically own flats or houses in Spain, but also other, in countries like France, Italy, Malta etc. This type of activity started in the 1970s, and many of the recently retired people that moved to Spain at that time, are now old and frail and in the significant need of health care. Many of the pensioners live part time in Spain (more than three months) and part time in the their native country, thus, retaining their tourist status. These persons are considered as "false tourists" and, thus, not recognised as part of the population base for Spanish health care provision. Still they are in need of more than just acute care including, for example, care for chronic conditions, screening, health promotion, and disease prevention. However, many of the pensioners register as residents and are included in the base for planning of the health care in Spain and are not any longer part of their native country's health care system. [Rosenmöller, McKee & Baeten 2006.]

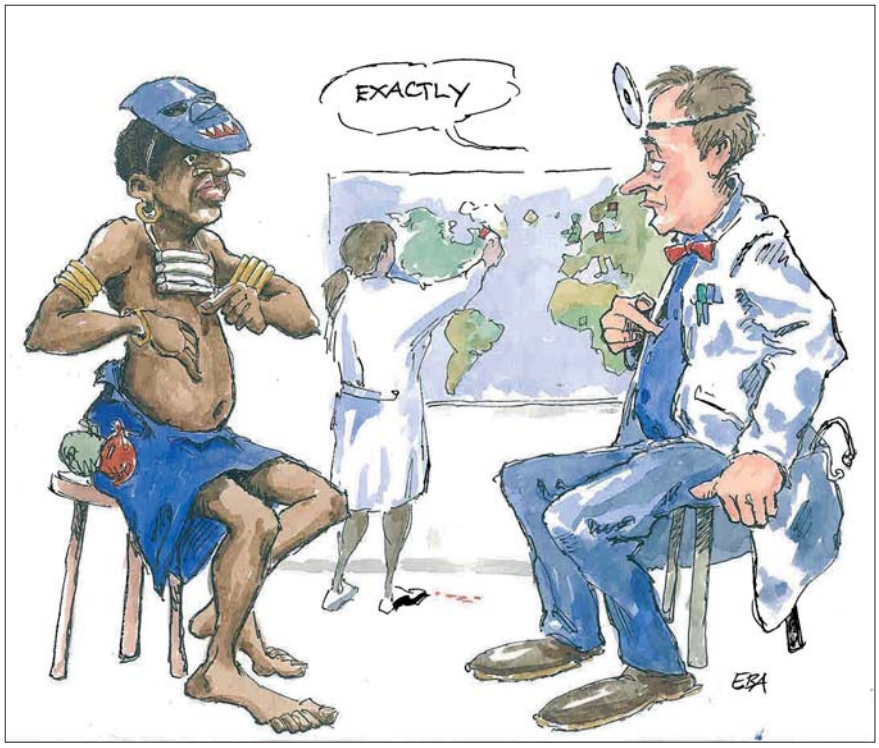
Language might still be a barrier for the contact with the health care staff. This is especially important in psychiatric diagnoses, where therapy is dependent on the spoken language. The situation is even worse, when we consider patients with dementia, who have lost their spouse and are left alone in an environment that is no longer familiar and with people speaking a language that is not so easy to follow anymore. There are examples of private psychologists and psychiatrists from northern Europe who have opened practices for this type of patient group.

Rare cases and very expensive technology

The Rare Diseases Task Force (RDTF), set up by European Commission's Public Health directorate, has defined rare disease as "life-threatening or chronically debilitating diseases that are of such low prevalence that special combined efforts are needed to address them." RDTF proposes that a prevalence of 1 per 2000 is to be recommended, although other definitions are practised in different member states (1/50,000 in UK and 1/10,000 in Denmark and Sweden). To date, there are six to seven thousand different diseases considered as rare diseases. Since there are so many different distinct rare diseases, many European citizens are suffering from a rare disease despite its rarity. It is estimated that more than 20 million people suffer from a disease that is classified as rare. Until recently, rare diseases have been neglected by physicians, researchers, and politicians. Some initiatives have now been taken to create new research programmes and networks for cooperation on the issue. [Overview of current Centers of Reference for Rare Diseases 2005.]

RDTF has made a proposal for technical and scientific aspects on the role of European Centres of Reference in rare diseases. RDTF states that only the large countries in Europe (Germany, UK, France, Italy, Spain and Poland) have enough professionals to identify one centre for a disease of a prevalence of 1 per 100 000. For the rarest of diseases, it is unlikely that there will be one national expert for each category. Medium-sized countries (Netherlands, Greece, Belgium, Portugal, Czech republic, Hungary, Sweden, and Austria) are in the position to have quite a few centres of reference, and are in the need to refer patients abroad for treatment or alleviation [Overview of current Centers of Reference for Rare Diseases 2005.]

Orphanet is a network that organises a database of rare diseases and orphan drugs. The concept "orphan drugs" refers to "drugs that are not developed by the pharmaceutical industry for economic reasons, but which respond to public health need". The aim of the network is to improve treatment of rare diseases and to give service to patients, professionals, and researchers in the field [www.orpha.net].



Diseases with very low incidence...

The reasons to cooperate on rare diseases are obvious. A certain amount of patients per year, treated by a centre of reference, is needed to ensure enough experience to maintain a highly skilled staff and optimise the use of specialised equipment needed for the treatment. Research in the field also requires concentration on cases, to be able to obtain reliable statistics. In diseases with very low incidences, it is necessary to cooperate over national borders, to obtain these conditions.

Limited resources

The main challenge for employment offices is to fit the competence of the existent labour force with the demand of the labour market. There will always be a mismatch, and the task is to minimise such imbalance. The problem increases, when the required competences are narrower and more specialised. The problem is very pronounced in the medical field, where there is a need of a number of specialists working in a very narrow field of expertise. The problem is less severe in densely populated areas, where a reasonably good matching of competences and needs can be obtained, while less densely populated areas will always suffer from a more or less pronounced mismatch.

In the boarder regions, as described above, the population base for recruitment of specialists can be increased, if the population on both sides of the border is considered as one labour market, giving better probability for matching of needs and competencies. Border regions also give the opportunity for care providers to organise the levelling of the need for staff capacity across borders, so that a temporary deficit on one side may be compensated by a surplus on the other side of the border. This, however, is probably less common, and it is more probable that the patient has to move to the place where capacity is available. Less densely populated areas rely on physicians originating from other places, coming to work for short periods of time to cover competence needs. Many physicians have collected on-duty compensation time, for working short times at once at places that suffer from the deficit of physicians in general and of lacking specialist competences. New EU-rules that regulate the number of hours allowed to work during one working period and that compensation for on-duty work must be taken in connection to the on-duty period may, however, change the conditions for care providers to get physicians working on a short-time basis.

The geographical area from which needed competence and capacity can be recruited, is expanded by the use of eHealth. The eHealth solutions are used to transport medical information from sites lacking competence, to be interpreted by specialists at regional, national, and – in the future more frequently – at international centres. On-line virtual meetings are used for this purpose when human interaction is important.

Diagnostic interpretation services, where images or electrophysiological data is sent to a centre or company, are an emerging business area. The Barcelona-based company Telemedicine Clinic, which offers interpretation service in the field of radiology, is a typical example of this. These types of companies take the diagnostic burden from clinics having difficulties in recruiting specialist competence, making it possible for the clinic to continue to offer a comprehensive service package to the citizen in its up-take area. These companies can equally well offer buffer capacity, helping to handle temporary variations in a clinic's capacity of specialist competence.

There is also cooperation among clinics, during which clinical issues are discussed over distance. This type of cooperation often deals with second opinions on difficult cases, but may also deal with therapy. One example of such a virtual on-line meeting is within the field of psychiatry, where a therapist and an immigrant patient speaking a common language can meet over distance.

Suppliers to the health care providers

Nowadays, suppliers to the health care system are not always present in all the countries of their customers, and health care providers may have direct business relations with companies in other countries on the European market. This has implications on the use of communication networks over national borders. Suppliers will use Internet connections to update and to maintain supplied equipment. The communication network will also be used for service tasks, where companies sometimes need support from their mother companies based in the US or in Japan, and where consultants need to be electronically connected to the equipment to be repaired.

Companies may also offer services to the health care transnationally. One example of this is the telecardiology application used in the "eHealth for regions" -project, where a server in Bad Segeberg, Germany interprets incoming ECG-signals sent by telephone from Lithuania, Poland, Sweden, and Finland. The received signals are then transformed into an ECG-chart that is sent by email to the health institution of the respective country. Another example is the supplier of implantable defibrillators, where the status from the defibrillator can be sent by telephone, each night, to the supplier's server in Berlin. The Doctor can then access this data by a Web-interface from any location. A service that offers automatic interpretation of images from heart isotope investigations is a third example. The telemedicine service mentioned in the previous section is, of course, also such an example.

