

Country Brief: Estonia

Authors: P. Doupi, E. Renko, S. Giest, J. Heywood, J. Dumortier

October 2010



European Commission,
DG Information Society and Media,
ICT for Health Unit



European Commission
Information Society and Media



About the eHealth Strategies study

The eHealth Strategies study analyses policy development and planning, implementation measures as well as progress achieved with respect to national and regional eHealth solutions in EU and EEA Member States, with emphasis on barriers and enablers beyond technology. The focus is on infrastructure elements and selected solutions emphasised in the European eHealth Action Plan of 2004

Disclaimer

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information. The views expressed in this report are those of the authors and do not necessarily reflect those of the European Commission. Nothing in this report implies or expresses a warranty of any kind.

Acknowledgements

This report was prepared by empirica on behalf of the European Commission, DG Information Society & Media. empirica would like to thank Jos Dumortier, Time.lex CVBA for the review of the section on legal issues, and Professor Denis Protti (University of Victoria) for valuable feedback.

Reviewer

Pille Kink

Contact

For further information about this Study or *eHealth Strategies*, please contact:

		
<p>empirica Gesellschaft für Kommunikations- und Technologieforschung mbH Oxfordstr. 2, 53111 Bonn, Germany Fax: (49-228) 98530-12 info@empirica.com</p>	<p>eHealth Strategies c/o empirica GmbH Oxfordstr. 2, 53111 Bonn, Germany Fax: (49-228) 98530-12 eHStrategies@empirica.com</p>	<p>European Commission DG Information Society and Media, ICT for Health Unit Fax: (32-2) 02-296 01 81 eHealth@ec.europa.eu</p>

Rights restrictions

Any reproduction or republication of this report as a whole or in parts without prior authorisation is strictly prohibited.

Bonn / Brussels, September 2010

Table of contents

1	Introduction to the report	6
1.1	Motivation of the eHStrategies study	6
1.2	Survey methodology	7
1.3	Outline.....	8
2	Healthcare system setting	9
2.1	Country introduction	9
2.2	Healthcare governance	10
2.3	Recent reforms and priorities of health system/public health	11
2.4	ICT use among general practitioners	12
3	eHealth strategies survey results	14
3.1	eHealth policy action.....	14
3.1.1	<i>Current strategy/roadmap</i>	14
3.2	Administrative and organisational structure.....	17
3.3	Deployment of eHealth applications.....	18
3.3.1	<i>Patient summary and electronic health record (EHR)</i>	19
3.3.2	<i>ePrescription</i>	22
3.3.3	<i>Standards</i>	24
3.3.4	<i>Telemedicine</i>	24
3.4	Technical aspects of implementation.....	26
3.4.1	<i>Unique identification of patients</i>	26
3.4.2	<i>Unique identification of healthcare professionals</i>	26
3.4.3	<i>The role of eCards</i>	27
3.5	Legal and regulatory facilitators.....	28
3.5.1	<i>Patient rights</i>	29
3.5.2	<i>Personal data protection act</i>	29
3.6	Financing and reimbursement issues	30
3.7	Evaluation results/plans/activities.....	32
4	Outlook	32
5	List of abbreviations	34
6	References	36

Executive summary

Since 2005, the Estonian countrywide eHealth approach includes four pillars: Electronic Health Records (EHR), Digital Registrations, Digital Imaging and Digital Prescriptions. The idea for developing a National Health Information System was introduced by the *Estonian Health Project 2015* in 2000 and in 2003 the Department of Health Information and Analysis was established for the practical development of the project's strategy. In addition to this, the *Estonian Information Society Strategy 2013*¹ and its Implementation Plan are directly linked to the Health Strategy.

Another important development is the launch of the framework of the 2007-2013 strategy *Knowledge-Based Estonia*. This document draws upon ICT utilisation roadmaps in six focus areas with one of these areas being healthcare.

In January 2009, the *National Health Development Plan*² (NPHS) 2009-2020 was presented by the Estonian government and its implementation plan 2009-2012 came into effect. It is a master document integrating many thematic development plans and strategies affecting the health condition of the population into a comprehensive national public health policy document. Thereby, eHealth is one of the issues addressed.

In order to consider Estonia's position regarding eHealth interoperability objectives the following eHealth applications have been examined: patient summaries and electronic health records, ePrescription, standards and telemedicine. In overview Estonia's situation is as follows:

The Estonian Electronic Health Record System (EHR) encompasses the whole country, registers virtually all residents' medical history from birth to death, and is based on state-developed IT infrastructure. It was launched on 17th December 2008 and since 1st January 2009 all healthcare providers have been obliged to send an agreed number of standardised medical documents, electronic information notes and electronic medical documents to it.

The Estonian Ministry of Social Affairs launched a pilot phase of ePrescription services which ran until January 2010³. Now, the central ePrescription system has been implemented and enables medical personnel and pharmacies to monitor and manage the issuing of prescriptions.

In Estonia, the eHealth Foundation and the Centre for Standardisation are responsible for the use of health informatics standards. In January 2010, Estonia became a Member of the International Health Terminology Standards Development Organisation to enable the use of Snomed CT in connection to digital health records, health research and other applications.

In December 2007, the Estonian Telemedicine Association was created as a sub-organisation of the Finnish Society of Telemedicine and eHealth. In general, Estonia has been or is part of several small projects, which are related to the use of telemedical applications.

¹ Ministry of Economic Affairs and Communications 2006

² Läänelaid 2008

³ The pilots were mostly carried out in the area of Tallinn, Tartu and Viljandi.

List of figures

Figure 1: Important features of primary healthcare organisation in Estonia..... 11

Figure 2: Estonian policy documents related to eHealth..... 17

Figure 3: Division of responsibilities among Estonian eHealth institutions 18

Figure 4: eHealth components of the Estonian health information system 18

Figure 5: Estonian ePrescription system..... 22

Figure 6: ePrescription progress in Estonia..... 23

Figure 7: Telemedicine services in Estonia 26

Figure 8: eCards in Estonia 28

Figure 9: EU Fund Distribution in Estonia 31

1 Introduction to the report

1.1 Motivation of the eHealth Strategies study

Following the *Communication* of the European Commission (EC) on “eHealth – making healthcare better for European citizens: An action plan for a European eHealth Area”⁴ Member States of the European Union (EU) have committed themselves to develop and issue national roadmaps – national strategies and plans for the deployment of eHealth applications addressing policy actions identified in the European eHealth Action Plan.

The *2004 eHealth Action Plan* required the Commission to *regularly monitor* the state of the art in deployment of eHealth, the progress made in agreeing on and updating national eHealth Roadmaps, and to facilitate the exchange of good practices. Furthermore, in December 2006 the EU Competitiveness Council agreed to launch the *Lead Market Initiative*⁵ as a new policy approach aiming at the creation of markets with high economic and social value, in which European companies could develop a globally leading role. Following this impetus, the Roadmap for implementation of the “eHealth Task Force Lead Market Initiative” also identified better coordination and exchange of good practices in eHealth as a way to reduce market fragmentation and lack of interoperability.⁶

On the more specific aspects of electronic health record (EHR) systems, the recent *EC Recommendation on cross-border interoperability of electronic health record systems*⁷ notes under “Monitoring and Evaluation”, that “in order to ensure monitoring and evaluation of cross-border interoperability of electronic health record systems, Member States should: consider the possibilities for setting up a monitoring observatory for interoperability of electronic health record systems in the Community to monitor, benchmark and assess progress on technical and semantic interoperability for successful implementation of electronic health record systems.” The present study certainly is a contribution to monitoring the progress made in establishing national/regional EHR systems in Member States. It also provides analytical information and support to current efforts by the European Large Scale Pilot (LSP) on cross-border Patient Summary and ePrescription services, the epSOS - European patients Smart Open Services - project.⁸ With the involvement of almost all Member States, its goal is to define and implement a European wide standard for such applications at the interface between national health systems.

Earlier, in line with the requirement to “regularly monitor the state of the art in deployment of eHealth”, the EC already funded a first project to map national eHealth strategies – the eHealth ERA “Towards the establishment of a European eHealth Research Area” (FP6 Coordination Action)⁹ - and a project on “Good eHealth: Study on the exchange of good

⁴ European Commission 2004

⁵ European Commission 2007

⁶ European Communities 2007

⁷ European Commission 2008

⁸ European Patients Smart and Open Services (epSOS)

⁹ eHealth Priorities and Strategies in European Countries 2007

practices in eHealth"¹⁰ mapping good practices in Europe - both of which provided valuable input to the present *eHealth Strategies* work and its reports. Member States' representatives and eHealth stakeholders, e.g. in the context of the *i2010 Subgroup on eHealth* and the annual European High Level eHealth Conference have underlined the importance of this work and the need to maintain it updated to continue to benefit from it.

This country report on Estonia summarises main findings and an assessment of progress made towards realising key objectives of the eHealth Action Plan. It presents lessons learned from the national eHealth programme, planning and implementation efforts and provides an outlook on future developments.

1.2 Survey methodology

After developing an overall conceptual approach and establishing a comprehensive analytical framework, national level information was collected through a long-standing Europe-wide network of national correspondents commanding an impressive experience in such work. In addition, a handbook containing definitions of key concepts was distributed among the correspondents to guarantee a certain consistency in reporting. For Estonia, the National Institute for Health and Welfare¹¹ (THL) provided information on policy contexts and situations, policies and initiatives and examples for specific applications. THL generates information and know-how in the field of welfare and health and forwards them to decision-makers and other actors in the field. The centre is overseen by the Finnish Ministry of Social Affairs and Health.

The key tool to collect this information from the correspondents was an online survey template containing six main sections:

- A. National eHealth Strategy
- B. eHealth Implementations
- C. Legal and Regulatory Facilitators
- D. Administrative and Process Support
- E. Financing and Reimbursement Issues
- F. Evaluation

Under each section, specific questions were formulated and combined with free text fields and drop-down menus. The drop-down menus were designed to capture dates and stages of development (planning/implementation/routine operation). In addition, drop-down menus were designed to limit the number of possible answering options, for example with regard to specific telemedicine services or issues included in a strategy document. The overall purpose was to assure as much consistency as reasonably possible when comparing developments in different countries, in spite of the well-know disparity of European national and regional health system structures and services.

Under Section B on eHealth implementation, questions regarding the following applications were formulated: existence and deployment of patient and healthcare

¹⁰ European Commission; Information Society and Media Directorate-General 2009

¹¹ National Institute for Health and Welfare (THL) 2010

provider identifiers, eCards, patient summary, ePrescription, standards as well as telemonitoring and telecare.

