

E-Health Initiatives in Estonia

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Estonia is a European leader when it comes to E-health solutions. This article provides an overview of the present state of E-health in Estonia and the plans that are being made for the future.

INTRODUCTION

Estonia is known in the world as a successful E-state. The relevant solutions have, almost unnoticed, become an inseparable component in Estonian lives. In 2005, for instance, 76% of income tax returns in Estonia were filed electronically. In five of the country's cities one pay the fee for car parking by mobile phone. ID cards can be used for E-elections, to buy bus tickets, to access online applications related to many state and private companies, and to sign notary contracts.

E-health developments gained speed in 2002, when three major projects were launched simultaneously. These included the digital health record, the electronic medical history, and the health bank. This article reviews the present state of these and other projects, as well as plans for the future.

E-HEALTH INFRASTRUCTURE

The cornerstone for successful Estonian E-solutions is a modern E-state infrastructure, commonly known as "X-Road". Digital signatures and ID cards are the basic elements which enable the creation of new, high quality E-services.

Digital signatures and handwritten signatures have been equally valid since February 2000. The Public Key Interface (PKI) solution in Estonia is unique in its use of a time stamp. Each digitally signed document indicates the exact time when it was signed. The Estonian ID card can be used for digital signatures. The card is mandatory for anyone who is a permanent resident of Estonia. It includes two certificates and two private keys. One certification is meant for the authenti-

cation of the individual, and the other is used for digital signatures. Each person who has an ID card has an automatic E-mail address – name.surname@eesti.ee. The address can be diverted to other E-mail systems, as needed by the individual. In mid-May 2005, a total of 758,288 ID cards had been issued (the population of Estonia is 1.3 million).

The X-Road environment was created so as to link up Estonian government records and other information systems. Each system that is connected to X-Road can communicate with others in a standardised way. Most state records are connected to the system at this time. New E-state systems must always be connected through X-Road.

E-health solutions are among those which communicate via X-Road in Estonia (Figure 1). ID cards are used for secure access to health care professionals and patients alike.

DIGITAL HEALTH RECORD

The most extensive E-health project in recent years in Estonia has been the Digital Health Record project, which was conducted by the Ministry of Social Affairs. The Digital Health Record includes four national E-health initiatives. The project was begun in 2002 under the framework of the Health Care Project 2015. Over the course of the subsequent three years, needs have been identified, and various solutions have been sketched out.

A co-ordinating committee and a set of expert groups were established by the ministry. Brainstorming sessions were held among medical and IT experts, essentials were defined, and consensus was achieved between the needs of the state and the needs of health care institutions. In the spring of 2004, a health record business plan, cost analysis, risk analysis, and analysis of security and legal issues were all commissioned from Estonia's leading con-