Sport medicine

Sportsmen are a special case of moving citizens that need extra medical support, while being abroad on competitions or on training camps. Sportsmen are more vulnerable than citizens in general, since the immune system is negatively influenced by high levels of physical exercise, training volume, and number of competitions. Immune deficiency, due to sport activities, puts the sportsman at risk to contract infections and subsequent adverse pathological processes that require medical treatment. Untreated conditions of such infections may result in persistent illnesses, and in unfortunate cases, they may end up a chronic disease or can even be fatal. Training activities and competitions are also moments of risk for injuries, due to accidents or wearing of joints, tendons, and muscles. Many sportsmen and teams bring along their own physician during travels abroad (although not all can afford it), to help deal with small health problems on the spot, but bigger problems, traumas, or more detailed diagnostics require local health care services. Time is often a critical factor, and the organising of an effective and adequate health service for sportsmen and teams, is very important.

Research and education

Education is not always well adapted to the needs of the medical fields. Aging is a common challenge also among health care professionals, so making sure that there is a balance between the need for and supply of professional staff – for instance nurses and doctors – is a major challenge. This is one reason why there is a need to educate young generations also on eHealth solutions and to teach them on ways how to utilise eHealth in practice. Universities in some countries educate too few physicians and nurses, leading to a permanent deficit of medical staff, especially in rural areas. In other countries, especially in the new EU member states, we can see a surplus of physicians and nurses. Some of them are ready move to other countries to work, although the language can be a problem, which needs to be handled first.

The internationalisation of education became a key objective, in European education policy, in the late 1980s. One reason for this was the European integration process. Today, higher challenges are being set for know-how, and this is regarded as a universal, transnational phenomenon. In higher education, the competencies of the degree programmes in health care, as well as the learning outcomes of students, have been described at the European level.

Besides the European dimension, there is an increasing discussion of collaboration at the universal level. This requires entrepreneur-like activities from universities and other education and research institutions, as well as reacting to the changing needs of students and the population in general. Thus, higher education institutions have today intensive collaboration with public health care organisations and with the working life in the health care sector. The concept of community of researchers has extended to the users and producers of knowledge. In this way, the new applications and practices can be also developed together with the health care professionals and citizens. A new kind of communication culture that uses information and communication technology has been developed, as well. In its operational environment, higher education in medicine and nursing is confronted with many new challenges, among others, the change towards a knowledge economy and knowledge society, as well as the development and impact of new information and communication technologies.

Internationalisation was seen in the beginning only as the mobility of students, teaching staff, and researchers. Nowadays, mobility is only one part of internationalisation. Students of medical and nursing fields have greater mobility between European higher education institutions and better opportunities for practical training compared with other fields of education. Today, the concept of internationalisation includes double and joint degree programmes – also in the area of health care –, the

accreditation of studies accomplished abroad, transnational education, European quality assurance of education, the shift to ECTS (European Credit Transfer and Accumulation System) credits, lifelong learning and market-oriented education, as well as the definition of international standards and qualification requirements of education. In medical and nursing education, the European qualification requirements and competences have been defined by the European Commission Education and Training in the EuropeanTuning projects [(http://ec.europa.eu/education/policies/educ/tuning/tuning_en.htm/; http://europa.eu.int/comm/education/policies/educ/higher/higher_en.html Higher Education in Europé)] . Higher education trains professional degree students in medical and health sciences, to work in an international operational environment and in international labour markets. In the European Union, EU-directives also give guidelines for the content and implementation of medical, nursing, public health nursing, and physiotherapy education.

In medical and health education, as well as in other fields, there is a competition to recruit talented students, teachers, and researchers. Competition also exists in getting external, often international co-funding. An important aim is to strengthen the competitiveness of Europe with regard to Asia and the US. One important point of the European research and education area that interests other continents outside Europe is medical and health care combined to the information and communication technology.

eHEALTH AS A FACILITATOR – A VISION

The ultimate goal for information management is that "Appropriate information should be available at the right time and place when needed". This is, today, a generally adopted vision for information management in health care organisations. The use of eHealth is needed for this vision to become true. Another vision is that "Appropriate competence should be available at the right time and place when needed". It is favourable if the competence could be offered by physically present staff, but considering physical constraints on travelling time and human resources capacity, we can come closer the vision by distributing competence also in virtual form. EHealth is in this case a facilitator that can distribute competence to places impossible to reach physically within reasonable time. New possibilities for regional planning of health service provision will appear, if virtual competence distribution is included as a facilitating component. A hampering factor is that, although technology solutions exist, they are not yet very well integrated into the health information systems. The conclusion is that organisational as well as technical development is needed for the vision of distributed virtual competence to become true.

Virtual competence exists in two principally different forms, off-line type and on-line type. Technical solutions for the off-line type are similar to solutions that offer information in the right time and place when needed, while the on-line type includes an extra component, namely the *real-time virtual meeting*.

eHealth is probably an endless way to improve transnational health care. The EU-Commission goes for it, and the UN-WHO sees possibilities in solving growing demands and growing possibilities. The patients and their families would benefit from it, and would often take for granted that the use of information technology already is at hand transnationally. Health care professionals and vendors see great possibilities – but most often eHealth is not yet made useful transnationally, not to mention that eHealth in many areas is far from implemented to the desired and possible extent.

Allow us a short detour to the introduction of electricity in the last part of the 19th century: Maybe there can be drawn parallels to that time's use of electricity, its possibilities etc. and the way we look at eHealth today? It is interesting to notice, that we do not at all today discuss the usefulness of electricity – we take it for a fact. It is there, it is a prerequisite, and we know how to use it, without necessary knowing how it technically functions. Our vision is that eHealth, like electricity, will be a present fact for patients, medical staff, and health care managers in Europe, or why not globally. World Wide Web and eMail are examples of such electronic solutions that have become a fact and are present globally. Like in the electricity

field, there is a need for a distribution network. In the case of eHealth, the network has to connect all patients and service providers in a secure way with high capacity. This requires two basic elements, a secure identification of the patient and of the medical professionals including their authorization data.

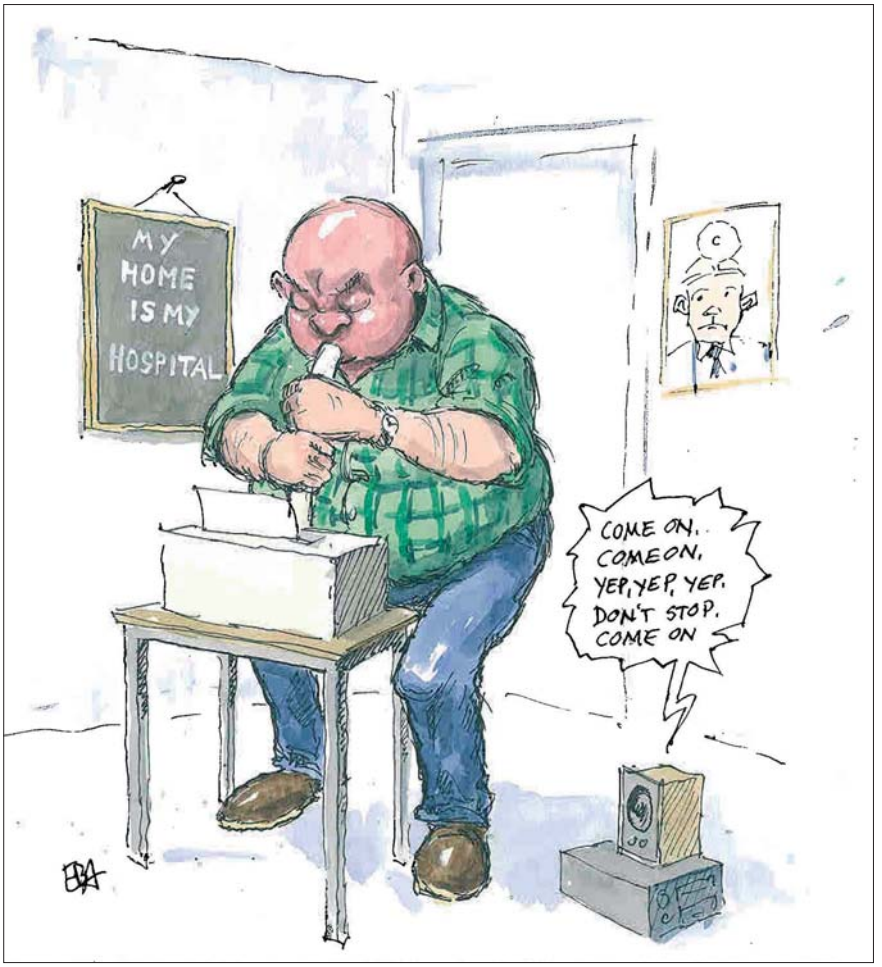
We guess that we can define, pin down the possibilities of eHealth from different angles – a technological angle and a functional angle. At least we will go into more detail from these points of view and leave more politologically-oriented angles for others to deal with.