The data and information gathering followed a multi-stage approach. In order to create a *baseline* for the progress assessment, the empirica team filled in those parts of the respective questions dealing with the state of affairs about 3 to 4 years ago, thereby drawing on data from earlier eHealth ERA reports, case studies, etc. to the extent meaningfully possible. In the next step, national correspondents respectively partners from the study team filled in the template on recent developments in the healthcare sector of the corresponding country. These results were checked, further improved and validated by independent experts whenever possible.

Progress of eHealth in Estonia is described in chapter 3 of this report in the respective thematic subsections. The graphical illustrations presented there deliberately focus on key items on the progress timeline and cannot reflect all activities undertaken.

This report was subjected to both an internal and an external quality review process. Nevertheless, the document may not fully reflect the real situation and the analysis may not be exhaustive due to focusing on European policy priorities as well as due to limited study resources, and the consequent need for preferentially describing certain activities over others. Also, the views of those who helped to collect, interpret and validate contents may have had an impact.

1.3 Outline

At the outset and as an introduction, the report provides in chapter 2 general background information on the *Estonian* healthcare system. It is concerned with the overall system setting, such as decision making bodies, healthcare service providers and health indicator data.

Chapter 3 presents the current situation of selected key eHealth developments based on detailed analyses of available documents and other information by national correspondents and data gathered by them through a well-structured online questionnaire. It touches on issues and challenges around eHealth policy activities, administrative and organisational structure, the deployment of selected eHealth applications, technical aspects of their implementation, legal and regulatory facilitators, financing and reimbursement issues, and finally evaluation results, plans, and activities

The report finishes with a short outlook.

2 Healthcare system setting

2.1 Country introduction¹²

Estonia is the northernmost of the Baltic States, lying on the east coast of the Baltic Sea, with Latvia to the south and Russia to the east. It has a population of 1.34 million which makes it the smallest of the three Baltic countries formerly belonging to the Soviet Union. It is a unitary and sovereign democratic republic. Its Central Government consists of 11 Ministries and various Central Offices. There is no elected regional government. Estonia has a single-level local government. All local issues are managed and resolved autonomously by the local authorities, which have an independent budget. State tasks may be imposed on local authorities only pursuant to law or under an agreement with them. Estonia is a democratic parliamentary republic and has belonged to the North Atlantic Treaty Organisation (NATO) and the European Union (EU) since 2004. Since regaining independence, the political environment has been stable enough to implement various economic and social sector reforms which aim to further ensure stability in Estonia.

Estonia has vigorously and quite successfully reformed its health system over the last decades. Whereas incremental changes have been observed in the last five years, larger scale legislative reforms had been implemented since the early 1990s and at the beginning of this century. The current system is built on solidarity based health financing; a modern provider network based on family-medicine centred primary healthcare (PHC); modern hospital services and more attention for public health. This has resulted in a steadily increasing life expectancy and continuously high population satisfaction rates with access and quality.

The box below summarises the key facts about the Estonian healthcare system:

Key facts about the Estonian healthcare system:¹³

Life expectancy at birth: 74.34 years (WHO 2008)

Healthcare Expenditure as % of GDP: 6.1% (NIHD 2008)¹⁴

WHO Ranking of Healthcare systems: rank 77

Public sector healthcare expenditure as % of total healthcare expenditure: 78% (NIHD 2008)

¹² Evidence-based support for the design and delivery of user-centred online public services ; Koppel, Kahur et al. 2008

¹³ Data from World Health Organization 2000; Health Consumer Powerhouse 2008; World Health Organization 2009

¹⁴ Tervise Arengu Instituut [National Institute for Health Development] 2008

2.2 Healthcare governance¹⁵

Decision making bodies, responsibilities, sharing of power

The steward of the health system in Estonia is the Ministry of Social Affairs. The organisational structure in the health system is advanced and comprises numerous actors, including various agencies under the Ministry of Social Affairs (e.g. State Agency of Medicines (SAM), Health Board (HB), National Institute for Health Development (NIHD); public independent bodies Estonian Health Insurance Fund (EHIF); (mainly publicly owned) hospitals under private regulation and private primary care units; and various nongovernmental organisations (NGOs) and professional associations.

In recent years, other sectors (e.g. agriculture, justice, economy, environment and transport) have started to be more actively involved in health system activities due to the development and implementation of inter-sectoral public health strategies. In this environment, with many stakeholders and diverging responsibilities, a correct balance between the stewardship role, direct control mechanisms, good governance and proper accountability is continuously aimed for within the Ministry of Social Affairs and within the health system.

Healthcare service providers

Reforms which started in the early 1990s introduced the principles of a purchaser and provider split; strengthening primary care; free choice of provider; and a high level of provider autonomy in the Estonian healthcare system. As a result, the current Estonian healthcare system is built around countrywide primary care which is centred around family medicine, with specially trained doctors and nurses. Primary care is supported by ambulant services available all over Estonia. Specialised care has increasingly been provided in outpatient settings and care involving high technology has been centralised to fewer institutions. Furthermore, over the years, availability of and access to pharmaceuticals has increased significantly. Increasing importance of public health services has led to development of services and standards, raised awareness of the population, as well as an increased public health approach to healthcare services.

Increasing concerns of the population are waiting times to access outpatient services and overall access to healthcare services. Various initiatives have been implemented, including opening a 24-hour primary care call centre in late 2005; widening the scope of services; and introducing financial incentives as quality bonus. In addition, more emphasis is put on quality of care, which is visible in initiatives such as voluntary accreditation of professionals by their associations, introduction of quality handbooks in hospitals and developing clinical guidelines. In relation to both access and quality, the coordination of and approach to tackling chronic conditions are a continuous concern. In this respect several additional topics need further attention, most noticeably patient empowerment, self-care, development of further home care as well as long-term care services.

¹⁵ Koppel, Kahur et al. 2008; Koppel, Leventhal et al. 2009

Figure 1: Important features of primary healthcare organisation in Estonia

Political/administrative unit responsible for primary healthcare	Shared by the Ministry of Social Affairs at the national and county levels. County-level administration has a limited role in organising and supervising primary care. The EHIF ¹⁶ administers the public health insurance system, participating also in developing policy and in supervising providers related to health insurance benefits provided to insured people and contractual obligations with the EHIF.
Consumer Choice	Patients can change their family doctor at any time if they can find a new one to take them on.
Financing	Mainly tax-based.
Public or private providers	Family doctors may practice as self-employed individuals or establish a limited liability company. All healthcare providers act legally under private law, although most of them are controlled by central or local government authorities through ownership and supervisory boards. Yet, these entities are fully independent in financial and organisational terms. With the exception of out-patient clinics, there are very few healthcare providers fully established by private capital, even though all entities are regulated under private commercial or foundation law.
Gatekeeping function of the GP	Family doctors act as primary entry points to the system and control access to most specialist services and hospital care. All individuals in Estonia belong to one of the family doctors who should principally hold the medical history of an individual and his/her family from birth to death. Patients are able to access some specialists directly, without a family doctor's referral (for example, ophthalmologists, gynaecologists, psychiatrists and dentists).
Integrating health: initiatives for coordination	Tendency towards consolidation of primary, out-patient specialist and rehabilitation care into multifunctional polyclinics. A primary healthcare development plan from 2008, which covers the years of 2007-2015, foresees organising primary care services (integrated with some specialist and social care) in health centres which are built around a group of family doctors while part of the central purchasing role and regional responsibility for providing primary care services will be delegated to the new regional units. A change in law in 2007 allows local government units to become an owner of the provider of primary medical care.

2.3 Recent reforms and priorities of health system/public health

Currently ongoing reforms in the health and social care systems

Since regaining independence in 1991, Estonia has been undergoing extensive reforms to expand insurance coverage and availability of services (both public health and healthcare), to increase the responsiveness to patients and to change various other

¹⁶ Estonian Health Insurance Fund

elements of the health system. Chronologically, the Estonian health system reforms can be divided into four development phases: the early 1990s, the mid-1990s, the late 1990s/early 21st century, and the current system at the time of writing.

The first two periods introduced a radical new direction for the health system and laid the foundation for the organisational structure (including the Ministry of Social Affairs, the health insurance fund and the SAM), including basic regulation on health financing and service provision. The reforms can be characterised by relatively short preparation periods and implementation deadlines. Reforms such as the introduction of a health insurance system were not prepared down to the very last detail, leaving considerable space for fine-tuning and regional innovation in implementation. However, due to the small size of the country, this did not result in unmanageable chaos, as might have been expected; rather, it created opportunities to learn from best practice when developing uniform national procedures from 1994 onwards.

The third phase focused more on incremental development, aiming to clarify and strengthen the regulatory framework, setting the strategic objectives, clarifying the functions and responsibilities of various stakeholders and exploring different ways of working. Compared to the previous periods, the reforms were planned in greater detail. The overall objectives of the changes were to increase the efficiency and transparency in the system. In 2001 and 2002, this culminated in a legislation update (including health financing, service provision, pharmaceuticals, and obligations) that has since been the basis for further health system development.

In the fourth phase, the health system is being fine-tuned from day to day; however, there are no principle major changes applied. This last phase can be characterised as assessing the health system from various angles and developing further strategy. The continuous objectives for the health system have been to increase efficiency and sustainability. However, during further development, other objectives such as access, responsiveness, quality and accountability have also gained increasing attention.

2.4 ICT use among general practitioners

This section provides a brief overview of relevant ICT related infrastructure and services data. It draws on earlier studies commissioned by the EC, notably the Indicators eHealth Study. Although the results of this study date from 2007 and may therefore not reflect latest changes, a more recent pan-European survey is not available¹⁷.

In Estonia the highest rates of infrastructure availability are attained. GPs in Estonia also show extremely high use rates of security features.

100% of the Estonian GP practices use a computer. The same share of practices disposes of an Internet connection. In Estonia, broadband represents the most usual form of access to the Internet with 72% of GP practices resorting to broad-band connections.

98% of GPs in Estonia store administrative patient data and 94% use a computer in consultation with the patients. With respect to the use of Decision Support Systems

¹⁷ ICT and eHealth use among General Practitioners in Europe 2007

(DSS), Estonia also scores highly with 94% of the GPs reporting using a Decision Support System for prescribing or diagnosis. Virtually all Estonian GP practices store at least some sort of electronic medical patient information. The data types stored most often include diagnoses (95% of GPs) and medications (84% of GPs). Other types of medical data are stored less frequently, but all types are stored by at least 50% of the GP practices.