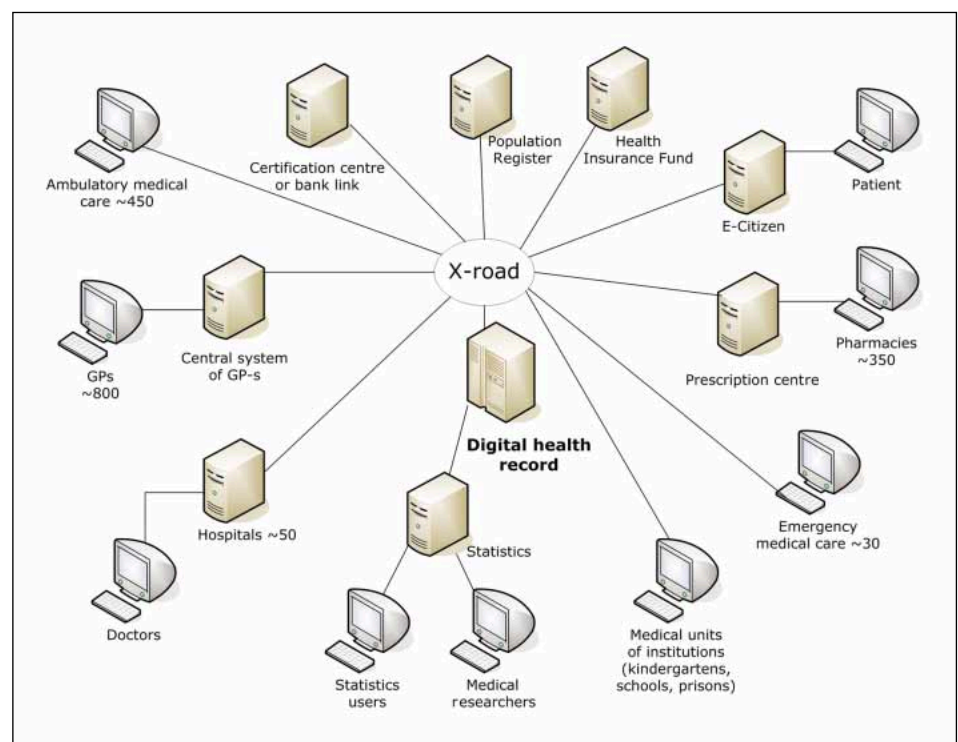


Figure 1. Parties to the Health Information System

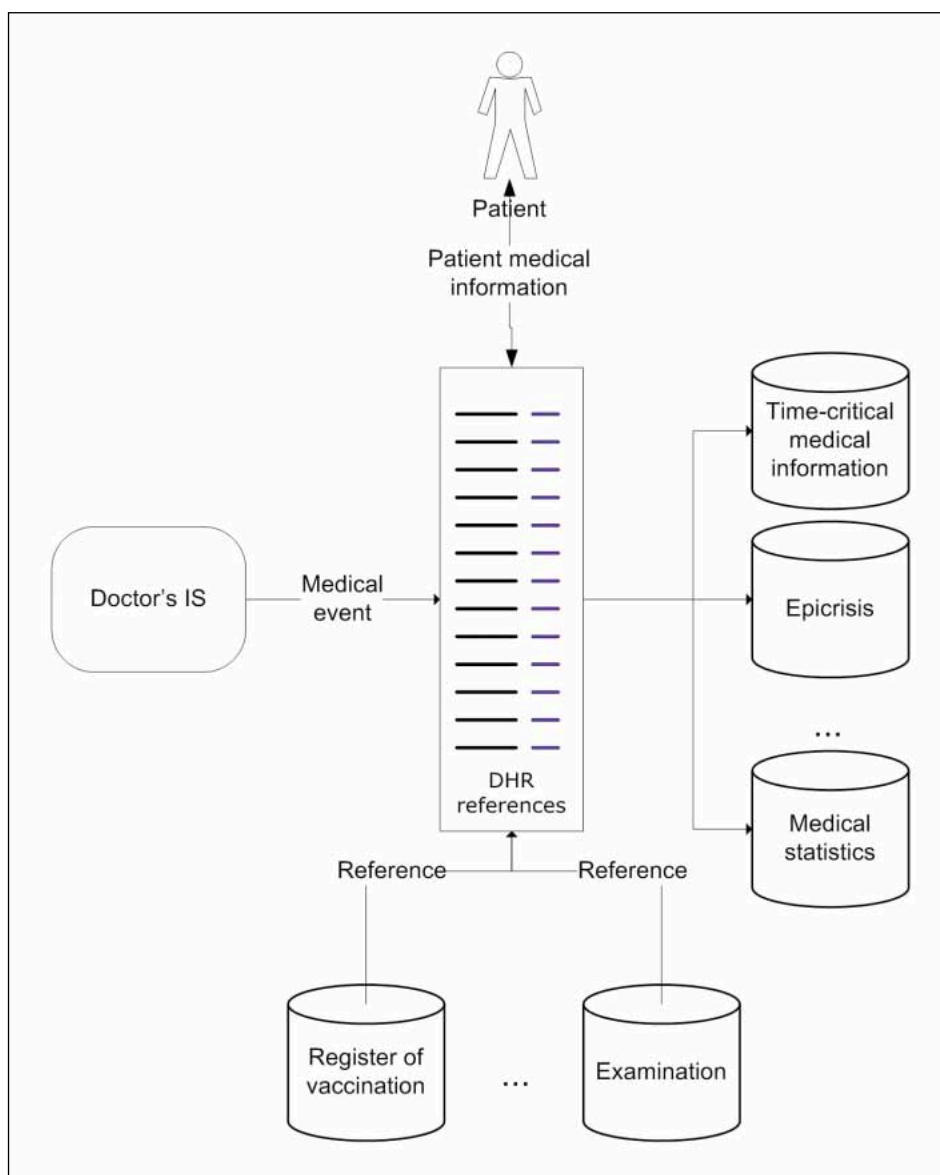


Figure 2. The reference register is the central element in the Digital Health Record.

sulting firms. The plan for the necessary information system and the vision for the Digital Health Record were prepared by the end of 2004. Early in 2005, the Ministry of Social Affairs, in co-operation with the Hansson, Leego & Partner company, correlated the work that had been done over the course of many years so as to prepare for international procurement.

The Digital Health Record project has been divided up into four sub-projects – the record itself, digital images, digital bookings, and digital prescriptions. Funding of EUR 2.2 million was provided by the government, with the help of the EU's structural funds. The importance of the issue was illus-

trated by the fact that financing for the E-health projects amounted to 28.3% of all state financing for IT projects, as funded by the EU. International bids for tender were to be announced in the summer of 2005, the first results are scheduled to appear early in 2006, and the entire project should be completed by 2008, if not earlier.

A brief description of the various sub-projects is offered below.

DIGITAL HEALTH RECORD INFORMATION SYSTEM

The aim of the digital health record information system is to collect medical data about patients into a central register. All institutions

which offer health care services are obliged to file information about patient visits with the digital health record reference register, along with links to the information in the IT systems of the care providers. With the help of these links, detailed information can be found electronically or through ordinary inquiries.

The central element in the Digital Health Record is the reference register (Figure 2). Time-critical information about the patient's health and information about the patient's visits to the doctor are gathered together in the register. Time-critical information (e.g., that which has to do with diabetes) is to be forwarded to emergency care providers within 30 seconds after a request.

The main users of the Digital Health Record information systems are doctors, who gain a quick overview of the patient's medical history. The government, in turn, can use the system to compile health care statistics. Patients can monitor their own medical histories.

DIGITAL PRESCRIPTIONS

The system is also meant to make the writing of prescriptions on paper an obsolete thing of the past (Figure 3).

Here is how this system works: The doctor prescribes medication to the patient. The system checks the Health Insurance Fund to see if there is any bargain percentage for the prescription. The prescription is then confirmed by the doctor and submitted to the register. The patient can then go to any pharmacy, where the pharmacist will seek out the prescription on the basis of the patient's personal data and then sell the medicine. Information about the purchase is submitted to the Digital Health Record.

The lives of doctors are much simplified by the fact that the bargain percentage is selected by the system. Calculation of the percentage is very complicated, and doctors can easily make mistakes. If they do, they have to make up the difference from their own pockets.

In terms of treatment, it is very important for doctors to know whether their patients have actually pur-