How can eHealth be brought into use in health care? This is what interests us the most, and the way it is looked upon in policymaking. Healthcare service delivery, the health care industry can be viewed as one huge knowledge-based organisation, as it is often put: 'evidence-based medicine' is the backbone of health care service in our part of the world. In these settings, it is obviously important to gather information, to document, to facilitate diagnosis, treatment and rehabilitation. It is as obviously important to share information between partners delivering health care service, and it can even be extremely important to get access to information quickly in acute, possibly life-threatening situations. The normal practice for medical and nursing staff includes rounds and meetings, where the patient's treatment is discussed and planned. It is as well obvious that these types of meetings need to be of virtual character, when geographically separated care providers cooperate. For the development of medical insight, it is also extremely important to collect systematically information on experiences from health care service and to get the opportunity to meet over distances and share experiences.

To promote best practise, to economise scarce resources, to make priorities, it is finally important to health care deliverers and financers to know which inputs give which results. Not to mention the possibility to use eHealth in order to empower patients, relatives, and friends of patients, to cooperate in the solving of health problems.

The patient and family perspective

It is in effect the end purpose of all activity in healthcare to put the patient in focus of healthcare delivery, and eHealth is a great tool to empower patients and families in handling their own health. There are several already known, but hardly yet well known and used, ways to involve the patient and families and others who care in the whole patient process - from noticing pain via diagnosis to treatment and rehabilitation. It is interesting to think of patient focus in this way: The empowered



The Empowered Patient

patient can become a reality, if eHealth solutions can be thought out and integrated in the way that the health care service is operating.

Let us give some everyday examples. For instance, measuring of lung capacity of e.g. asthma children, when they feel like it, and when they are relaxed. Measuring of blood pressure when relaxed at home, during periods, or on an ongoing basis. Measuring … only name it. All of the obtained results, simply as ever, are added to the patients file, e.g. via an automated telephone call from the equipment to the file-centre. The process includes describing to the doctor or nurse and to the patient him/herself the value, giving a good prediction, and good advice on the intake of medicine etc. Thus, the patient him/herself actively gets involved in the treatment procedure and comes to know much better the consequences of his/her own behaviour and/or the effects (wanted or negative side-effects) of treatment, medication etc. The person influenced can as well be a chronic patient, who can begin to bet-

ter handle his/her everyday life, when confident that professionals are up-to-date with his/her medical data. Another example group is parents to babies and young children, or oppositely, older children of elderly parents that can get support, give advice, make corrections to reverse developments and so on.

Introducing eHealth, with focus on the patient, will have many impacts on health care service. The patient will be a far better informed co-worker capable of handling the illness in question. And the patient will at the same time use less and more of health care service: On the one hand it is believed that by being an empowered patient, the patient can be dealt with, with the use of less manpower of doctors and nurses. On the other hand 'more will have more', which means that the patient and his/her relatives will endlessly want to know more and eventually do more.

So this future way of involving patients/relatives will naturally make new demands to the health care service sector: There will be a better possibility to get round-the-clock information if and when needed, communication from patient to service provider will improve, and better documentation on the running of what has been suggested and actually done is anticipated. Patients, who will be treated at distant service centres, perhaps abroad, will be better prepared for the visit through possibilities to virtually meet the treating doctor in advance. Involvement of groups of patients, for instance, suffering from rare illnesses, will profit much of transnational cooperation.

The EU member states offer various types of nearby care for their citizens, including primary health care, family doctor systems etc. Nearby care is, however, nearby only as long as you stay at home or in the vicinity of your home. As soon as you leave this area you are dependent on general health care service, in the case of an acute situation or in handling chronic somatic or psychiatric problems. This will probably not cause big problems, as long as you move within your own country, where you can comply with the health system and understand the language of the health professionals (Although, for immigrants may movement also within the country cause problems in contacts with the health care system). When you move outside the borders of your country, this will, however, be more difficult. To which health care centre should I go to? Will they take care of me without requiring money out of pocket? Am I ill enough to visit a health institution abroad to start a complicated procedure? Do I understand what they say? Will I need special transport to my home? A vision for this patient is to have a direct contact with the staff at the nearby care centre at home, where all these questions could be clarified in a language that the patient understands. The nearby care should, thus, be distributed such that I, as a moving citizen, could rely on *nearby care everywhere*. Firstly, organisational changes are needed for obtaining a distributed nearby care, but in the

next step technical solutions could offer a virtual visit to the nearby health centre at home from any place.

All of this will, to a great extent, be possible via Internet for a travelling patient; only will he/she need a possibility to receive help locally in correspondence with his/her actual situation. So the patient might - in acute instances – need to seek a local health care service provider and have the wish to have his medical information translated to the local doctor. The information should be given in a way that the doctor will understand – either because it is presented in a standardised way or it is given in a common language. Documentation of the performed treatment should successively be added to the patient's file, also in a way that could be understood. A virtual meeting with the home care centre, when visiting a foreign doctors office, will in many cases improve the patient's confidence and empower the patient in relation to the local care provider.

In the "eHealth for Regions" project there is one solution to this through a pilot set-up: The so-called PIMS (Personal Information on a Medical Stick), which is an USB stick maintaining a standardised set of important personal health information, and with what it is also possible for the doctor to write in the patients file – as an add-on. As help in other instances, it is proposed in this eHealth for Regions project that all EU-countries, when possible, give and take medical information in English aside from the native language. The next technological steps will be taken, when reliable automated translations between all EU-languages, at all times and at all places, are available.

The perspective of professionals in health care

Appropriate information, which is available at the right time and place when needed during clinical situations and in home care, will improve the confidence of the medical and nursing care staff, and improve their possibilities to make best possible decisions. eHealth offers a great possibility to be updated in the diagnosing, treating, rehabilitation of patients: The actual patient file will be present when needed in an updated form, it will be easy to navigate in order to find relevant information, and decision support can be right at hand. You are relieved of tedious administrative work – once the information is in the patient file it is reused and automatically entered into databases for administrative, quality standards, or pure scientific purposes.

eHealth solutions will offer medical staff a larger geographical labour market and will reduce the need for movements and travel. Specialists may stay at research

centres that offer possibilities to develop and maintain competence, while offering medical services via eHealth solutions to other places. Others prefer to stay in the rural area, but can, with the use of eHealth, keep in contact with the research centre by participating in seminars and research projects from a distance.

eHealth solutions facilitate the creation of distance consultation services by giving medical and other health care professionals' opportunities to offer their competence at a distance, also on a commercial basis. On the other hand, medical staff has great opportunities to use consultation services to optimise its own work. Having second opinions, holding virtual meetings with specialists, who have come to know about rare diseases, forming interest groups of dedicated specialists, developing cooperation in the areas of research, teaching, and learning, could be examples of other subsequent consequences that could be obtained through eHealth.

A business as described, involving more cross border cooperation, will have some subsequent advantages: Gradually there will be better knowledge and growing understanding on how health care services are delivered in different countries among professionals. In the long run, this will be to the benefit of travelling patients and it will make it easier to compensate intermediate shortages through the use of eHealth. There will be more developed ways of treatment and standards of health care service. Even though healthcare service is not part of the European Treaty, the emphasis on improving the conditions of the border-crossing inhabitant, at work and on holiday, is a great challenge also for the healthcare service development in the 25+ European countries. So this type of bonding of professionals together will surely be a great and important milestone.

Better evidence-based medicine and nursing

Improving the base for evidence-based medicine and nursing is –perhaps – the perspective from which most is to be gained: As Western medicine is based on evidence, it is important to be able to demonstrate from a mass of information collected by eHealth, if new as well as old technologies and medicines have the desired effect. So medical development and the medical industry will be sure winners of this development, and in the end it will be for the benefit of the patients. The background of evidence based nursing is on nursing science and nursing research in collaboration with multidimensional research. In Finland the evidence based nursing and nursing research have already long history and the Ministry of Health and Welfare is also supporting that in the Action Plan for the years 2004-2007. Collaboration between research, education, practice and management is important also for the development of eHealth.