When it comes to the electronic transfer of patient data, Estonia shows a slightly weaker performance, the only exception being the transfer of lab results from laboratories to GP practices, which in Estonia is around 40%. Only 1% of Estonian GP practices, however, transfer either medical or administrative patient data to other care providers.

The ePrescribing system set to work on 1.1.2010 and since then an average of 50% of prescriptions are made digitally and sent to the central ePrescribing system. The use of eHealth applications today seems to be well in line with the history of the Estonian eHealth strategies. An early eHealth strategy had already been launched in 2000. At the same time, all primary care practices were obliged to procure computers and Internet connections. Today these infrastructure prerequisites have not only been purchased, but are moreover heavily used, as shown by the high rate of Estonian GPs using a PC in consultation with the patients.

90% of GPs have the possibility to access the nationwide Picture Archiving and Communication System (PACS) to see digital images made/taken in different hospitals. PACS uptake, the creation of the country-wide picture archive, was accomplished in 2006 by two major hospitals. Since 2007 approximately 82 %of radiological studies in Estonia are stored in national PACS. The foundation of Estonian PACS developed a dedicated internet portal for GPs. This portal gives the GP access to the images, reports, ECG's of this particular GP's patients. Now, 95% of family doctors have access to the images of their patients. Furthermore, PACS has created a possibility for Estonia to join the European teleradiology network and to export services¹⁸.

Key figures for PACS

- 92% of all images (in Estonia) are stored in nationwide PACS
- 98% of all GP's (in Estonia) are using nationwide PACS
- 605 personal user accounts for GPs have been issued (at the end of 2009)
- Additionally 498 GP IS integrations
- In comparison to 2008 system usage by GPs increased 52% in 2009
- Daily usage up to 3767 different study viewings

¹⁸ Margus Ulst-TÜ Kliinikum Eesti Tervishoiu Pildipank [University Hospital Estonia Health Image Bank] 2007

3 eHealth strategies survey results

The following sections present the results of the eHealth strategies online survey. In the first section, the eHealth policy actions undertaken in Estonia are presented. This is followed by a presentation of administrative and organisational measures taken. Section 3.3 presents results on key eHealth applications. Section 3.4 focuses on the technical side of eHealth, namely the role of patient and healthcare provider identifiers and the role of eCards. Legal and regulatory facilitators as well as financing and reimbursement issues are presented in the following chapters, 3.5 and 3.6. The report concludes with evaluation activities (3.7.) in the country and an outlook (4.).

3.1 eHealth policy action

The eHealth strategies of EU and EEA countries are not always labelled as such. Some countries may indeed publish a policy document which refers to the ICT strategy in the healthcare sector. Other countries such as France and Germany have enshrined the central eHealth activities in legislation governing the healthcare sector. In Germany, the relevant law is the law on the modernisation of healthcare; in France the introduction of an electronic medical record is included in a law concerning social security.

Sometimes, also documents from domains such as eGovernment or Information Society strategies may contain provisions which concern eHealth. In cases where the healthcare system is decentralised, i.e. where power is delegated to the regional level, there may even be strategy documents regarding eHealth from regional authorities.

3.1.1 Current strategy/roadmap¹⁹

Different policy documents form eHealth goal

In spite of obvious achievements in eHealth implementation and the strategic commitment of the Ministry of Social Affairs to the advancement of eHealth in the country at least since 2000²⁰, Estonia does not have an official eHealth strategy document as such. Rather, during the last decade there have been a considerable number of policy documents issued from various actors, which have eventually shaped the current state of affairs in the field. These documents can be viewed as belonging to two groups: 1) Information Society/ eGovernment; 2) public health and organisation of healthcare services and 3) eHealth specific.

¹⁹ Koppel, Kahur et al. 2008; Läänelaid and Aaviksoo 2008

²⁰ European Commission 2007

**Principles of
Estonian
Information****Information Society/eGovernment**

eHealth is listed among other eGovernance priorities in all horizontal national level strategy documents, including the Principles of Estonian Information Policy. The main policy document on Estonian Information Society policy – Principles of Estonian Information Policy (RTI 1998, 47, 700) – was approved by the Parliament in 1998. An updated version of the strategy – Principles of the Estonian Information Policy 2004-2006 – was approved by the Government in 2004²¹.

The latest “Estonian Information Society Strategy 2013”²² and its Implementation Plan are directly linked to the Health Strategy. The roadmap for the development of an information society describes the foundations of defining, creating, launching and implementing various public sector eServices (eHealth projects) with high impact applications. The eServices with highest impact on governance efficiency and economic development have been identified, acknowledged, launched and made mandatory for legal persons if necessary.

**Knowledge-
based Estonia**

From an industry perspective, the framework of the 2007-2013 strategy ‘Knowledge-Based Estonia’ was launched. This document draws upon ICT utilisation roadmaps in six focus areas: education, healthcare, manufacturing, energy, financial services and ICT security systems. Thereby, the need for the modernisation of the Estonian healthcare system is highlighted. The overall planning for Information Society development has created the necessary infrastructure also for eHealth-specific implementation, while the general policy for unification and reuse of public administration and services information has underpinned strategic choices also in the field of eHealth.

**Estonian Health
Project 2015****Public health and organisation of healthcare services**

The idea for developing a National Health Information System was first introduced by the Estonian Health Project 2015, which was initially a preparation for the follow-up loan to the first World Bank financed health system improvement project (1995-2000). The main concept of the current strategy dates back to 2000, while general features were prepared by 2002, when the Estonian Health Project 2015 was terminated and the Health Division of the Ministry of Social Affairs took fully over the responsibilities for the entire process. In 2003 a separate Department of Health Information and Analysis was established for the practical development of the strategy.²³

Another document, which is indirectly concerned with the renewal of the health system in terms of IT deployment, is the “Estonian Hospital Development Plan 2015” (HNDP). It was initiated in 2000 (updated 2003) to reorganise the hospital network with the underlying idea of concentrating high-technology specialist care into major centres to raise the efficiency and quality of the services. The Plan determined the list of regional, central, general, local and specialty hospitals based on the access criteria to ensure

²¹ EPIST [Enhanced Participation of SMEs in IST European Technology Platforms] 2006

²² Ministry of Economic Affairs and Communications 2006

²³ Aaviksoo A. 2005

sufficient population pools with necessary service volume (at most 60 minutes travel by car to reach a hospital).

Furthermore, the Health Services Organisation Act and Amendment Act accepted by the Parliament in 2007 (the Riigikogu) states that as of September 2008 the healthcare service providers are obligated to forward medical data to the Estonian National Health Information System (ENHIS). The first applications of ENHIS were launched in the autumn of 2008 and the gradual development of the system will continue until 2013. The use of the e-prescription system is obligatory from January 2010 according to Medicinal Products Act and the governments Statute no 130 August 14th 2008.

National Health Development Plan 2009-2020

In January 2009, the “National Health Development Plan”²⁴ (NPHS) 2009-2020 by the Estonian government and its implementation plan 2009-2012 came into effect. It is a master document integrating many thematic development plans and strategies affecting the health condition of the population into a comprehensive national public health policy document. Thereby, eHealth is one of the issues addressed.

eHealth specific

Digital Health Record Vision

During the first years of the NHIS project, a series of feasibility studies were undertaken which formed the basis for the Estonian Digital Health Record Vision document (which became public since November 2004, yet with several amendments thereafter). The Ministry of Social Affairs also executed a Regulation setting the minimum information for health records in Estonia, which is the basis for the development of electronic medical records.

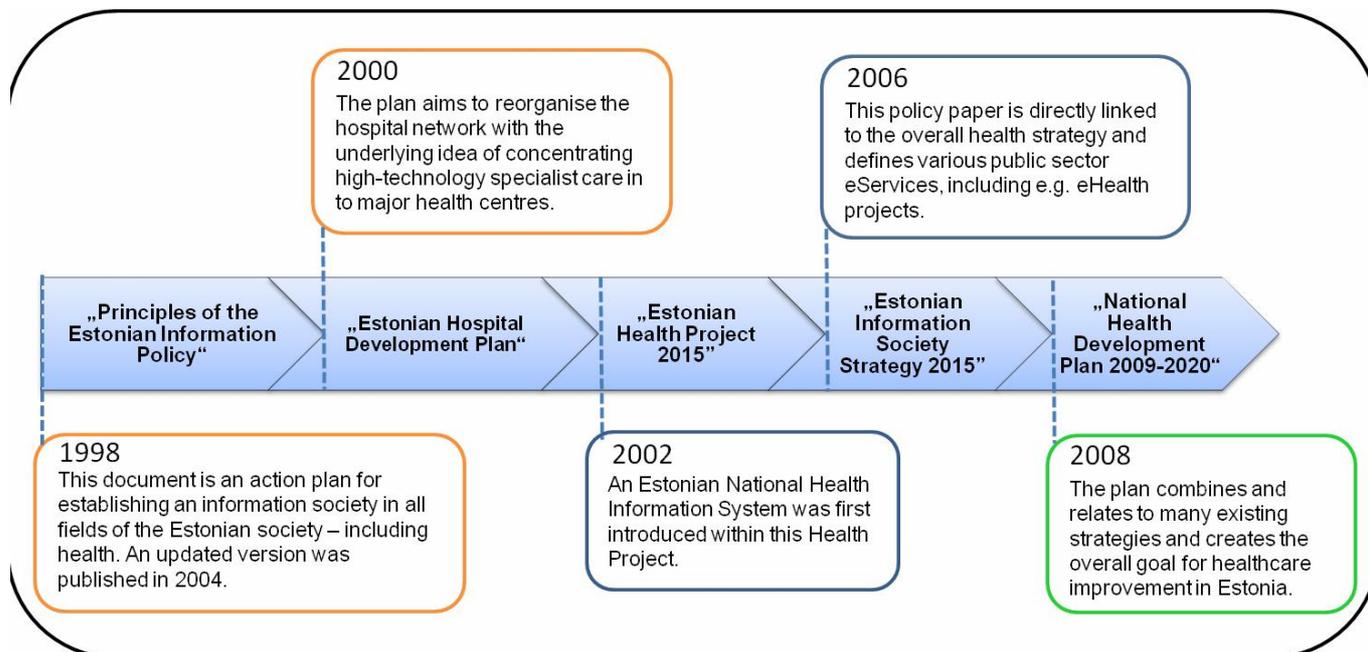
In 2004, also the Estonian Health Information System Development Plan 2005-2008 was published. The Estonian Health Information System Strategy has vague targets to improve interoperability of data exchange between different parties within the health system. There are signs toward convergence of health and social care, but prospects are complicated due to the separate financing mechanisms of the two systems, directing every discussion and strategy-building to bargaining over funding principles. Nevertheless, the *Long-term Care Development Plan 2004-2015* for health system and *Social Welfare Strategy* make several cross-references to each other's services.²⁵

In sum, it can be stated that the general eHealth concept in Estonia is built around the idea that all information about patient health should be 1) available to patients and health professionals on request and 2) collected once and managed centrally, so that multiple and variable secondary uses are enabled. The patient has the right to decide how personal information should be handled by state authorities and health service providers. Since 2005, the countrywide eHealth approach encompasses four pillars: Electronic Health Records (EHR), Digital Registrations, Digital Imaging and Digital Prescriptions.