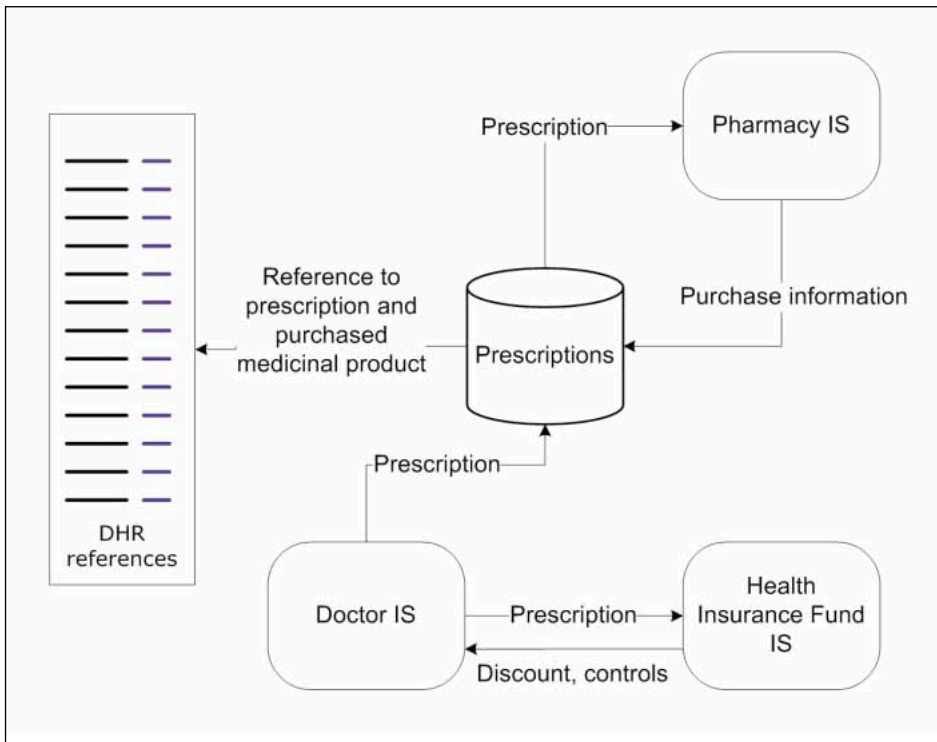


Figure 3. Paper-free prescriptions in the future

chased the medications that have been prescribed to them. If a patient's health does not improve, then it is easier to know whether the problem is with unsuitable medication or with a patient who has simply not followed instructions.

DIGITAL IMAGES

The information system for digital images makes it possible for doctors to access electronic images of a medical and diagnostic nature (Figure 4). Modern X-ray equipment, computer tomographs and other diagnostic devices can save electronic images. No more does a doctor have to print out X-ray images on film. It is much more convenient to review the images on a computer.

The digital images system allows radiologists to split up their workload. A doctor in a city can assess an image that is filed in the system from the countryside. No longer will patients need to travel to a city to perform medical diagnostics.

DIGITAL RESERVATIONS

The digital reservations information system (Figure 5) has two functions. Patients can book reservations with any doctor at any hospital, and

medical personnel can review the size of queues for treatment.

An overview of the queue is needed so that the Health Insurance Fund can divert funds to those areas where the need is greater and the queues are longer. Alternatively, patients can be directed to places where queues are shorter.

The reservations system will probably not be fully functional for some time to come. It is an elegant system, but many hospitals and other treatment facilities will have to reorganise their working processes to a considerable degree so that they are compatible with the national system.

OTHER E-HEALTH INITIATIVES

It is not just the state which has been active in E-health projects. Private business has also been a part of the mix. Here is a brief look at some of the most outstanding examples.

