

CASE STUDY PP 6

E-Health development in Estonia and Võru County

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1. Introduction

This study gives an overview of Estonian national e Health projects and the ones that are used in South - Estonian Hospital. The second part of the study describes the activities and result in hospital within the Baltic Rural Broadband Project (BRB project).

After the regional WIMAX network installation in Võru in 2006-2007 within the Baltic Rural Broadband project, the goal is now to start developing and using as much as possible e-services in health care, including more patient friendly systems development.

South-Estonian hospital located near Võru town uses four national e-Health projects:

digital health record, digital patient registration, digital pictures and digital prescriptions. All these projects are connected to the national Estonian e-services as e-citizen and X-road information portal.

Within the BRB a project radiological information system was bought which helps to save time and make the work more effective in hospital and in the whole region as the family doctors also have access to the digital photos. Cooperation projects are in progress with other Estonian hospitals and with Finnish project partners.

According to the surveys, 75% of Estonians favour the use of digital health record. In 2006 a forum of e-Health was opened in Internet where citizens can ask questions about above-mentioned health projects, make comments and proposals. The forum is accessible on <http://foorum.e-tervis.ee/>

The e-Health project are coordinated by Ministry of Social Affairs and e-Health Foundation (<http://www.e-tervis.ee>).

2. E-Health information system and projects in Estonia

At the moment there's **no integrated health care information system in Estonia**. Instead, smaller different information systems are existing as hospital, family doctors, first aid and pharmacies information systems; also Estonian Health Insurance Fund system, different registries and databases. No systematic change of information is happening between these systems.

In order to have more patient friendly systems, it is necessary to change them more citizen friendly because at the moment they are focusing on institutions. Digital health record is concentrating on person, on the data and e-health service providers related to him/her. This system would allow the

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free movement of patients in Estonian and also in European health care systems.

In Estonia there are **four e-Health pilot projects**: digital health record, digital patient registration, digital pictures and digital prescriptions. All these projects are co-financed by European programs and they should be finished in summer 2008. The most important of them is the digital health record project with more than 1,5 million euros.

2.1. Digital health record

The centre of health information system is centrally managed digital health record including important medical information and forwarding information to the different parties. It also contains the links permitting the information search from different parts of health information. Health record system has to guarantee the necessary information exchange for the registry and to create the environment for exchanging data about health information. It is not only technological but also organisational project.

The **precondition for the digital health record is the e-health act** or the set of rules defining the rights of doctors and patients for the use of data. This law is not yet promulgated in Estonia.

Two national enquiries about health care showed that 75% of Estonians favour the use of digital health record. The improvement of exchange of information between doctors and the rise of the quality of treatments are seen as the most important benefits. People wish to have access to their medical records by Internet and the medical staff have the digital overview of their health.

Survey conducted at the beginning of 2007 shows that the access for medical data of medical personal and patients helps to make treatment more effective and avoid the errors in the process. Half of the people questioned agree with publishing their digital health record for scientific purposes and health registries.

91% of questioned people considered important the aspect that in the case of urgency (patient is in a critical situation or not able to contact), the medical data that doctors possess can be vital. Already now doctors insert the patient information after every visit into the information system of the medical institution. When the digital health record will be in use, this data will be available for other medical institutions, as well as for the patient.

In 2007 six Estonian medical institutions take part in the pilot project: Tartu University Clinics, Regional Hospital of North-Estonia, Central Hospital of Eastern Tallinn, Family doctors' centre of Järveotsa, Medical centre of Koeru and Tartu first aide centre.

Hewlett-Packard technological company that has created similar solutions in Great Britain, Spain, Austria, Ireland and Lithuania will work out the technical solution for the digital health record project.

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2.2. Digital photos and registers

In March 2007 Estonian Social Ministry concluded the procurement contracts with the provider of digital IT photos Microlink Eesti and digital registers solution provider Medisoft.

The digital registers allow patients to compare the line-up of the same doctor in different institutions and to fix the convenient time himself/herself or with the family doctor. The risk of losing the prescription will disappear, as these documents will be available digitally. Thanks to this solution the prescription system will be much more easier, today the 500 different prescriptions existing will be exchanged to 4 different type of prescriptions with the possibility to have a quick overview of the patient radiological exams and analyses.

In the future patients do not have to carry the information from one institution to another neither to worry about losing the papers as the projects will enable exchange of digital photos and analyses between hospitals. The important advantage in the treatment process will be the possibility to use the results of earlier analyses because they will be preserved in the digital information banks at least 110 years. Thanks to this system the doctors can consult their national and foreign colleagues.