²⁴ Ministry of Social Affairs 2008

²⁵ Kalvet and Aaviksoo 2008

Figure 2: Estonian policy documents related to eHealth



© empirica 2009

3.2 Administrative and organisational structure

In 2005, the Ministry of Social Affairs and leading healthcare players founded the “Estonian eHealth Foundation”²⁶, which in charge of coordinating nation-wide activities regarding eHealth. The Ministry department manages and coordinates projects, including planning, implementation, administration, the development of health information systems as well as standardisation and implementation of data sets, nomenclature and classification of medical documents.

The Council of the Estonian eHealth Foundation consists of 11 members, who are appointed by organisations according to the criteria described in the Statute of the Foundation. The Council members are appointed for a 3 year term.

Estonian eHealth Foundation and Ministry of Social Affairs

A challenging aspect related to administrative and organisational structures is the fact that not all stakeholders are equally represented. Especially, the patient/citizen perspective is not taken into account in any other form than questionnaires. Health professionals are only represented to a small degree, including GPs, radiologists, doctors interested in telemedicine. Mostly, professional associations are participants in the dialogue and in planning committees.

The figure below summarises the overall division of responsibilities among the institutions.

²⁶ Estonian e-Health Foundation

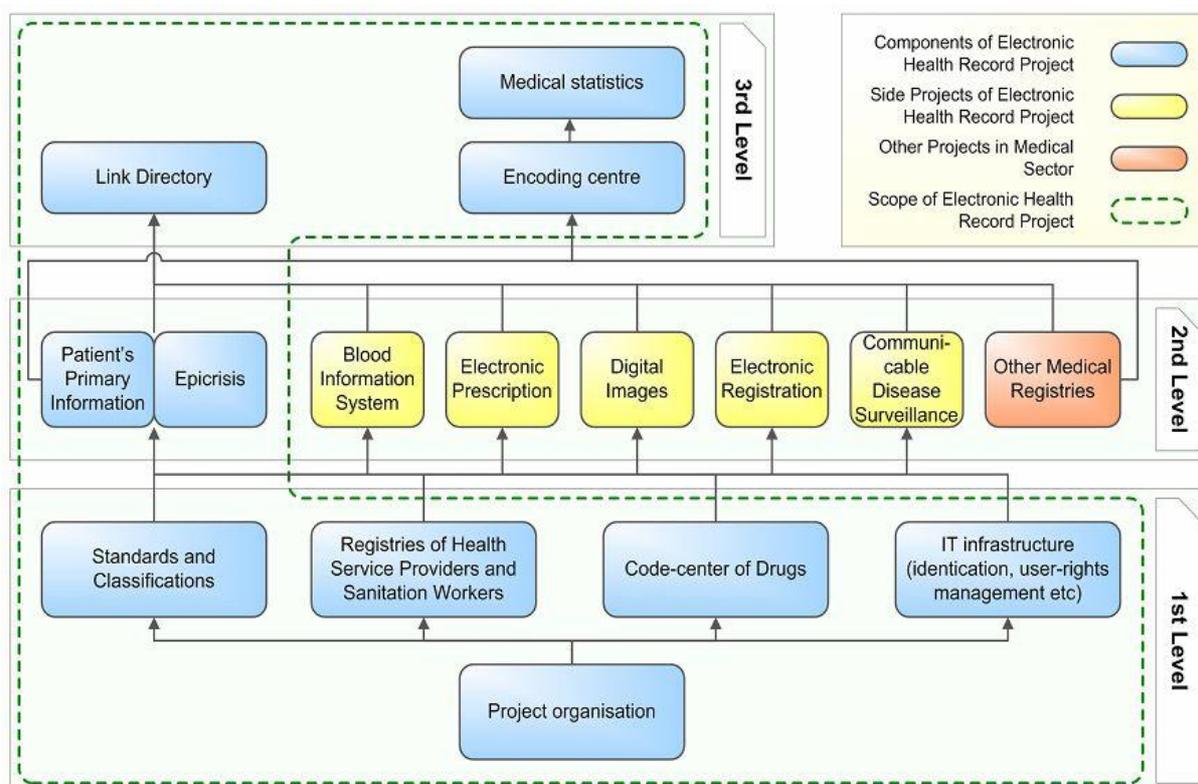
Figure 3: Division of responsibilities among Estonian eHealth institutions²⁷

Policy & Strategy	Coordination	Implementation	Monitoring
<ul style="list-style-type: none"> - Ministry of Social Affairs - Ministry of Economic Affairs and Communication - Department of State Information System 	<ul style="list-style-type: none"> - Ministry of Economic Affairs and Communication - Department of State Information System - Estonian eHealth Foundation 	<ul style="list-style-type: none"> - Estonian Informatics Centre - Ministry of Social Affairs - Estonian Health Insurance Fund - Local governments - Estonian eHealth Foundation 	<ul style="list-style-type: none"> - State Audit Office

3.3 Deployment of eHealth applications

In Estonia, the electronic health record (EHR) is the main feature of the planned health information system. The EHR consists of different components, such as standards and classifications, registries of health service providers or an IT infrastructure. Furthermore, there are side projects planned or ongoing which address ePrescription, digital imaging or electronic registration. These components are described in the following section and also pictured in the following figure.

Figure 4: eHealth components of the Estonian health information system²⁸



²⁷ Christodoulou, Dunbar et al. 2008

²⁸ Ross

3.3.1 Patient summary and electronic health record (EHR)²⁹³⁰

In this study, the epSOS project's definition³¹ of a patient summary was used as a general guideline. There a patient summary is defined as a minimum set of a patient's data which would provide a health professional with essential information needed in case of unexpected or unscheduled care (e.g. emergency, accident), but also in case of planned care (e.g. after a relocation, cross-organisational care path).

Lacking a standard definition, a patient's electronic health record (EHR) is here understood as an integrated or also interlinked (virtual) record of ALL his/her health-related data independent of when, where and by whom the data were recorded. In other words, it is an account of his diverse encounters with the health system as recorded in patient or medical records (EPR or EMR) maintained by various providers like GP, specialists, hospitals, laboratories, pharmacies etc. Such records may contain a patient summary as a subset. As of yet, fully-fledged EHR systems rarely exist, e.g. in regional health systems like Andalucia in Spain or Kronoberg in Sweden, or in HMOs (health maintenance organisations) like Kaiser Permanente in the USA.

It should be noted that in most policy documents reference is made simply to an "EHR" without any explanation of what is meant by it, thereby in reality even a single, basic electronic clinical record of a few recent health data may qualify. As a consequence, this section can only report on national activities connected to this wide variety of health-related records without being able to clearly pinpoint what (final) development stage is actually aimed for or has been reached so far.

The Estonian Electronic Health Record System (EHR) encompasses the whole country, registers virtually all residents' medical history from birth to death, and is based on state-developed IT infrastructure. It was launched on 17th December 2008 and since 1st January 2009 all healthcare providers have been obliged to send an agreed number of standardised medical documents, electronic information notes and electronic medical documents to it. Additional personal information will also be sent to the EHR including orally submitted information from the patient or their representative.

Additional Information for EHR submitted by patient or patient representative

- Contact Information
- Representatives
- Consent/refusal of: blood transfusion, organ transplantation, organ donation, resuscitation and in the event of death donation of body for research and educational assignments.

To enable secure access to the EHR, the Estonian countrywide data exchange platform X-Road is used. X-Road does not depend on the transition of all databases to some larger data management system, but in the creation of unified user interfaces for different

²⁹ Madis Tiik and Peeter Ross 2010

³⁰ Madis Tiik 2010

³¹ European Patients Smart and Open Services (epSOS)

databases. Citizens and institutions can join and use the X-Road free of charge. Identification of the person is based on the compulsory ID-card issued by the state. The ID-card is used both for identification of the user and for digital signing of documents, e.g. discharge letters, radiology reports, etc. Identification of the person inputting medical information must be proven by the physician's digital signature, or it must be date-stamped by the healthcare service provider's information system.

Only the healthcare employee currently associated with patient's treatment has the right to make enquiries about patient's data, i.e. the patient's attending physician or a medical assistant. Acting as the patient's attending physician refers to treating a patient during a set time period beginning with the initial appointment and ending when the case of illness is resolved (excluding family physician and pathologist). Making enquiries about patient's health data outside of the treatment process is not allowed. Health data will be issued to healthcare employees registered with Health Care Board and who are marked as the attending physician.

The patient or a patient's representative with full legal rights has the right to enquire about all documents relating to the patient from the EHR information system that the physician has not set any restrictions on. A patient representative with full rights has complete authorisation to act on behalf of the patient. The patient doesn't have a right to change the level of authorisation of a legal representative.

Access rights

- All healthcare providers must send agreed data to EHR.
- All access rights and data usage is regulated by the law.
- ID-card for authentication and digital signature for both, doctors and citizens.
- Access is enabled only to licensed medical professionals.
 - The attending doctor concept – an attending physician is a healthcare employee currently associated with patient's treatment and registered with the Health Care Board.
- Citizens can access their own data through Patient's Portal, where they can also declare their intentions and preferences. The patient has a right to set access restrictions to documents, cases of illness, and to all his/her information in the EHR. The access ban can be set to one specific document or applied to the complete data in the EHR.
- Patient's Portal allows patient representatives (adult patient, parent of an underage, legal representative, trustee) to browse patient's health record, download documents, submit consents, update demographics data, book an appointment, and review patient health record usage logs via Web.
- The EHR will record information about when, how, and why the data was used (logging information), enabling citizens to monitor who has viewed their health data.