Undoubtedly a major advantage of eHealth shall show itself to be the systematic gathering of information in respect to determining whether a given treatment has the intended effect. This, however, will only come through if a great effort is made to define terms and to report them accordingly in the same ways, across borders, languages, and healthcare systems.

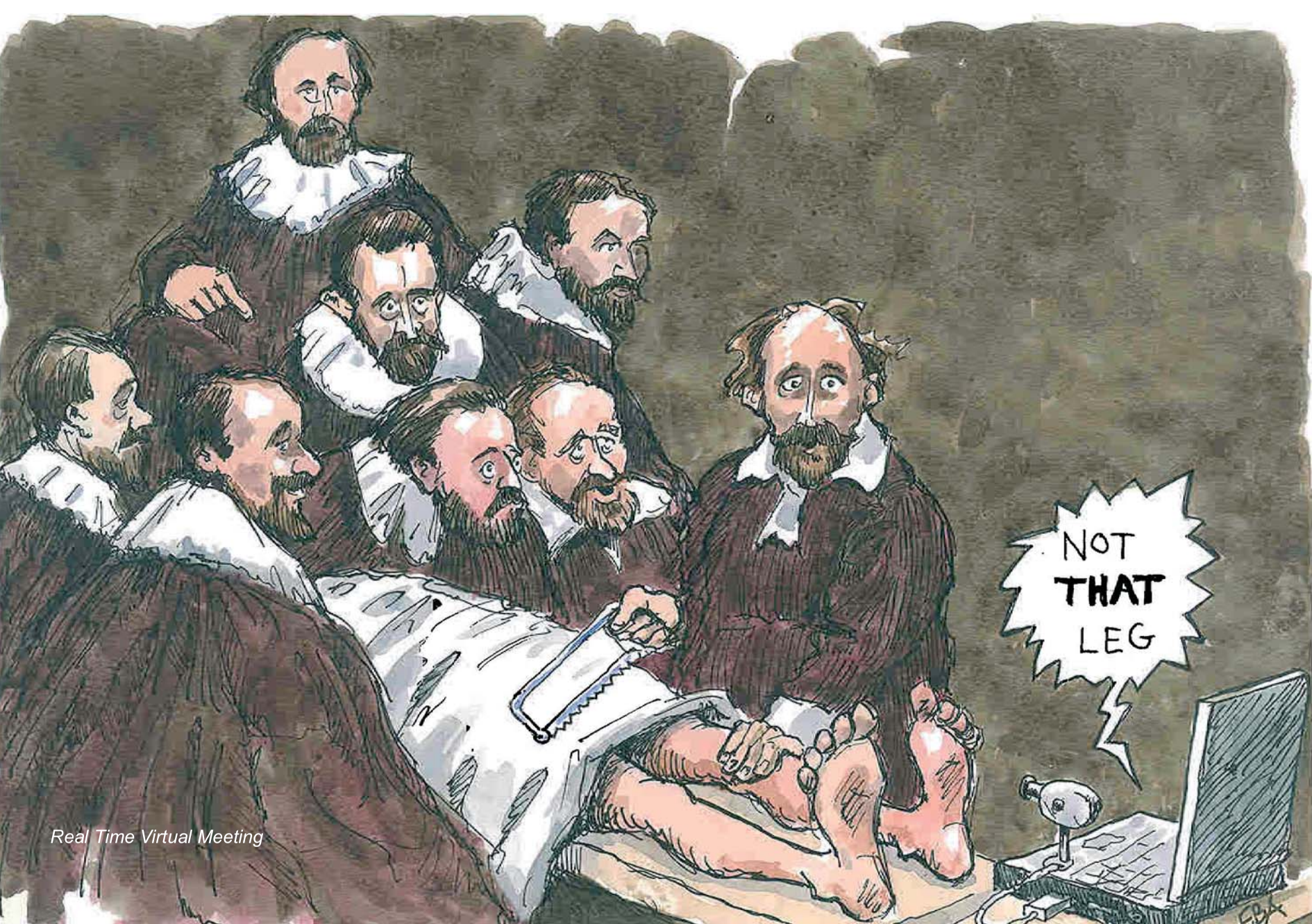
For many years, there has been cooperation in these fields throughout Europe and the Western world. With no doubt, eHealth can support these cooperations and ease further developments. By making the frames of European healthcare more dedicated to evidence-based medicine and nursing, the European industry may obtain a better position in competition with the USA, which today is the melting pot of new medicine, nursing and new medical technology.

Managerial aspects

eHealth will contribute to significantly improved decision support as the documentation of activities and the use of resources is becoming more consistent and up-to-date. eHealth can help levelling the unbalance in competence supply between countries, by situating specialists from locations where there are enough of them to places where there is a shortage. This is achieved by the possibility to move capacity and quality over time and distance: For instance, by allowing interpretations of digital radiology to be made where the service can be rendered, can reduce the need to have more than one doctor on duty during nights/weekends and covering the increased number of wards.

Shortly put, eHealth makes it possible to reorganise healthcare delivery in a way that that expensive and highly-specialised manpower can be rationed. For example, digital radiology pictures taken in Sweden by specialists working in Lithuania is one example of such potential rationing action that supports the health care system i.e. it is easy and secure to move digital information from one place that needs specialists to a place where specialists are at hand. If specialists are not available, an alternative could easily be either closure of the service, or the moving of specialists from where there are enough to where there is a shortage - often from centre to periphery (within one country), or from low wage areas to high wage areas (e.g. from Lithuania to Sweden).

At the same time as eHealth makes it possible to secure better quality by giving an easier and quicker access to a second opinion, eHealth will also facilitate concentration of specialist centres, to offer highly specialised treatments with an appropriate size of uptake area. This is also true for the creation of specialised centres for treat-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Real Time Virtual Meeting

ing rare diseases. Patient information management facilitated by eHealth - which includes virtual conferences to prepare the patient and the treatment procedures - will optimise security and make true that the patient gets the best available evidence-based treatment for each rare disease case, as well as benefit those patients living in sparsely populated areas.

In many parts of the world today, societies face a trap with a growing proportion of elderly people to younger inhabitants on the one hand, and growing possibilities and corresponding costs of healthcare on the other hand. There is, therefore, a vast need to make healthcare service more efficient. This could be obtained through benchmarking, going for agreed upon service levels, by reducing growth in costs of pharmaceutical products, by rationalising processes, by minimising the use of beds in hospitals and by making ambulatory service grow - just to mention some of the many agendas of healthcare service today. eHealth is a promising tool to cope with these challenges: rationalising, optimising, securing quality of health, as well as to engaging patients in the process far more than today, by giving the patient and family new possibilities of getting information and tools to work with.

Patient safety is an important issue to address, since there are many mistakes reported that are based on missing or bad information, or on not having anyone to consult in specific clinical situations. eHealth solutions can help in reducing wrong decision making within the health care sector; throughout the entire hospital organisation, and finally at the regional and governmental level. Here easy access to valid information comes to the scene. In respect to the vast, huge amount of information at stake, it will only be through the active use of eHealth that one will be able to select and get the relevant information and communication. The next challenge can very well be, not the lack of information, but the abundance of poorly validated information to sort out from. Here too, eHealth will come in handy. It will be the only way to handle the challenges. Finally, eHealth solutions can offer convenient consultation services that can be at hand without the need for medical staff to move physically.

In the future, accreditation will be part of any healthcare provider’s description of his/her qualities. It will make it easier for the health care providers to buy services based on a more valid basis of comparison of qualities of healthcare provision among hospitals, in the own country and at foreign hospitals.

Ethical aspects

Should you do all you can do? Or are there limits of e.g. ethical nature that should be taken into consideration. Of course, there are. It is generally agreed upon that screenings to find diseases should not be undertaken unless the screening results could be used for the benefit of the sick person. It should be so that the net positive effects of screening and consequent action should outweigh the negative effects significantly.

It is the belief here that same ethical considerations are to be observed irrespectively of the use of eHealth or not. However, the wider use of eHealth might pose new ethical challenges. Across borders, different religions and culture might create different attitudes to ethical questions – how to cope with this? The implication could be that efforts should be made to put these predictable ethical challenges on the agenda openly, to discuss them publically, and, finally, create a guideline for the handling of these problems.