Microlink LTD is working on the project to provide wider access to the digital information kept in central digital PACS archive of Tartu University Clinic and to start sending the results of the analyses electronically. The deadline of this project is 15th April 2008.

At the moment Tartu University Clinic, North-Estonian Regional Hospital and Central Hospital of Eastern-Tallinn are using the digital archive of different test results. In addition to these institutions, Central Hospital of Western Tallinn, Children Hospital of Tallinn, private hospital Fertilitas, Family Doctors Centres of Järveotsa and Koeru, as well as 97 providers of medical services in Harju County will be linked to the digital register project.

The projects are financed by EU structural funds. EU finances 75% of budget, 25% are co-financed by Estonian Government. The budget of digital archive is 185 343€ and the digital registries 191 734€.

2.3. Digital prescription

Medicaments are given to the patients on the paper-base prescriptions written by doctors. About 8 million prescriptions are printed out every year. Patient submits the prescription to the pharmacy where the chemist enters the data on the information system and delivers the medicament. The doctor

makes a report for the Estonian Health Insurance Fund how much and which types of prescriptions he/she has written.

At the moment, the doctors' and chemists' reports are time consuming. Besides, doctors make errors while calculating the discounts because the system is too complicated. The Health Insurance Fund will deduct the sum that is not correctly calculated later from the doctor's salary. There's always the risk of losing the paper-based prescription, for the new one, the patient has to return to see the doctor.

The objective of the digital prescription is to solve the above-mentioned problems through digitalising the prescription process. It should diminish errors and lost prescriptions. A central system will be created which will register incoming prescriptions and forward them on demand to the pharmacies' information system. The platform will enable to follow and manage the writing of prescriptions, to assure the exchange of medical and discount information. Lots of time of doctors and chemists will be saved. Besides, doctors can have feedback if the patient has bought the medicament. Information on the prescription will be more secured.

2.4. Estonian e-Health Foundation

In order to exploit modern technologies in health information system, Estonian Ministry of Social Affairs together with health care providers created Estonian e-Health Foundation. A supervising committee, consisting of the representatives of the founders, determines the strategical work of the foundation.

The objective of the organisation is to raise the quality of the treatment through the better management of information concerning patients. It would give a better overview of the health care process on national level. The foundation also aims at solving the general problems of health care and decrease through it the costs spent on information technology, cooperation between medical institutions and organisation.

Foundation initiates and leads following projects and activities: national e-health projects as digital health record, digital photos etc; development of health care standards and classification.

It coordinates and develops the harmonisation of providers of medical services in Estonia, manages national health registers and organises the technological integration projects and prepares procurements.

During 2005-2008 the following projects are in progress: register of medical deaths causes, digital register information, central component of geriatric software EstRAI, health portal for schools, information portal about infectious diseases and centralised information about vaccinations.

In 2006 a **forum of e-Health** was opened in Internet where citizens can ask questions about above-mentioned health projects, make comments and proposals. The forum is accessible on <http://foorum.e-tervis.ee/>
The website of the foundations is: <http://www.e-tervis.ee>

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3. South-Estonian hospital and e-Health development in Võru County

3.1. South-Estonian Hospital



South-Estonian Hospital or simply Võru hospital is located 5 km from the centre of Võru town in the Southeastern corner of Estonia. The 9 floor building with 22 886 m² is surrounded by pine forest and not very far from Kubija lake. The **hospital was opened in May 1982** but the technical project was already achieved in 1968. A polyclinic from 1975 year in the centre of Võru town belongs also to the Hospital. The 13 municipalities of Võru County own hospital.

Nowadays the objective of the hospital is to provide high quality health and social care services. Hospital works in cooperation with regional family doctors, Tartu University Clinic and other health care providers.

“Satisfied client is the measure of our activities” explains the chief doctor Rein Kermes.

Hospital consists of following institutions: clinic of surgery and anaesthesia, clinic of internal diseases, service of diagnostics and rehabilitation centre. In the hospital there are working traditional Estonian specialised doctors as aorist, dermatologist, psychologist etc.

3.2. Electronical medical story

Nearly **all medical stories are inserted into electronical database ESTER** adapted from the Ministry of Internal Affairs. This system enables the exchange of information about the patient via intranet.

“On the one hand, electronical information is practical, but on the other, it might be sometimes complicated to find the needed information”, comments doctor Kermes.

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All information is doubled in paper version as indicated by the law. The synopsis of illness and the treatment is printed out and signed by the doctor. If the digital signature possibility existed, there would be no need for the synopsis on paper.