Authorised user of the EHR can benefit from the following services:

- Health event service enables users to browse and search for health related events of patient treatment history. Health related events are for example diagnosis, visit, prescription, operation, diagnostic image, etc.
- Health status service enables users to fetch information about certain health related parameters of a patient. These parameters are for example blood type, pregnancy, allergy, height, weight, smoking, etc.
- Booking service enables healthcare service providers to publish information about their healthcare services and available resources, so that doctors of other institutions and patients can book for appointments at these providers. Booking service keeps track of referrals and appointments.
- Reporting service provides users with prebuilt reports about patient health status. Here one can find Time Critical Reports that summarise information about patient's health events and health status in a way most useful for emergency treatment.
- Document archive service organises all digital documents that are submitted to the central system. One can fetch a document by ID from a document archive.
- Statistics service reorganises facts from patient health related documents for further statistical processing.
- Demographics service collects and reports general information about patient identity, locations, and relationships. The information is based on the data of the Estonian Population Registry, registration documents from healthcare institutions, and information submitted via Patient's Portal.
- Consent service maintains data about patients' will expressed in digital documents. Currently there are trustee access rights, healthcare service options, and health record access rights related consents implemented.

The success of the EHR with medical institutions can be seen by the immediate volume of use: more than 350 000 medical documents were sent to the EHR during 2009. Altogether 953 GPs, private healthcare specialists, and hospitals connected to EHR during the first year, which is 90% of all healthcare institutions in Estonia. By the end of 2009, 143,360 citizens had a medical document in the EHR. This number has increased rapidly with an additional 114,012 citizens documents added by January 1st 2010, meaning that 20% of citizens had some kind of medical record in the EHR. This rapid increase is down to the launch of digital prescriptions.

The uptake has been somewhat slower with citizens. A web-based Patient's Portal was launched on October 26th 2009 to allow citizens to access data in the EHR. In the first five months the portal was visited by 12,993 citizens. This is 1% of the Estonian population, as of January 1st 2010. The reason for this sluggish uptake lies in the promotion of this access. There has not yet been any publicity released directly by the government on how to use the portal. Rather, it has been doctors who have been informing their patients.

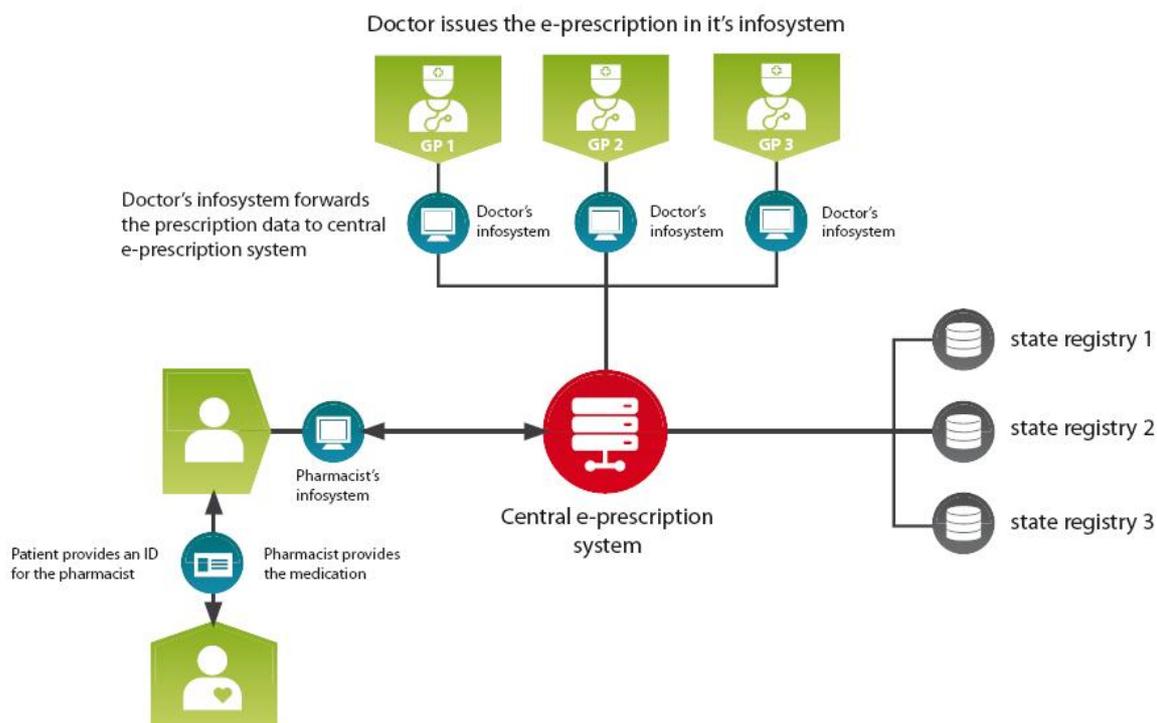
3.3.2 ePrescription

ePrescription available for all Estonian doctors, patients and pharmacies

In the framework of this study and following work in epSOS, ePrescription is understood as the process of the electronic transfer of a prescription by a healthcare provider to a pharmacy for retrieval of the drug by the patient. In this strict sense, only few European countries can claim to have implemented a fully operational ePrescription service.

In cooperation with SAP, ERP and the company Helmes, the Estonian Ministry of Social Affairs launched ePrescription services. After a pilot phase until January 2010³², the central ePrescription system now enables medical personnel and pharmacies to monitor and manage the issuing of prescriptions. The system stores incoming prescriptions (messages) and sends patients' prescriptions on demand to a pharmacy's information system. The pharmacist identifies a person using his/her ID card and receives the prescription from the central database.³³ If a person buys drugs for someone else, then it is necessary to know the personal identification code of the patient (provided that at the time of issuing, the prescription was classified as public). A patient can also restrict the group of people who are allowed to buy his/her prescription drug, in which case an authorised prescription is issued.

Figure 5: Estonian ePrescription system



Source: Paasmae 2010

³² The pilots were mostly carried out in the area of Tallinn, Tartu and Viljandi.

³³ Estonian Health Insurance Fund

The expected benefits in relation to the launch of the ePrescription system are:

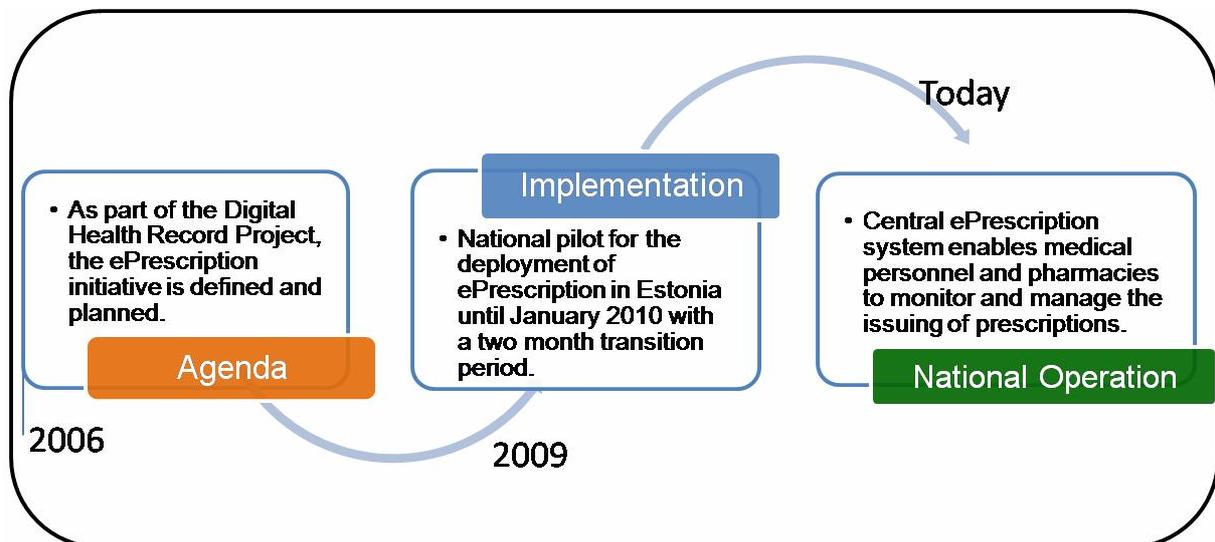
- Doctors spend less time issuing prescriptions. They will get feedback as to whether the medication was actually bought by the patient. The system protects doctors from unforeseen costs related to inaccurate use of subsidies;
- Pharmacies spend less time filling prescriptions;
- Patients no longer have to worry about carrying a paper prescription or losing the prescription;
- The Estonian Health Insurance Fund and the Ministry of Social Affairs will be provided with fast and accurate reporting.

It is assumed that about seven million ePrescriptions will be issued each year and that this solution will save a significant amount of time for doctors, patients and pharmacies. The purchased information is then stored in the database along with the medicine information and the links to this data is provided by the central registry.³⁴

The ePrescription service is one of the side-projects related to the digital health record, which has been presented in more detail in section 3.3.1.

As the transition phase between pilots and national deployment has recently ended in the beginning of March 2010, it became apparent that not all doctors were ready to apply the system in full, because of healthcare budget cuts, technical difficulties with installing the system, and fears that it has not been tested enough. Still, the number of digital prescriptions has been growing steadily, reaching over 750000 ePrescriptions in early March 2010.³⁵

Figure 6: ePrescription progress in Estonia



© empirica 2009

³⁴ Paasmae 2010

³⁵ Eesti Haigekassa [Health Insurance Fund] 4/3/2010; Bruce 2009

3.3.3 Standards

Standards are not only crucial to enable interoperable exchange of meaningful information in the healthcare system; they also ensure secure access to patient records by healthcare providers and citizens. This study aims to identify, among other usage, standards related to the domain of health informatics, such as the SNOMED Clinical Terms or the LOINC terminology.

**Estonian Centre
for
Standardisation
and the eHealth**

In Estonia, the eHealth Foundation and the Centre for Standardisation are responsible for the use of health informatics standards. The EVS (Centre for Standardisation) is a non-profit association recognised by the Government of Estonia as the national standards body for Estonia. It started its operations as provided by the Technical Regulations and Standards Act in 2000. The eHealth Foundation is responsible for the promotion and development of national eSolutions within the healthcare system.