It is becoming more common with health care ethical committees that have the task of giving health care providers, from general-frame-level to actual-care-delivering level, advice on how to act in accordance with general conceptions of ethical standards. Questions of an ethical nature also arise from the use of eHealth; although eHealth can be seen to improve health care service it also contains problems, e.g. the possible abuse of personal intimate data versus the life-saving possibilities of having access to these data. So the ethical committees will also have to look into questions arising from the use of eHealth. It is a challenge to e.g. Polish culture and values that Polish women can go abroad to get a provoked abortion. Not that this practise is new – it has probably been ongoing for years – but the knowledge of this possibility is facilitated through modern information technology.

Educational aspects

In general, especially new generations will require rapid, real-time, and on-line services from health care. eHealth will be a solution for that. To the benefit of all - providers as well as consumers – there should be education in the use of eHealth. Concerning the health care profession, new generations in the labour force will demand modern technology to work with. They will have experience on how to handle information and communication technology applications, messaging, and networking. They will be familiar with quick results and distributed real-time information. They will, therefore, expect their workplace in the field of health care services to be based on modern technology, such as eHealth.

Therefore, new generations of health care professionals shall be educated to develop eHealth services to manage eHealth services, and to support client-centred integrated, flexible, and seamless health care services through eHealth. It is thought of as essential that health care professionals receive multidimensional education, so that they can achieve a wide perspective on developing new eHealth-based services.

Older generations of citizens and health care professionals will need up-to-date knowledge of the possibilities of eHealth and the use of ICT- based applications. Older generations also need to be supported in achieving positive attitudes towards eHealth. When using eHealth in empowering, for instance patients with long-term illnesses, the education shall be given targeted to the specific needs.

Education will form a bridge between the past and the future of the health care sector. Through education, the current and future use of eHealth could be optimised. Education should focus on the interests of specific target groups: Health care professionals (nurses, medical doctors, home care assistants, physiotherapists, health care managers etc.), patients and their family members, decision makers, and citizens.

HOW TO CREATE INTEREST, COMMON UNDERSTANDING AND COMMITMENTS FOR EHEALTH

Healthcare systems all over the world face big challenges. We can see more elderly people, new demands, and new medical technology causing even more demands and an increasing number of people travelling around the word in their professions or as tourists. It is in this context that we can see the big advantages in using eHealth - both nationally and as an instrument for increased international cooperation concerning healthcare. Nationally and regionally there are many examples of successful implementations and usage of eHealth. When it comes to transnational cooperation, however, eHealth is not used so much yet, in spite of big ambitions from the European Commission in the last ten years.

Although everyone agrees upon the benefits of using eHealth for transnational cooperation, very little has been realised. To move forward and to facilitate an extended use of eHealth, there are a number of challenges to overcome. The European commission points out some examples of barriers that need to be overcome on the pathway to full size implementation of transnational eHealth. Some examples of such are the fear of technology, fear of 'big brother' watching you, fear from exposition of own performance and from meeting new or other values and cultures. Other obstacles arise from the lack of knowledge, technological infrastructure, or money. Different ways of organising health care systems (referrals, payments, legal aspects, and so on) is another factor causing difficulty, not to mention the language barrier.

There is, however, a big interest among some EU -politicians to work with eHealth questions, despite the obstacles seen today. The challenge is to convince patients, professionals, and politicians at home – at the local level – of the benefits and possibilities of eHealth and to get them to work actively with the issue (You are not afraid of what you understand). Many of the patients and professionals are, however, already familiar with the possibilities in eHealth. In a study done by the Interreg III B-project "eHealth for Regions", a majority of the respondents (health professionals and decisions makers) in the five regions participating in the study recognised the benefits of eHealth, especially those for the moving citizen, who can become a patient anywhere. Many professionals and decision makers also have a very optimistic view on how quickly solutions can be realised

When it comes to implementation of eHealth solutions and the tackling of different practical issues, the politicians and healthcare managers are, however, giving priority to the problems in their own region. There is not enough time or money for future solutions and futuristic projects, where benefits are a few years away.

The incitement structure is unclear and profits do not always go to their own organisation. To broaden the interest, to create more understanding of eHealth, and to obtain higher commitment, further efforts are required in addition to those made by the EU-commission.

The EU communication "An action plan for a European eHealth area" [eHealth – making the health care better…] describes many challenges and suggests activities to help facilitate eHealth development. Although they do not primarily address the local level, it is very important that efforts are made also on the European Union and national government level to address the challenges for eHealth development. We will in this chapter give some viewpoints on actions to support and develop eHealth from the local level by projects and transnational cooperation.

Research and Education

The ability to maintain and strengthen the innovative capacity of Europe and the Baltic Sea Region is widely seen as a key determinant of whether Europe and the Baltic Sea Region will continue to be among the most prosperous in the world. eHealth related innovations, such as round-the-clock health information and services, new European health market platform, or new eHealth business opportunities, can also contribute to the competitiveness of the Baltic Sea Region in comparison with other European regions as well as among the companies and citizens of the region. Strong skill base and high-quality research are two critical requirements for achieving high levels of innovation. Open innovations develop in networks of companies, universities, and other institutions, and they require very different incentives, rules, regulations, and institutional support compared to the old sequential model of universities and large R&D centres. In the area of eHealth, this means that large multiprofessional research and development projects, such as Interreg III B project "eHealth for Regions" and "Baltic eHealth", have an important role in developing health care. Sustainable networks that result from eHealth development projects, could be one way to exchange knowledge and to innovate and test new eHealth practices also in the future. Through projects and networks, professionals from different specific areas and different organisations from the working life and industry can get opportunities to discuss with each other. Education and innovation policies remain a critical point for the Baltic Sea Region.

Internationalising of the operational environment brings new challenges to know-how, science, technology, and innovation. It is important to stress that *technological innovations* and determined investment in *social innovations* should go hand in hand [Finnish Science and Technology Council 2003]. Social innovations, such as new

working methods in health care or new ways of organising health care services, may even be preconditions for technological innovations. When we combine social and technological innovations, the result could be new eHealth services, like the USB-stick with patient medical information or the Web-based electronic patient health record for moving citizens. Determined effort to develop innovations cannot be limited to the national environment or to traditional international cooperation. Strengthening of the competitiveness of European welfare societies, including their health care services, is one of the key objectives. Competitiveness of the European medical and nursing higher education system in the global and commercialised education markets is also a key objective. A high level of education is one of the most important ways to reach a high level in the offering of health care services.

A strong brand of eHealth education and eHealth Programmes taught in English are important competitive factors in global educational markets, but also when we are developing eHealth services for the citizen. The European action programmes of education allow the development of student exchange in Europe. In medical and nursing programmes, student and teacher exchange is one of the most active between European countries. These numbers should, however, double especially in eHealth education, in order for students to gain experiences from eHealth practices in different countries.

Transnational education has been launched as a new product in the educational markets. The goal of the European Union is to create 90 networks of European institutions of higher education and 250 European Union joint Masters Courses by 2008. It is important for the institutions of higher education to be also able to satisfy the needs of corporate staff, e.g. by customising the contents of the educational programmes to meet the needs of customers. The amount of network-based studying has increased; even courses leading to some special professions are offered on the Internet, not so much though in Europe, but especially in the United States, Canada, and Australia. European higher education institutions already offer many master programmes in Health and Medical Informatics. Some examples are the Master Programme in Aalborg University in Denmark and Flensburg Fachhochschule, eHealth Master Programme in the University of Tromsö in Norway, Telemedicine and eHealth Master Programme in the University of Aberdeen in the UK, Master Programme in eHealth Technology in Warwic Medical School in the UK, distance Master programme in Telemedicine in the University Laguna, Teneriffa and International Master in Medical Informatics and Telemedicine in Italy. Most of these programmes are national, so there is a need to develop transnational joint programmes. In European universities there are many Master programmes and other courses in the area of eHealth that are also taught in English.

Higher education is closely connected to change towards a global knowledge society [Van Damme 2004]. Therefore, institutions of higher educations must be able to modify their curricula in accordance with new educational and working life needs and they must recruit teachers and researchers from other countries. In Health and Medical Informatics (HMI) education, there are also international recommendations for the learning outcomes, knowledge and skill domains, and for the content of courses and programmes. It is not possible to refer to any standard curricula at the European level, but still there is one kind of commitment in competence requirement: in 1) information processing, 2) information systems and technologies and competence requirements, and 3) information management, i.e. how to effectively use information and communication technology to support appropriate decision making and evidence based health care practice [IMIA 2000]. But maybe eHealth competences should also be re-evaluated based on the requirements of today and the future. In eHealth educational programmes, content such as medicine, nursing, economics, law, management, teaching and learning, as well as business and marketing studies is needed, so that professionals will be qualified in practice, teaching, and in research.