Võru hospital uses the same radiological database with Tartu University Clinic. All Estonian digital radiological pictures are doubled in two reflecting systems in Tartu and Tallinn.

The website of the hospital is: www.vh.ee

3.3. Electronical registers (booking)

All regional family doctors have access to the **electronically register or booking system of South-Estonian hospital**. They can book a reception time for their patients according to their needs. In Estonian medical system a patient cannot go directly to a specialised doctor but has to have a prescription from his/her family doctor.

Patient can register also himself/herself by filling in a registration form on the website of hospital. Somebody from hospital staff will respond by e-mail informing about the free possibilities. In the same way it is also possible to cancel the reservation.

As many specialised doctors moved from clinic to the hospital building, this system has been well accepted by the doctors. The family doctors have been asked to use as much as possible electronical booking system in order to keep the hospital's telephone lines opened.

Regularly working broadband connection is now very important as doctors use more and more Internet to communicate. The connection must be fast and reach also the rural areas.

3.4. Digital laboratory

When a patient has to make some tests or analyses in the hospital or polyclinic laboratory, the **results of the analyses arrive electronically to his/her medical history**. The system could be developed in a way that the patient have a bar code that inserted to the system search information about his/her case. At the moment lot of time is spent for inserting the data to the system.

4. Baltic Broadband Project and Digital radiographic system in South-Estonian Hospital

4.1. Decision making and the impact for the region

South-Estonian hospital is administered by a foundation Healthy Võrumaa who owns 100% of the shares of the South-Estonian Hospital Ltd. The members of the foundation are from 13 local municipalities. Thus, hospital is functioning as a private-public partnership cooperation unit.

In order to improve the quality of the services and also to cover the lack of radiological doctors, the hospital administration made a decision to purchase two new radiological information systems (RIS) to the hospital and to the polyclinic. At the same time it was decided that the hospital needed better Internet connection in order to start offering good quality e Health services.

The work group started the procurement process for the RIS system purchase and also a search for additional financement. At the same time Võru County Government was planning the activities of Baltic Rural Broadband project and the network solutions for different institutions in Võru County.

The two work groups met and BRB project team accepted the RIS project of the hospital as part of the project. Together with the hospital specialists and the procurement experts, 2 procurements were made in order to purchase the RIS systems.

Now, when the RIS systems have worked one year in the hospital and in the polyclinic, the impact is considerable for the region. First, it saves the time and money of the patients, they do not need to cover long distances and carry the radiological images with them. Second, the radiological doctor can examine the images in whatever hospital in Estonia, and it is a great additional value for the hospital.

Third, on the bases of quality images, the hospital works in cooperation with other Estonian hospitals and exchanges medical data. Within the project, a cooperation has begun also with Turki region hospital.

The activities together with the training of the hospital staff took place in 2005. As the experts coordinated the procurement procedure, there were no problems.

The only challenge for the Võru County Government was the ownership of the one RIS system that was financed within the BRB project. According to the procurement rules, the investments have to belong for 5 years to the organisation that calls for tender. Thus the financial department had to make necessary paperwork in order to take the RIS on the account of the County Government, after what a contract of free use of RIS was concluded between the county government and hospital.

4.2. Model of financing

The purchase and installation of **AGFA digital radiographic system** was one of the most important activities within the BRB project which cost 750 000 EEK (47 933€). 75% of it was paid by EU Interreg III B program, 25% came from the budget of Estonian Government. The second identical system was also bought by hospital for the Võru polyclinic with the own means of hospital.

“Without the initiation of Võru County Government and Interreg support, we could not have bought the two systems because we could not have allowed an investment of 1,5 mil EEK”.

After the necessary procurement, the systems work since the end of 2005 in the hospital and polyclinic. One of the systems is the property of the County Government for 5 years.

4.3. How does the RIS system work?

New mechanism takes a roentgenogram digitally to the phosphorus plate, which is put to the reading system. The tube and mechanism used for roentgenogram are the same as earlier.

The photos are made in the radiological office; afterwards the radiologist examines the photos in photo editing room..

Radiological nurse, who after taking a picture inserts the phosphorus record cassette to the reading system, takes the photos of patients. After this, the image appears to the computer screen and the nurse enters patient's name and code to the program. The nurse also adds some letters to mark the difference between left and right side images. All the data is entered to the hospital internal information program ESTER where the doctor can examine the picture.