The following standards are mandatory for the provision of eServices in Estonia:

- HL7 V3 standards used in XSD files and extensions of the HL7 V3 XSD files
- eHealth projects, which are established on the basis of medical standards, mainly use XML, XSL and CSS files

In January 2010, Estonia became a Member of the International Health Terminology Standards Development Organisation to enable the use of Snomed CT in connection to digital health records, health research and other applications.

3.3.4 Telemedicine³⁶

The use of telemedicine applications is recognised as beneficial to enable access to care from a distance and to reduce the number of GP visits or even inpatient admissions. Commission services define telemedicine as “the delivery of healthcare services through the use of Information and Communication Technologies (ICT) in a situation where the actors are not at the same location”³⁷. In its recent communication on telemedicine for the benefit of patients, healthcare systems and society, the Commission re-emphasises the value of this technology for health system efficiency and the improvement of healthcare delivery³⁸.

**Estonian
Telemedicine
Association**

In December 2007, the Estonian Telemedicine Association was created as a sub-organisation of the Finnish Society of Telemedicine and eHealth. The goal of the association is to connect the promoters of the Estonian telemedicine and eHealth through establishing cooperation and a discussion forum.

In general, Estonia has been or is part of several smaller projects, which are related to the use of telemedical applications. Three of these co-operations are described below:

³⁶ Köhler, Schierbaum et al. 2005; Rossa, Sepperb et al. 2010

³⁷ Europe's Information Society 2009

³⁸ European Commission 2008

Tartu University Clinic³⁹ started telemedicine projects in 1997, and has today enabled real-time video consultations and clinical conferences with other hospitals and family physicians. This is used for emergency consultation of head trauma patients and weekly specialist consultations to family doctors in Saaremaa, the largest island off the western coast.

The National Heart Centre in Tartu cooperated with Germany in the cardiac project “Partnership for the Heart”. The main elements of the project were (1) the training of Estonian physicians in Germany, (2) training courses conducted by German and Estonian specialists in Estonia and (3) use of telemedicine for consultation on a continuous basis. This led to the deployment of a telemedical infrastructure, training of professionals and substantial investments in equipment for the participating Estonian Centre.

The Tallinn Central Hospital and the University of Vilnius participated in the “Baltic eHealth”⁴⁰ Project, which created a network to offer eHealth services to patients in the entire Baltic Sea Region, including eUltrasound and eRadiology.

**Partnership for
the Heart, Baltic
eHealth and R-**

Another project, in which Estonia participated, was the “R-Bay” initiative. Here, 171 different radiology cases from Finland were reported in Estonia. Between Denmark and Estonia the corresponding number was 45 in this project. However, only knee X-ray images were reported. For second opinion 283 Czech radiology cases were randomly selected, anonymised and interpreted by the Dutch hospital. This procedure was done via cross-border teleradiology service.

Through participating in the different project, the implementation of telemedicine has steadily progressed over the last years, as Teleconferences, - consultations and - radiology have been deployed.

Furthermore, telemedicine projects were already started by the Tartu University Clinic (TUC) in 1997. Today, the Clinic has enabled real-time video consultations and clinical conferences with other hospitals and family physicians. Since 2001, with the facilitation of the EU-funded Bitnet project, TUC’s digital image archive is currently holding over 25 million units of digital images from different hospitals all over Estonia, forming the de facto standard for the country.⁴¹

As of January 2010, the Estonian eHealth Foundation participates in the Regional Telemedicine Forum project. RTF is a collaboration of 9 European regions which aims to deliver Good Practices Guidelines and policy recommendations addressing the key challenges that hinder the wider use of telemedicine⁴².

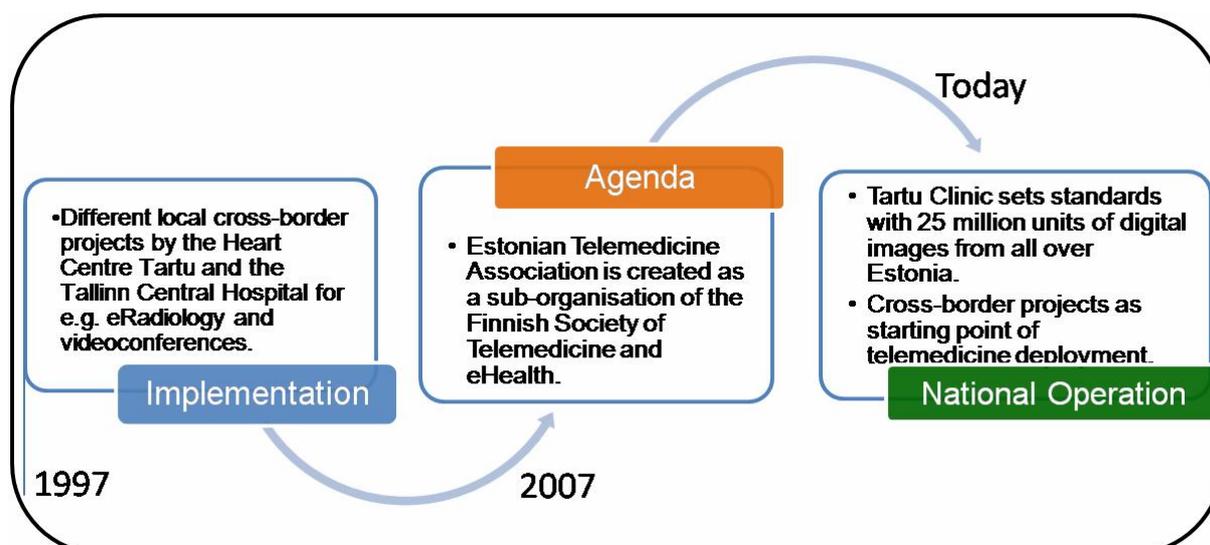
³⁹ Tartu University Hospital

⁴⁰ Voss 2005

⁴¹ Christodoulou, Dunbar et al. 2008

⁴² Regional Telemedicine Forum

Figure 7: Telemedicine services in Estonia



© empirica 2009

3.4 Technical aspects of implementation

A key prerequisite for the establishment of an eHealth infrastructure is the ability to uniquely identify citizens/patients and healthcare professionals. This part of the survey deals with identifiers and how they are stored. This section does not deal with the tokens through which identification can or will take place. One such possibility would be via an eCard. This topic is dealt with in the following section. The current section focuses solely on whether or not unique identifiers are in place in Estonia and for which purpose.

3.4.1 Unique identification of patients

Personal Identification

In Estonia, the Personal Identification Code (PIC) functions as a unique identifier for citizens and residents in eGovernment services, including health. Every Estonian has a PIC number, which is included on the certificates of the eID cards. PIC is provided by the Population Register.⁴³

Further identification or authentication processes are all done in connection to the Estonian eID Card, which is further described in section 3.4.3.

3.4.2 Unique identification of healthcare professionals⁴⁴

The Estonian Health Board established a register for healthcare professionals. Through the assignment of IDs to every professional, status confirmation can be requested through the MISP server (Mini Info System Portal). This portal is part of the “X-road project”⁴⁵ and enables professionals to identify as a registered professional as well as access patient data and medical information.

⁴³ Martens 2007

⁴⁴ Tiik 2009

⁴⁵ X-Road project was preliminarily initiated for interconnecting Estonian governmental databases to the common data resource accessible over the Internet. After the successful start of sending database queries and answers over the Internet, the X-Road environment was expanded to

3.4.3 The role of eCards⁴⁶

Estonia began issuing ID cards in January 2002 and has since issued over 800.000 cards: the largest ID card roll-out in the EU. The card, which is valid for 10 years, is used for identification but also as a travel document within the EU. ID cards are used for visual identification of persons, to access different services, for electronic identification and for digital signatures and can be verified against the Population Registry.⁴⁷



eID cards for general access to

Because of the concept of the Estonian ID-card, according to which the smart card itself does not contain any other information than that necessary for the identification of a person, there is no longer need for a special health insurance card. A person identifies with his/her ID-card, while the information about his/her insurance is maintained in the respective database.⁴⁸

The roll-out of the ID-cards was completed in 2006. The next phase – getting people to use it electronically – started with the initiative “Computer Protection 2009”. The growth of usage is expected to take place in forthcoming years.

Up to this point, the ID cards are used as identification tool for electronic services provides over the “eesti.ee” portal.⁴⁹

Prospective initiatives include a public tender for new generation ID-cards within this year. Plans include the transformation from Orga/Micardo platform to MultOS and including RFID capability (with separate chip) for biometrics. Compliance with the European Citizen Card standard is also considered. Furthermore, all three major mobile operators in Estonia are now providing Mobile-IDs for authentication purposes.

send all kinds of XML-format electronic documents securely over the Internet. For further information see Kalja 2007.

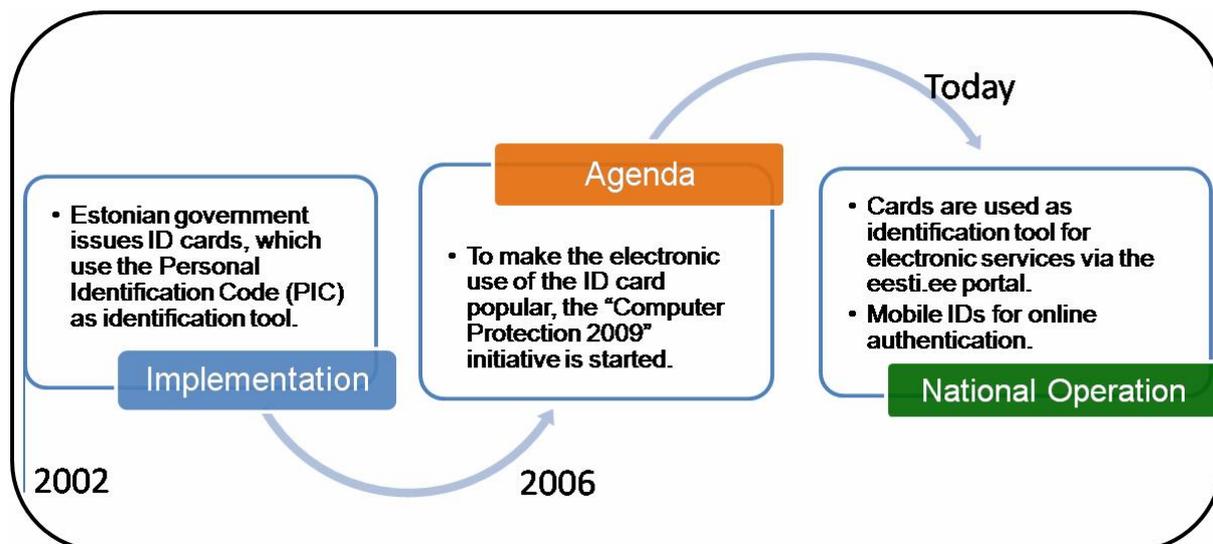
⁴⁶ Estonian Certification Centre 2003; Graux, Inte et al. 2009

⁴⁷ Atun, Ohov et al. 2005

⁴⁸ Kalja, Reitsakas et al. 2005

⁴⁹ Ministry of Economic Affairs and Communications 2006

Figure 8: eCards in Estonia



© empirica 2009

3.5 Legal and regulatory facilitators⁵⁰

Legal and regulatory issues are among the most challenging aspects of eHealth: privacy and confidentiality, liability and data-protection all need to be addressed in order to make eHealth applications possible. Rarely does a country have a coherent set of laws specifically designed to address eHealth. Instead, the eHealth phenomenon has to be addressed within the existing laws on professional liability, data protection etc.