Health and eHealth education should be included as part of many educational programmes – optional or elective – for instance in the fields of medicine, nursing, dentistry, pharmacy, public health, health care management and administration, as well as informatics and computer science. There must also be dedicated educational bachelor, master programmes and academic doctoral programmes in health and eHealth. Continuing education will also be needed for all different professionals. A multidimensional and multiprofessional view is needed in education. Important is the integration of teaching and learning, research and development, and collaboration with the working life to achieve the commitment concerning the development of eHealth practices. The important question is how to educate professionals and decision makers to manage eHealth services so that empowerment of patients and citizens will be achieved. Citizens and public themselves also need education as service-users.

In regional strategies, know-how that is based on education and research plays a central role, and institutions of higher education are seen as actors securing regional development, also in the health care and eHealth sector. Permanent effects on regions can be achieved only by utilising international collaboration.

Proof of concepts

One way to increase the interest and understanding of eHealth is by carrying out different pilot implementations and disseminating information on best practice solutions, to show that the concept of eHealth works and is profitable. Pilot implementation can be allowed to be sub-optimal. Projects with a limited level of ambition can give valuable experience, create good examples, and maybe most importantly, create demands for better solutions. One example is the "eHealth for Region" project, where an USB-stick, into which most important medical information is stored, is tested. This project is a common project between five regions in the Baltic Sea area. One of the main tasks has been to agree upon certain basic issues, including: What kind of medical information is important? Which language(s) to use for a common understanding in the five participating countries? The solution is at present not perfect nor final and should not stand for a more formal handling in a EU-perspective, but could be a trigger for improvement and a practical way to move forward towards better and longer lasting, standardised solutions for the moving citizen. With examples like this, you can show politicians and professionals that something is happening in the area and challenge those who are critical to find better solutions. Below are some proposals for such approaches.

Create solutions for the moving citizen. By presenting solutions for the moving citizen, you can give rise to pressure from the citizens themselves. Today, the moving citizen in the EU has a health insurance card, which guarantees the citizen acute healthcare in all EU-countries without having to pay out of the pocket. This is a big advantage for all those falling ill and for those who need healthcare abroad. It would also be a great advantage for the citizen, who becomes a patient abroad, if the healthcare institution taking care of him or her somewhere in Europe, was knowledgeable of his/her important medical information, and if there could be established an easy connection for virtual meetings with the nearby care provider at home.

Work with patient interest groups, travel agencies and insurance companies. One suggestion is to work with patient interest groups, to include their ideas on how they want to improve security of their members when they are going abroad. Can their home pages, for example, be a start for handling personal medical information in a secure way, and for giving advice and support with reasonable efforts and costs? Another suggestion is to involve travel agencies and insurance companies to regard personal medical information as something that may raise the value of the travel insurance for the customer/patient. You may find a win/win situation with regards to healthcare, where the citizen and the insurance company both could benefit from a combination of patient security and cheaper insurances.

National and international websites. International marketing of websites for patients as for example NHSDirect UK [www.NHSDirect.nhs.uk], Sundhed Denmark [www.sundhed.dk], and Vårdguiden Sweden [www.vardguiden.se] is another way of creating more interest in eHealth. Inhabitants in different countries can learn about the sites, see the advantages, and put pressure on their own regions or country to build similar sites. As international travelling increases, owners of the sites may be more willing to discuss a common international site as a complement to the national/regional site. Can, for example, common international portals like the public health portal for the European Union http://ec.europa.eu/health-eu/index_en.htm develop into such that support travelling citizens with personal medical information, give advice on how and where to contact medical institutions abroad, and perform other functions that virtually connect a patient to the nearby care at home?

Integrated and easy-to-use software. There already exist many eHealth solutions within health care today. The use of them is, however, hampered since they are implemented as separate software solutions that sometime even need specific hardware, or specific rooms, where you have to go to use the eHealth solution. The challenge for the development of eHealth solutions is to create a common user interface that integrates different eHealth functions with the ordinary workspace. The user should not need to start a new application, make a new login, and know about complicated settings to start an eHealth application while working with ordinary clinical work. The eHealth solution should just be one click of a button away from the ordinary clinical workspace. Pilot projects that show examples of such integration and simplification of the user interface are very important.

Create solutions for an European health market

There may be several reasons for citizens to look for health care outside their own country, but the main reason is probably that the care you need cannot be provided in your home country, in proper time, or not at all. The care provider can also ask for help from another country in taking care of its patients, to keep up with acceptable waiting times for treatment. It is important to influence politicians and decision makers to see the advantages and profits in buying certain types of services from somewhere else, to be able to offer the citizens health care fast and with good quality, instead of only seeing the costs in using other care providers. Failing to provide care in reasonable time can often be even more expensive than using other providers, especially if you also take the costs of the patient's sick leave into account.

For rare cases there is a special need for cooperation over the national borders, since many countries are too small to be able to run specialised centres for each of these.

The development in this issue that is going on in Europe should be facilitated, if eHealth solutions become an important part in their work. Some health services may be suitable for large-scale production, possibly making it more profitable both from quality aspects and economical aspects. Such types of services may be more suitable to buy – even from abroad – rather than to produce them as small-scale versions locally. Different types of development projects in order to improve eHealth solutions facilitating cooperation on services for rare diseases or for large-scale treatment centres, are important.

Some sort of international market conditions for health care provision is needed to facilitate cooperation between health service providers. One important condition for such a market is a standardised *service catalogue*, where you can find where you can buy a certain treatment and hard facts about the services. The service catalogue can be seen as a needed tool to realise the intention behind the EU-patient concept, where the patient can look for health care all over Europe. The service catalogue can also be seen as a marketplace for sellers offering health care services.

In a service catalogue, you should be able to find exactly what kind of health services there are to be bought and necessary facts about the services, including quality indicators, price, waiting lists, doctors CV etc. The quality and standardisation of the catalogue is crucial, and the development of criteria for such a catalogue should be given priority as well as the supervision of the quality of the care providers and the content of the catalogue. Some important actions in this issue are proposed by the European Commission, who will work in order to set a baseline for standardised qualifications for eHealth services in clinical and administrative settings by the end of 2009. The Commission will also during 2004 –2010, biannually publish a study of the art in deployment, examples *of best practice*, and the associated benefits of eHealth knowledge sharing. [eHealth – making healthcare better for European citizens 2004]. Pilot projects that show different aspects on how to build such a service catalogue are very important.

A European market for health may be complicated, and comparisons between different alternatives may not be so easy. An idea could be to arrange education for brokers and establish special brokers or agencies to facilitate the market of the health services. The brokers can either be independent private brokers or people within the health care provider's organisations. Today the possibility of buying health care services, instead of providing them yourself, is often a neglected possibility, and when a business case happens it is a "happening" for which there are no established routines. Routines and bi- or multilateral agreements combined with educated brokers could be a powerful facilitator for eHealth and the increased exchange of health services.

Interoperability

Standardisation is the far most important facilitator for the development of eHealth - in Europe and for interoperability. Important work has been done in CEN251 (European committee for standardisation http://www.centc251.org/) since 1997, and there are 4 workgroups concerned with different aspects of standardisation in health informatics. The standardisation process is, however, very slow with the exception for technical standardisation (platforms, networks and so on), where the industry is driving the standardisation work.

Priorities for the moment are the standardisation concerning patient identifying services, agreements about how to build up an electronic health record, referral/response format, and how a common set-up of important medical information should look like.

A report from the EU-commission highlights the following: [eHealth – making the health care better for the European citizens 2004]:

- Patient identifier
- Patient summary
- Important medical information/emergency data
- Care provider identity

A big question is how the process can be enhanced to facilitate the standardisation. Below are some suggestions.

Citizen's demands can speed up standardisation. Citizens can be encouraged to demand having access to their own important information. As travelling citizens they should be encouraged to put pressure on the politicians and the hospitals in their home countries to make important information their own, standardized, international information. Information that can be accessed for care providers in other countries, in a different or a standardised language, and on the owners demand, can be stored for example in an "Internet bank" for patient information. Such Internet banks do already exist in some places in Europe as private initiatives. Examples are LifeOnKey and the company "Telcomed" that among other products also offers a Web-based file, where you can store your own personal medical information [Telcomed, LifeOnKey].