“The new system is time saving and facilitates the work of nurses and doctors”, comments Linda Ots one of the six nurses in radiological office in Võru Hospital. Before this technique the roentgenograms were taken to the film, which had to be developed in a dark room. The nurse had to work between several rooms and once the photos developed, note with a permanent marker the data concerning the patient on the photo and also to a medical dossier. At the end the picture was taken to the doctor. This work was unhealthy and time consuming. Often the picture was still wet when the doctor had to examine it. Now it takes only two minutes to see the picture on the screen.

This system is very useful in cases where the photo of the same organ has to be taken several times (after a certain interval) in one day. For example photos were taken of kidneys, first normally and then using a contrasting liquid to see how fast does it move in the kidneys.

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The radiological office works 24 h a day. **Approximately 80 photos are taken every day**, in addition to the 30-40 made in Võru polyclinic. Hospital also has a mobile radiographer, which is taken to the surgeries if needed. Often unconscious persons have to be examined, this is the most complicated part of the work.

Some photos are taken directly by the radiologist (as large intestine, stomach and digestive tract) who chooses the projections.

“The system functions very well and it has a high quality, we can also enlarge the pictures”, explains the nurse Linda Ots.

“We were really waiting for it, our work is much more effective now. Before nobody knew how the pictures turned out before developing”, adds the radiologist.

Now the pictures are kept in a database, patients will not have them any more and do not have to “carry” them to one doctor to another. Before, often the pictured got lost and turned yellow with time.

The work of the radiologist is to communicate the information on the photos to the doctors in order they could interpret the picture. Võru Hospital has also a contract with two radiologists of Viljandi county hospital who interpret the photos via Internet. They used to drive to Võru every week (the distance between two towns is 128 km). This kind of cooperation helps to manage in the situation of lack of doctors, and simply helps to share the information between doctors.

Radiologist looks at the photos in computer room, from three different screens. She can have a look at earlier pictures or pictures from Tartu University Clinics at her room. “The more information we have, the better the diagnosis”, tells Laivi Kuus.

The patients are not being exposed to the radioactive X-rays as much as it used to be earlier as different medical institutions do not have to take new pictures. Now the good quality Internet connection is vital.

“If we have technical problems, the work of the whole day is stopped”, explains Laivi Kuus. “It is a very serious problem but luckily the problems have not occurred very often. I was afraid it would be worse”.

4.4. Transnational and regional cooperation within Baltic Rural Broadband project

South-Estonian hospital has a good cooperation within the BRB project with Finnish professor Patrik Eklund. Several work meetings have taken place in order to study if Võru hospital could use an assessment program worked out in Umea University for the dementia patients. This is a computer program that should be translated into Estonian.

Chief doctor Rein Kermes has also visited a day care clinic in Turku region within one Steering Committee meeting.

Several regional family doctors were questioned about the use of digital pictures. All of them use it and are very satisfied with the results. The work of family doctors is much easier and time saving especially when the doctors have lot of work. For the doctors in rural area, good Internet connection is vital, without it they could not communicate with hospital and Health Insurance Fund.

There are still some technical Internet problems in some villages (due to the hilly landscape and forests), those problems will be solved within the BRB project. The town doctors are very satisfied with the quality and speed of Internet connection.

At the moment family doctors do not need additional computer trainings, they have been trained to use ESTER and other health care information systems and Internet lists.



5. Recommendations

Even if every project is different, depending upon the status of the partner (public, private or third sector), different local and national conditions, some general recommendations can be made based on the cooperation of different sectors within the Baltic Rural Broadband Project. They could be listed as follows:

- It is important to gather information about regional and national situation: governmental priorities, projects, strategical priorities for the next years in order to harmonize the activities with the context;
- Bear in mind the national (and international) market situation in your project field: sometimes it turns out that “market law” does not function in all regions at the same way and you have to find additional resources in order to attract important service providers into your region;
- Gather information about technical possibilities, developments and tests’ results. Use the test results wherever possible to convince your potential financiers, politics etc who play important role in your project;
- While starting your project idea, plan lot of time in case of necessity of procurements. Always include experienced experts into the process in order to avoid the misunderstandings and discussions with the potential service/equipment providers after the procurement. Whenever possible contact the experts that have participated in the similar procedures in your field of action (private/public).
- Include as much as possible local partners into the decision and implementation process of the activities. Share the responsibility between partners; take time for the discussions and work sessions.
- Consider different investment models: private-public partnerships, national funds, regional support possibilities;
- Always bear in mind that even if you’re planning the activities with lot of time supply, there’ll be always surprises and limitations in your resources: try to be as flexible as possible in you working methods and adapt yourself with the new situation.
- There’s never enough communication with your partners, financiers, decision makers and medias. Do not forget to work on a media plan how to inform a larger public of your project progress.