Regulation and supervision of the health system is the responsibility of the Ministry of Social Affairs. The health acts (laws) are enforced with the support of governmental and ministerial regulations. The Ministry of Social Affairs also develops broader health programmes (strategic plans) which have to be developed according to the Ministry of Finance's guidelines and need approval from the Government in order to receive financing from the state budget.

Health Services Organisation Act and Amendment

On 20 December 2007, the Parliament ratified the Amendment Act⁵¹ establishing the legal basis for implementing the eHealth projects, such as the Electronic Health Record, Digital Image, Digital Registration and Digital Prescription. The goal of the new Act is to unify all information systems created for the needs of specific healthcare organisations into one central Health Information System.

The basic idea of this Act is to create a basis to enable the electronic processing of different medical documents. Paper documents are planned to be gradually replaced by digital documents. The diagnostic systems and medical equipment will be interfaced with the information systems that allow processing information faster while using modern methods of telemedicine. The aim is to enhance the protection of public health and

⁵⁰ Ministry of Economic Affairs and Communications 2006; epractice.eu 2007; Koppel, Kahur et al. 2008

⁵¹ Amending the Health Services Organisation Act.

patients' interests by increasing the availability and security of data. By laying down the general principles for the management of health information, the Amendment Act has set the grounds for the maintenance of medical registers.

The Amendment Act entered into force on 1 September 2008. The gradual digitisation of medical documents will continue until 2013 – the official deadline for the implementation of eHealth in Estonia.

Up to this point, different legislation is in place regarding the use of eService applications: Estonian legislation gives digital signature equal power to handwritten ones, and imposing a responsibility on public authorities to accept digitally signed documents. This is defined in the Digital Signature Act from 2000 with an amendment from 2006. The amendment includes a reference to a Secure Signature-Creation Device (SSCD), as required in the EU Directive 1999/93/EC and provisions on the use of digital stamps.

Furthermore, legislation concerning the personal identification code and the ID card is being reviewed to ensure its conformity to the requirements of the information society.

3.5.1 Patient rights

In Estonia, an electronic patient record is automatically created if the citizen does not object to it. Thereby, the patient has read-only but full access to his or her record. The patient can however be denied access for a period of maximum six months when the healthcare provider considers this necessary to protect the life and the health of the patient. This exception should preclude the patient of learning about data entered into the Health Information System before the healthcare provider had the opportunity to explain their full meaning to the patient. The patient is not entitled to alter the data. Parents do have the possibility to manage the records of their children by using their respective Personal Identification Code (PIC). Healthcare providers automatically have access to the personal data in the Health Information System for the conclusion and performance of their care; this is unless the patient has denied access to him. The patient has furthermore the right to request the healthcare provider to apply the access restrictions immediately. It is remarkable that the same rules apply to emergency situations. Besides healthcare providers, other persons can only access the data after this was stipulated by law.

3.5.2 Personal data protection act

The Personal Data Protection Act (PDPA) was passed by Parliament in June 1996 and entered into force on 19 July 1996. The Act was amended in 2003 to be made fully compliant with the EU Data Protection Directive 95/46/EC. The PDPA's lastly amended version came into force on 1 January 2008. The Act protects the fundamental rights and freedoms of persons with respect to the processing of their personal data, in accordance with the right of individuals to obtain freely any information that is disseminated for public use.

In 2008, a revised version of the Act introduced several changes: First, the previous classification of personal data into three groups (non-sensitive personal data, private personal data and sensitive personal data) has been replaced by two data categories: (1) "personal data" and (2) "sensitive personal data", the latter being the sub-class under special protection. Moreover, the new PDPA Act extends all general principles applying to

the processing of personal data to the processing of the personal identification code (the unique number assigned to every Estonian citizen and resident). Lastly, the new Act contains a new definition relating to the “person liable for the protection of personal data” while regulating the processing of personal data for research and statistics purposes.

Issues, which are currently discussion regarding patients rights and the legislation on citizen data are:

Discussed issues related to patient right legislation: ⁵²

- Patient access
- Misuse of data
- Health professional access
- Deletion of data
- Access of family doctors (especially related to psychiatric diseases)
- Restriction of data use

In general, new legislation for the collection of medical data is needed in Estonia – especially regarding the implementation of the digital health record. This will also involve amendments to existing laws on data protection.

3.6 Financing and reimbursement issues⁵³

The Estonian Health Insurance Fund (EHIF) is the largest eHealth service supplier. In the Estonian Development Fund Act it is defined that the objective is to invest into knowledge-based and high-technology industries – including healthcare. The EHIF spends around 240.000€ (or 14% of the annual operation budget) on ICT development work. The newly established eHealth Foundation is financed from state budget (about 1,3 million € yearly since 2008⁵⁴).

In general, the Estonian Ministry of Social Affairs (MoSA) provided a budget of 2.0 million € for the launch of the National Health Information System (NHIS). Thereby, the project was 85% EU-funded and furthermore co-financed by the World Bank.

The costs for the Health Information System were split as followed. As the project was planned to be finished by 2008, all numbers are provided up to this date:

- EU structural funds 2006-2008 (2.8 million €)
- State budget 2006-2008 for eHealth Foundation (2.0 million €)
- Healthcare providers 2006-2008 (1.5 million €)

The money from the EU structural funds was distributed as followed:

⁵² Tikk 2006

⁵³ Estonian Government 2007; Läänelaid and Aaviksoo 2008; Tiik 2009

⁵⁴ Riigikogu [Parliament of Estonia] 2008

Figure 9: EU Fund Distribution in Estonia⁵⁵

EHR	1 599 705
IT infrastructure	18%
Standardisation	34%
Digital prescription	218 882
Digital Registration	188 223
Digital Images	186 479

While Estonia has put in place relatively advanced eHealth services, several specific problems on eHealth services development remain. First and foremost is the lack of a comprehensive eHealth strategy for the country. Another key area where difficulties have arisen is that of interoperability and standards. After several failed voluntary attempts by the ICT industry, MoSA has also failed to develop or facilitate the development of standards for consideration by all players in the field.

The slow start of the ambitious National Health Information System has also been facing several challenges: parallel development of standards and technical solution by different competing companies; inappropriate legal framework and threat of parliamentary standstill due to non-existing public debate on privacy concerns and insufficient funds for the development due to fast rising IT development costs (mainly human resource issue).

Many crucial partners – Estonian Health Insurance Fund, Estonian Medical Association, University of Tartu, and the patients – are not actively engaged in the development process and there is no clear strategy for communicating and establishing the added value for each one of them.

Another issue is that while 79% of local governments have positive attitude regarding the future development of eServices, 17% remain unconvinced of its usefulness (Information Society in Estonian Local Governments, 2006).

The main challenge of the Estonian NHIS remains the future financing of the initiative and the whole operation. Currently it is foreseen that all service providers will pay a mandatory fee to the system operator, which is reimbursed to them by the Estonian Health Insurance Fund (EHIF) within the regular price of health services. The service providers oppose this solution and wish to see the state directly covering all costs incurring from the use or implementation of the EHIS. In the financial plan of the Action Plan for Growth and Jobs of 2008⁵⁶, there are 41 and 73mil euro reserved in 2010 and 2011 respectively for eHealth projects (development of the Digital Prescription and cross-usage of health data between different institutions). However, it is stated that costs for these years could be revised during annual budgetary processes.

⁵⁵ Tiik 2009

⁵⁶ Republic of Estonia 2008

3.7 Evaluation results/plans/activities

From a public policy perspective, evaluation is a key activity in the policy-cycle. It provides insights into the success or failure of a policy or project and leads to new policy goals and new methods of implementation. The need for evaluation of eHealth policies and projects has been stressed time and again by the EC, not least in order to further the spread of eHealth in the process of healthcare delivery.

Generally, eHealth impact in Estonia has not been quantitatively measured so far, but there are a few surveys and impact assessment studies on eGovernment/eHealth projects and policies. The most detailed ones are carried out by the Estonian State Audit Office⁵⁷. The Audit Office has carried out several evaluations concerning eGovernance and there is also a plan for monitoring eHealth implementation, but so far it is not publicly available.

The most recent monitoring audit that has been carried and is indirectly linked to eHealth services is the “Quality of public service in the information society”⁵⁸ from 2007. Here, public services are accessed, including the ID card. The audit states that services can be easily used via the internet through the eSignature procedure, but that training for state personnel and citizens as well as the remaining requirement of paper documents for application are system drawbacks.

In April 2008, a separate large-scale project for the monitoring and evaluation of eHealth impact was approved by the State Chancellors Office. This project ended in April 2010, and final report reflecting the scientific work done during the project has been issued. The results of this project will be introduced at the upcoming international eHealth conference in Tallinn in October 2010.

4 Outlook

The Estonian healthcare system has undergone major revisions between 2006 and today, with respective activities in the area of eHealth mainly focusing on the Digital Record Project. With EU and WHO support and own funding initiatives, it has developed to one of the frontrunners in comparison to other East-European countries.

This progress can basically be attributed to the creation of the Estonian eHealth foundation, a supportive legislative environment for ICT and the use of existing structures for a health information system.

Difficulties, which occurred in recent months are related to a couple of issues: First, the regular use of eServices in health by doctors and patients is still rather small, which is caused by a lack of trust in eHealth applications and missing technical equipment and training (mainly on the health professional's side). Here, discussions are ongoing. And second, financial cuts have slowed down the development of eHealth in Estonia – the consequences of these financial obstacles will show during the following months.