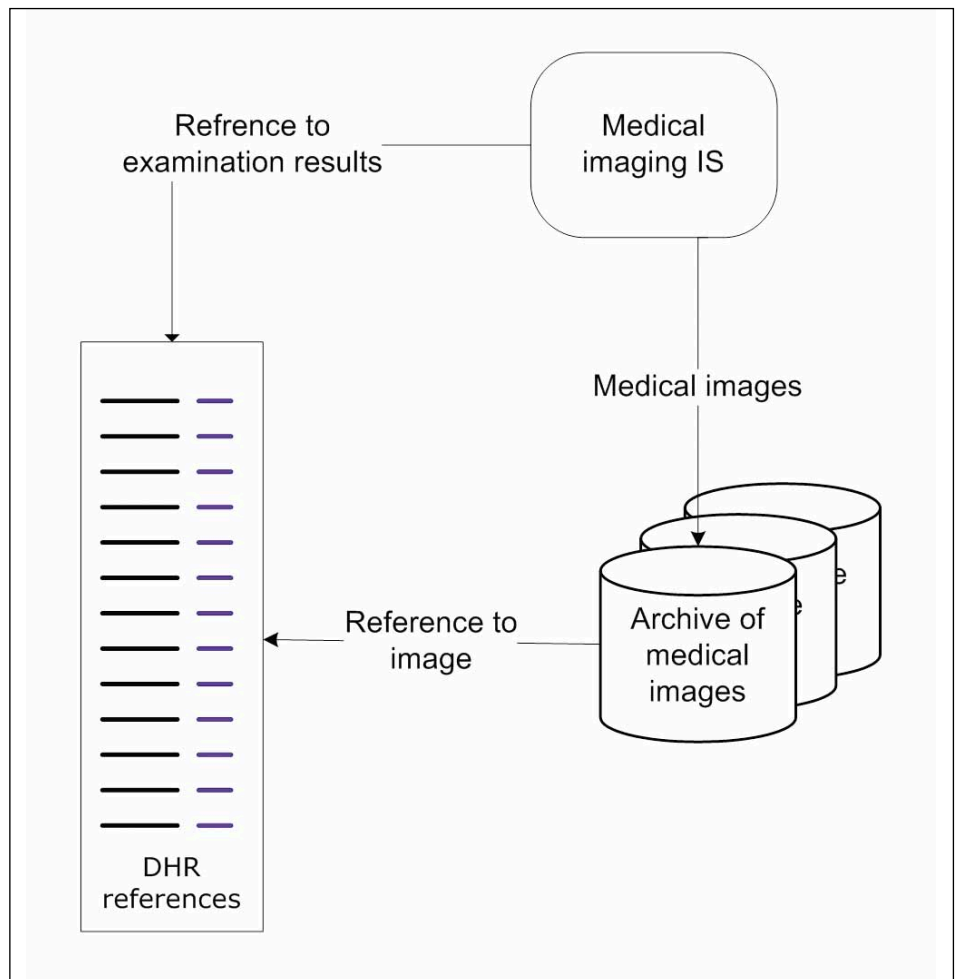


Figure 4. Digital images will be available to every doctor.