Industry-driven standardisation. If one let the industry, for example the travel agencies or insurance companies, to handle questions such as "important medical information for the travelling patient", there is a good chance that standards will be developed very fast. Another field where this could be applied is the market for

health services. An international market for health services will need a standardised catalogue to be able to function, and here the industry can probably be helpful in speeding up the standardisation work in the health care area. The problem is, however, that it needs strong and rapid actors for developing internationally accepted industry standards. There are unfortunately many examples of industry standards that have not been accepted by competing companies, and have been established as proprietary standards that have been an obstacle for interoperability.

Cooperation between industry and public organisations. Microsoft is in Great Britain engaged in a project to create a standardised medical interface for NHS (National Health Service), to be used by different vendors of electronic health record systems in their applications. An easy, standardised, user-interface is a big facilitator to get the information standardised for the end user and on the screen. The goal is not to have a complete common interface, but to have important information look the same way in every application and to be found in the same places on the screen. Examples of such information are patient-id, warnings, and drug prescriptions. This could be very useful, when exchanging information between different countries and when you design an international common interface for the patient's important medical information.

Secure networking

The security and integrity of health information is a critical issue in all computerising and communication, especially when it comes to interregional or transnational communication. Without guaranties for a secure storage and communication of patient information, there will probably be little progresses in transnational eHealth. This is a big issue in all health care organisations. The technology that makes secure communication possible is today quite well developed, but requires rather big organisational changes to be implemented. We give in this part some aspects on the implementation of secure solutions.

The main principle – when it comes to health care abroad on the patient's own initiative – must be that the patient decides what information about him/herself he or she would like to communicate and that it is the patient him/herself who owns the information. In a situation where a care provider buys healthcare for a patient abroad, it is the care provider's responsibility to secure that the performer of the health service will be provided with sufficient patient information in a secure way.

The patient information must be stored and communicated in a secure way, such that the patient can feel safe to move from the small world (the family doctor or the local health care centre) to global health care. In the future, one must be prepared for a situation where your own medical information travels across borders, when you are getting care in another country. It is then very important that the patient can feel safe about how his/her own medical information is handled from a privacy point of view. Another aspect on information security is that the information must be securely stored and transported in such a way that it is not changed involuntary in any way, thereby causing medical risks for the patient. Protection against changes, logging, and traceable changes are key words in this connection.

Technical solutions that solve these problems exist, but are not implemented very much within the eHealth area for transnational cooperation. Implementation of such technical solutions is crucial for the development of transnational eHealth solutions. It is, therefore, very important to intensify actions in this area, where pilot implementations can be important ways to gain practical experience. The actions proposed by the European commission, to intensify solutions for common identification of citizens (patients) and of care providers, are crucial for implementation of secure eHealth solutions. The above-mentioned service catalogues may include needed certificates for secure identification of the care providers.

Language differences

Among the big obstacles for a fast dissemination of eHealth are language and cultural differences. Alone in the Baltic Sea Region there are for example ten official languages. We here have at least three conditions to handle:

- Overcoming the language barrier without having a 24-hour translation service, 7 days a week, all year around.

- Access to information for patients seeking acute medical service abroad, either during holiday or in business, should be provided. This is an important part of the EU-concept and policy to facilitate transnational activities.

- Access for the care provider to important medical information about the patient (e.g. hyper sensibility, chronically diagnoses, what kind of medicines the patient is on etc.)

The problem is big and optimal solutions to remove the hindering factors of language differences are far away. It is, thus, important to find solutions that are reachable within reasonable time. The key issue is, therefore, to keep it simple first of all:

- Abide to international coding agreements: ICD10, Snomed, ICPC.
- Keep (or find) the original English as a basis in any translation of terms in every country, so that the English phrase, terminology can be easily extracted from the national information source, e.g. an electronic health record
- Make it known and accepted that - unless there is a mutual understanding - the basic language for exchanging information is English.

Network for sustainable cooperation

One important result from cooperation in transnational projects could be the established network itself. This network could be important for further cooperation, within the field of a project, but also as a base for future international projects.

"eHealth for regions" partners have, therefore, established a sustainable structure for the network, in order to avoid deterioration after the project is finished. The intention is that this structure will support innovative processes in the field of eHealth. The current and future network should, thus, constitute a platform for the exchange and generation of ideas on cooperation and support the implementation of concrete transnational projects.

The "eHealth for regions" network is organised according to figure 1. Each partner country selects for the Political Strategic Board a representative of the highest political level in the partner region. The Political Strategic Board decides on strategic

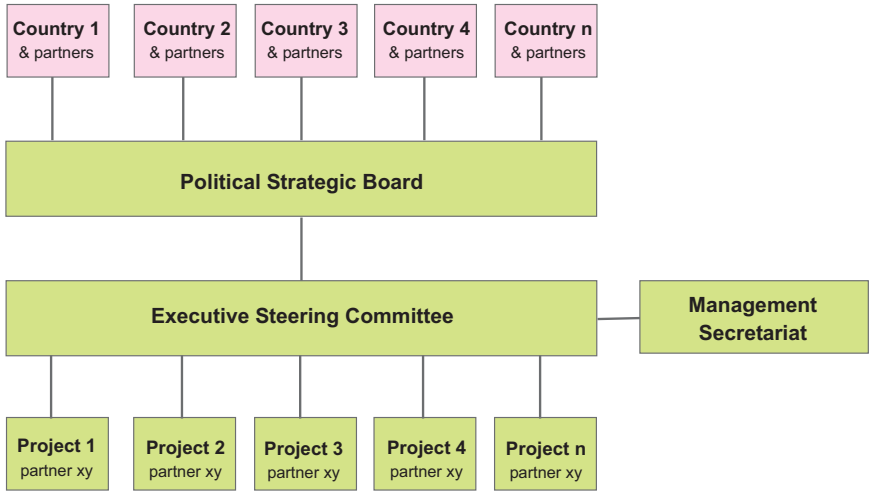


Figure 1. *Organisation model of the "eHealth for Regions" network*

guidelines for the development of the network and supports “eHealth for Regions” activities at the political level. The Executive Steering Committee prepares the decisions of the Political Strategic Board and e.g. works out yearly activity plans. The management secretariat prepares network meetings, supports the Executive Steering Committee, and takes care of other administrative tasks.

The base for this organisation model was established in November 2005, when the members of the Political Strategic Board signed a Letter of Intent in Viborg, Denmark. In May 2007, the signing of a network agreement by the Political Strategic Board is foreseen to describe the network and to strengthen the cooperation between the Baltic Sea Regions in the health care sector.

The network is expected to be a base for future transnational cooperation on eHealth. This should be achieved by providing experiences and knowledge about the specific challenges of transnational collaboration in the field of eHealth among the network partners. Finally, the partners themselves should run the cooperation projects. Project networks will be chosen such that they are appropriate for the concrete thematic fields. This means, as depicted in figure 2, that new project networks may incorporate only a part of the “eHealth for regions” network, while including other partners appropriate for the subject of the project.

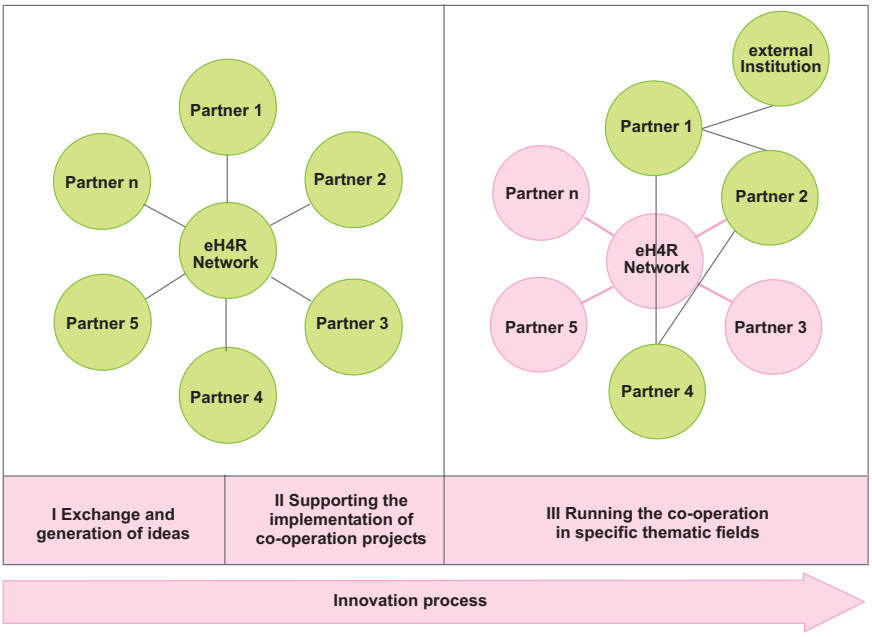


Figure 2. *Example on the establishment of a project network based on the eHealth for regions network.*