⁵⁷ National Audit Office of Estonia

⁵⁸ see above

Estonia

Overall, Estonia is planning to have a coherent eHealth infrastructure in place by 2013 which is connected to significant effort from different sides, as various initiatives show.

5 List of abbreviations

DRG	Diagnosis Related Group
DSS	Decision Support System
EC	European Commission
EEA	European Economic Area
EHIF	Estonian Health Insurance Fond
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
epSOS	European patients Smart Open Services
ERA	European Research Area
EU	European Union
EVS	Centre for Standardisation
GDP	Gross Domestic Product
GP	General Practitioner
HB	Health Board
HCP	Healthcare Provider
HL7	Health Level Seven International (authority on standards for interoperability)
HMO	Health Maintenance Organisation
HNDP	Estonian Hospital Development Plan
HPC	Health Professional Card
ICT	Information and Communication Technology
ID	Identification (e.g. number, card or code)
IHTSDO	International Health Terminology Standards Development Organisation
IT	Information Technology
LSP	Large Scale Pilot
MISP	Mini Info System Portal
MOSA	Estonian Ministry of Social Affairs
NHIS	National Health Information System
NPHS	National Health Development Plan

OECD	Organisation for Economic Co-operation and Development
PDPA	Personal Data Protection Act
PHS	Personal Health System
PIC	Personak Identification Code
R&D	Research and Development
RTF	Regional Telemedicine Forum
SAM	Stage Agency of Medicine
SNOMED	Systematized Nomenclature of Medicine-Clinical Terms
SSCD	Secure Signature-Creation Device
WHO	World Health Organization

6 References

- Aaviksoo A. (2005). "National Health Information System", *Health Policy Monitor*, . Retrieved 06/10/2010, from <http://www.hpm.org/survey/ee/a6/3>.
- Atun, R., E. Ohov, et al. (2005) Report - Estonian Health System: Analysis of the Strengths, Weaknesses, Opportunities and Threats. <http://ee.euro.who.int/SWOT%20Analysis%20of%20the%20Estonian%20Health%20System%20Jan06.pdf> (14/06/2010).
- Bruce, S. (2009). Estonian e-health project slows. *E-Health Europe*.
- Christodoulou, E., A. Dunbar, et al. (2008) The Development of eHealth in an Enlarged EU, Synthesis Report. European Commission, Institute for Prospective Technological Studies. <http://ftp.jrc.es/EURdoc/JRC43277.pdf> (12/03/2010).
- Eesti Haigekassa [Health Insurance Fund] (04/03/2010) Tānase pāeva seisuga on koostatud ūle 765 000 digiretsepti [More than 765,000 digital recipes distributed]. Haigakassa. <http://www.haigekassa.ee/haigekassa/uudised?news=veebruaris-koostati-401-387-di> (14/06/2010).
- eHealth Priorities and Strategies in European Countries (2007). eHealth ERA Report.
- EPIST [Enhanced Participation of SMEs in IST European Technology Platforms] (2006) Project deliverable D2.2.4, Survey of eHealth and eInclusion in Estonia. European Commission
- Estonian Certification Centre (2003) The Estonian ID Card and Digital Signature Concept. Tallinn. http://www.epractice.eu/files/media/media_603.pdf (12/03/2010).
- Estonian e-Health Foundation. "The Foundation." Retrieved 12/03/2010, from <http://eng.e-tervis.ee/miscellaneous/general-information.html>.
- Estonian Health Insurance Fund. "Estonian Health Insurance Fund." Retrieved 17/11/2010, from <http://www.haigekassa.ee/eng/ehif>.
- Estonian Health Insurance Fund. "FAQ – digital prescription." Retrieved 17/11/2010, from http://www.haigekassa.ee/eng/digital_prescription/faq.
- Europe's Information Society. (2009). "Telemedicine works." from http://ec.europa.eu/information_society/activities/health/policy/telemedicine/index_en.htm.
- European Commission (2004) e-Health - making healthcare better for European citizens: An action plan for a European e-Health Area. Brussels. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2004:0356:FIN:EN:PDF> (19/01/2010).
- European Commission (2007). European Commission Communication: "Lead Market Initiative for Europe".
- European Commission (2008). Commission Recommendation on cross-border interoperability of electronic health record systems Official Journal of the European Union. **L 190**: 37-43
- European Commission; Information Society and Media Directorate-General. (2009). "Good eHealth." Retrieved 19/10/2010, from www.good-ehealth.org.
- European Communities (2007). "Accelerating the Development of the eHealth market in Europe", eHealth task force report.
- European Patients Smart and Open Services (epSOS). "Glossary." Retrieved 20/10/2010, from [http://www.epsos.eu/glossary.html?tx_a21glossaryadvancedoutput_pi1\[char\]=p&cHash=df930cccbd](http://www.epsos.eu/glossary.html?tx_a21glossaryadvancedoutput_pi1[char]=p&cHash=df930cccbd).
- European Patients Smart and Open Services (epSOS). "Welcome to epSOS – a European eHealth Project." Retrieved 20/10/2010, from <http://www.epsos.eu/>.
- Evidence-based support for the design and delivery of user-centred online public services. "eUser." Retrieved 21/01/2010, from <http://www.euser-eu.org>.

- Graux, H., F. Inte, et al. (2009) Estonian country profile. eID Interoperability for PEGS: Update of Country Profiles study, IDABC programme, European eGovernment Services. <http://ec.europa.eu/idabc/servlets/Doc?id=32304> (12/03/2010).
- ICT and eHealth use among General Practitioners in Europe. (2007). "eHealth Indicators." from <http://www.ehealth-indicators.eu>.
- Kalja, A., A. Reitsakas, et al. (2005) eGovernment in Estonia: Best Practices. http://www.ria.ee/public/x_tee/eGovernment_in_Estonia.ppt (14/06/2010).
- Kalvet, T. and A. Aaviksoo (2008) The Development of eServices in an Enlarged EU: eGovernment and eHealth in Estonia. JRC-IPTS Reports, European Commission. <http://publications.jrc.ec.europa.eu/repository/handle/111111111/6958> (14/06/2010).
- Köhler, F., C. Schierbaum, et al. (2005). "Partnership for the heart German–Estonian health project for the treatment of congenital heart defects in Estonia." *Health Policy* **73**: 151–159.
- Koppel, A., K. Kahur, et al. (2008) Estonia: Health system review. Health Systems in Transition. Copenhagen, World Health Organization 2008 on behalf of the European Observatory on Health Systems and Policies. <http://www.euro.who.int/Document/E91372.pdf> (10/03/2010).
- Koppel, A., A. Leventhal, et al. (2009) Public health in Estonia 2008, An analysis of public health operations, services and activities. Copenhagen, World Health Organization Europe. <http://rahvatervis.ut.ee/bitstream/1/1301/1/Koppel2009.pdf> (11/03/2010).
- Läänelaid, S. a. A. A. (2008). "National Population Health Strategy (Cure for All); *Health Policy Monitor*." Retrieved 17/11/2010, from http://www.hpm.org/en/Surveys/PRAXIS_-_Estonia/12/National_Population_Health_Strategy_%28Cure_for_All%29.html.
- Madis Tiik (2010). "Rules and access rights of the Estonian integrated e-health system."
- Madis Tiik and Peeter Ross (2010). "Patient Opportunities in the Estonian Electronic Health Record System."
- Margus Ulst-TÜ Kliinikum Eesti Tervishoiu Pildipank [University Hospital Estonia Health Image Bank] (2007) E-tervishoid ja tervishoiu pildipangad [E-health and health image banks]. http://eestiartst.ee/static/files/072/e-tervishoid_ja_tervishoiu_pildipangad.pdf
- Martens, T. (2007) National Profile Estonia Preliminary study on Mutual Recognition of eSignatures for eGovernment applications, European Communities. <http://ec.europa.eu/idabc/servlets/Doc?id=30674> (14/06/2010).
- Ministry of Economic Affairs and Communications (2006) Estonian Information Society Strategy 2013. Tallinn. <http://www.riso.ee/en/system/files/Estonian%20Information%20Society%20Strategy%202013.pdf> (12/03/2010).
- National Audit Office of Estonia. "Activities." Retrieved 12/03/2010, from <http://www.riigikontroll.ee/?lang=en>.
- National Institute for Health and Welfare (THL). (2010). "About Us." Retrieved 17/11/2010, from http://www.thl.fi/en_US/web/en/aboutus.
- Paasmae, P. (2010) E-prescription. Tallinn, Helmes. <http://tiny.cc/0AzWx> (11/03/2010).
- Regional Telemedicine Forum. "Welcome to the Regional Telemedicine Forum (RTF)." Retrieved 06.10.10, from <http://www.regional-telemedicine.eu>.
- Riigikogu [Parliament of Estonia] (2008) Aasta Riigieelarve Seadus [Act on Financing]. 229. <https://www.riigiteataja.ee/ert/act.jsp?id=12901846> (14/06/2010).
- Ross, P. Digital Health Record - an internet based Electronic Health Record (EHR) system in Estonia. Good ehealth Reviewed/ candidate case. http://kb.good-ehealth.org/browseContent_alt.do?contentId=220&action=v3 (14/06/2010).
- Rossa, P., R. Sepperb, et al. (2010). "Cross-border teleradiology—Experience from two international teleradiology projects." *European Journal of Radiology* **73**: 20–25.

Estonia

- Tartu University Hospital. "About the hospital " Retrieved 14/6/2010, from http://www.kliinikum.ee/eng/index.php?option=com_content&view=article&id=21&Itemid=23.
- Tervise Arengu Instituut [National Institute for Health Development]. (2008). "National Institute for Health Development." from <http://www.tai.ee/?id=1646>.
- Tiik, M. (2009). Nationwide e-Health platform Estonia. e-Health for Individuals, Society and Economy. Estonian e-Health Foundation. Prague.
- Tikk, A. (2006). "Digital health record and handling of sensitive data in Estonia." Acta Medica Lituanica **13**(1): 21-22.
- Voss, H. (2005) Baltic eHealth - Improving Life in Rural Areas of the Baltic Sea Region by eHealth Services. INTERREG III B Baltic Sea Region. http://www.ehealth-impact.org/case_tool/data/binary/b96b88d1c65fe9a29aa75c2ae9dbb1e1.pdf (09/03/2010).
- World Health Organization, Regional Office for Europe. (2009). "European health for all database (HFA-DB)." Retrieved 20/01/2010, from <http://data.euro.who.int>.