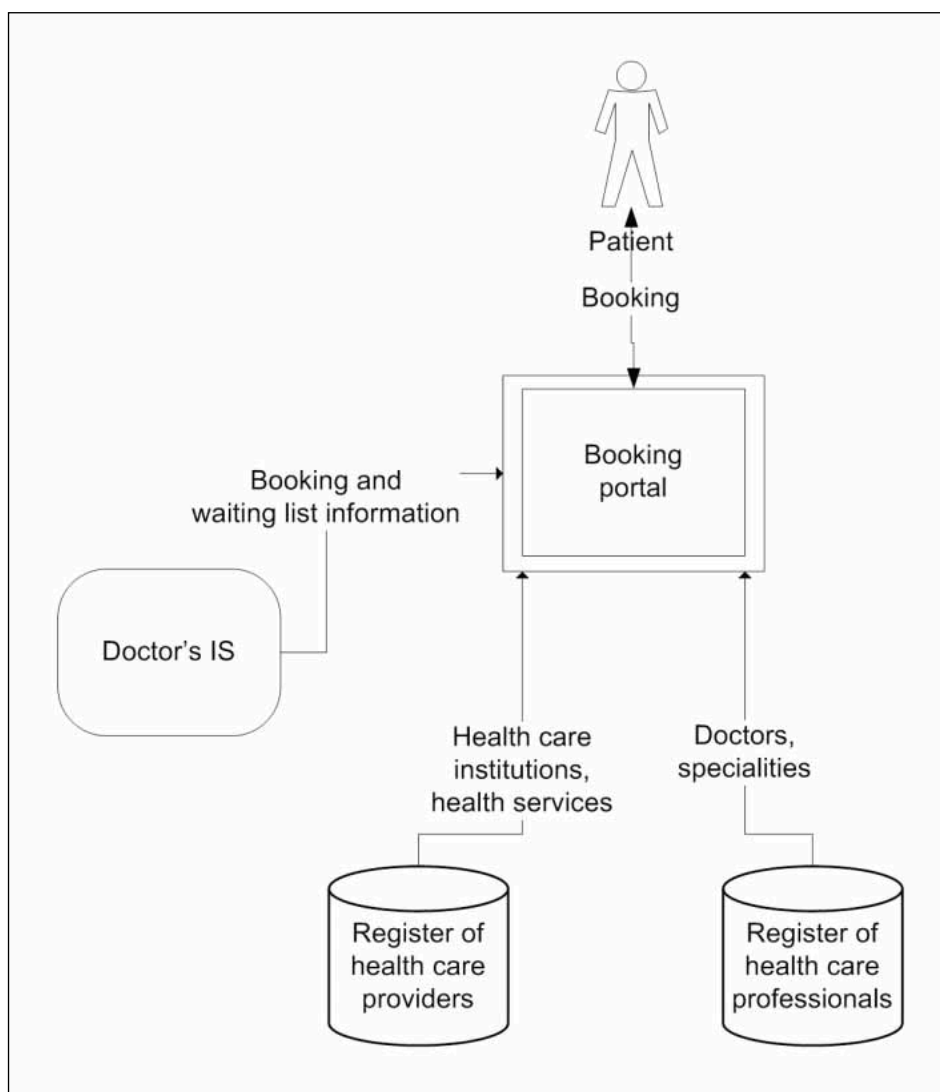


Figure 5. Digital reservations simplify access to medical care.

1. The electronic health records information system. In 2002, Estonia's only university hospital, the Tartu University Hospital, began work on an electronic health records information system which covers the entire hospital and all of its activities. The complexity of a major hospital's information system is such that the launch of a system from scratch was certainly a bold step to take. In the spring of 2005, the basic core and the first important modules of the system were in place after thorough testing. The system has the potential to become a standard solution for Estonian hospitals.

2. A health bank. The Estonian Association of Family Physicians and a company called Tervisepank have created a standard and convenient solution for the work of family doctors in

Estonia. Data protection rules in Estonia are very strict, and it is often difficult for family doctors – most of them private entrepreneurs who work alone – to ensure that all security rules are observed in their practice. It is much safer for them to store data about patients in a central server.

The Tervisepank (Health Bank) is a centralised application for family doctors on the Internet. It was put in place and received data protection authorisation at the end of 2004. Ten family doctors had joined the system at the beginning of 2005 (out of 800 family doctors in Estonia), but the system certainly has the potential of becoming a family doctor-centred system.

3. Doktor.ee. A private company called 7i worked with an IT firm called Helmes to create a reserva-

tions system for patients. It is similar to the one that is discussed above – patients can make appointments at all health care institutions which have joined the system, and they can use the system to pay for the services that have been provided.

In May 2005, the system was instituted as a pilot project at Estonia's fourth largest hospital – the West Tallinn Central Hospital. The ambition of project organisers is to get all health care institutions hooked up by the end of 2006.

4. Online inspection of insurance. The Estonian system for online inspections of insurance is unique in Europe. Since August 2004, people have no longer had to carry around a health insurance card. All that a patient has to do is present his or her ID card, and then the status of insurance is checked through the Health Insurance Fund's server in real time.

BALTIC E-HEALTH

Estonia, Norway, Denmark, Finland and Lithuania have joined together in search for a solution in the transnational exchange of health information and data. Tele-radiology is the first area in which this solution has been applied, and a successful pilot project involved the exchange of data and radiology images among Danish, Estonian and Lithuanian hospitals.

The broader aim of the project is to avoid urbanisation by enabling high quality health services in each country's regions via the help of telemedicine.

SUMMARY

Estonia is a European leader in E-health solutions. The key to development lies in the modern infrastructure of the E-state. Digital health record projects are setting an example in the industry. Four major initiatives have covered the most important needs in the area of E-health. Estonia is a small country, and in that sense it offers wonderful opportunities to test innovative solutions.

Much depends on the eagerness of those who are involved, of course. At this time it appears that Estonia is an enthusiastic kind of place. Where there is a will, there is a way. □