CONCLUSION AND PROJECT PROPOSALS

Already today there is extensive cooperation in Europe on health care. In the research field, it has always been natural to cooperate over borders (just look at the travel of Linneaus disciples). However, also in the field of health care provision there are many examples of cooperation fields. In the border regions, it may be most convenient for the citizen to visit a provider on the other side of the border. In the European health market, it is in principle open for the citizens to choose treatment from any provider, although there are in practice many obstacles against this. The European citizens move over the borders and need care abroad – acute care and support to chronic diseases. Cooperation over the borders facilitates the possibilities to offer specialised care to treat rare diseases and to obtain sufficient uptake areas to share costs for specialised and expensive care. By regarding Europe as a common labour market and by using eHealth solutions, the supply of competences can be better distributed to where the needs are – not least for the benefit of rural areas in Europe. The field of education in general and, thus, also of medical and nursing education is becoming more and more an international issue.

Our vision is that eHealth will be in the future there, unnoticeable – just as electricity is today, which we only notice when it is not there. We believe that eHealth will facilitate levelling of competences from surplus areas to deficit areas. Citizens moving for different reasons in Europe will feel like having access to nearby care everywhere, where medical information is available, where virtual access to the home nearby care centre is easily accomplished and where pharmaceutical prescription and treatment is performed in agreement with the home health care provider's intentions, all for the security and confidence of the moving citizen.

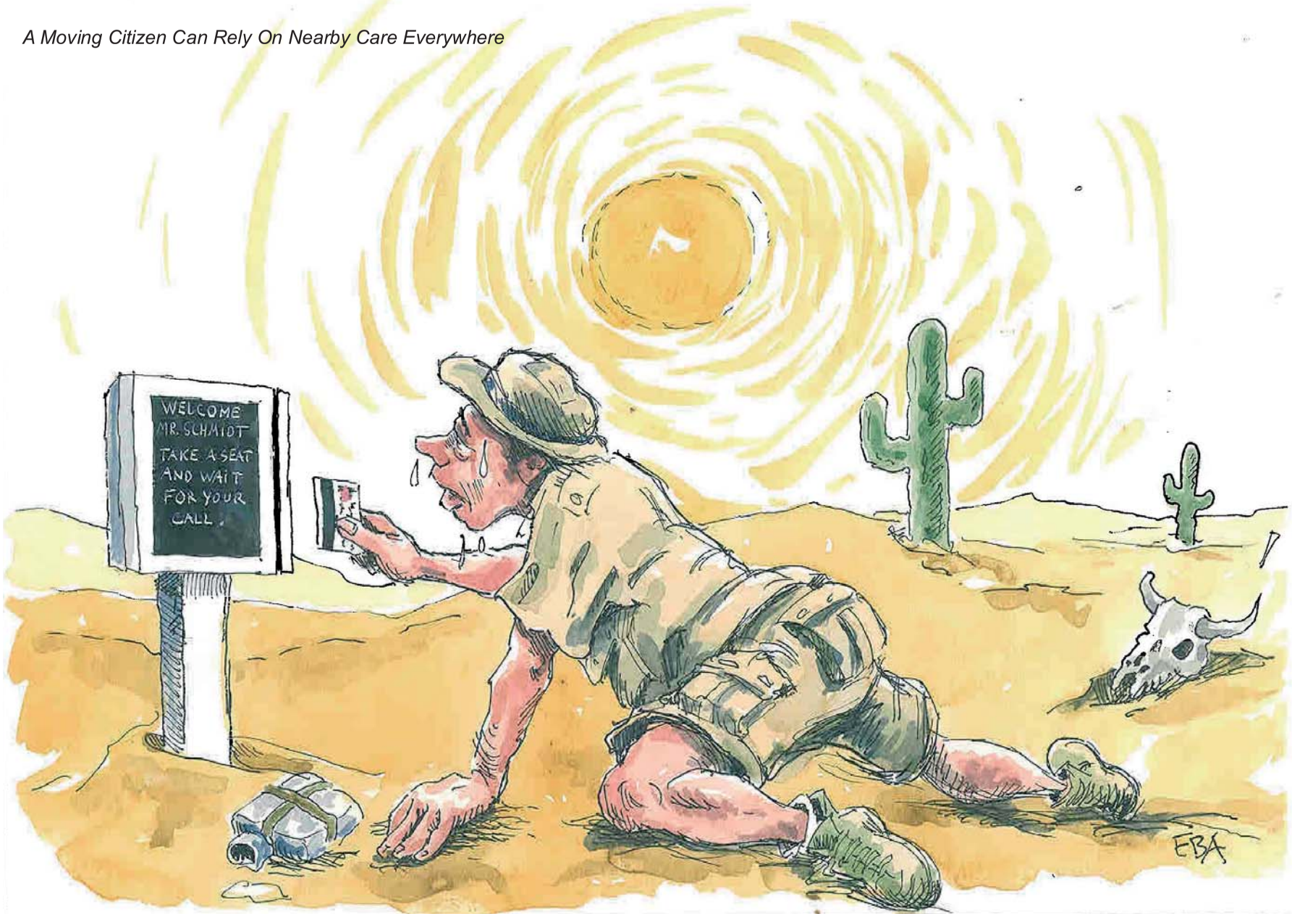
Challenges for the near future

Below are some suggestions of areas of interest for future interregional projects that can help pushing transnational eHealth forward:

- **Nearby care everywhere.** In reaching this vision for the moving citizen, it is needed to test and to prove the function of various components, as for example, accessibility of medical information, list of pharmaceuticals, virtual access to home nearby care (primary care centre, family doctor), agreements with service providers to facilitate reception, and practical handling.

- **User interface for a clinical platform.** Many different eHealth solutions exist today. They require in practice that you during clinical work have to

A Moving Citizen Can Rely On Nearby Care Everywhere



leave one clinical tool, open another and log-in, make a number of settings, and specify addresses etc. For some eHealth solutions you have to go to special rooms, where the eHealth session can be performed. For eHealth to be unnoticeable, like electricity, all functions have to be integrated into one clinical platform (also functions for virtual on-line meetings), where each function is one button away from the ordinary clinical user interface.

- **Learning and education.** The social and technological innovations in eHealth are based on high-level education and research. eHealth modules and courses must be included in the curriculum of health care programmes, and learning outcomes shall be described in transnational collaboration. Also transnational bachelor, master, and doctoral programmes in eHealth need to be developed. Further education modules, including virtual long-distance education modules, should be produced in collaboration. Research combined in education will produce eHealth innovations for the practice and business. Knowledge of eHealth should be exchanged from region to region, and moving citizens and patients need to be educated as eHealth users.

- **Clinical rounds, meetings, and conferences over distance.** The development of cooperation between service providers in Europe needs tools for virtual meetings over distance. Distance meetings are needed for preparation of patient cases before treatment and to follow up after treatment where the doctor meets the patient. Treatment procedures and other types of agreements also need to be discussed about between cooperating service providers. This requires further development of the traditional videoconference concept that is available today. A clinical virtual on-line meeting should be easy to use, available where needed, and needed medical information - medical records, images etc. – should be easily integrated into the meeting as a base for the discussion. The patient should be easily invited to the meeting, either from home or from the nearby care centre.

- **A seamless European communication network.** eHealth is dependent on a communication network that is well-functioning with high capacity, and where secure applications can be established regarding privacy for the patient, integrity of data, authentication and authorization of actors in the net, and traceability of activities. Good products exist today offering this, however, experience of practical implementations, especially for communication cross border, is lacking. A basis for implementation of a seamless communication network is to have secure identity on patients and service providers.

- **Interoperability.** This is a huge field with many different sub-areas. Interoperability needs standardisation or clever translation of formats. Standardisation can be defined on different levels, for example as a detailed description of a database structure, or as just an agreement to use an USB-contact or a Web-interface. Below are listed some sub-areas of interoperability.

    - Exchange of medical information, images, lab data, etc.
    - Nomenclatures for medical terminology
    - Structure for a European service catalogue
    - Structure for a European catalogue for medical staff, including secure identity and authorization data

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