Activities of the state in implementing the e-health system

Do the state, doctors and patients benefit from e-health?

Report of the National Audit Office to the Riigikogu
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Summary of audit results

What did we audit?

The purpose of the audit was to assess whether the objectives set to e-health – higher quality of the health service and more efficient organisation of health care – have been achieved. The four main e-health projects were reviewed in the audit: Electronic Health Record, Digital Prescription, Digital Registration and Digital Image. The problems encountered in the development and implementation of e-health and the reasons for these problems were also studied.

No opinion of the completion of e-health in terms of IT or security was given in the audit.

Why is this important to taxpayers?

Estonia's population is aging and the share of elderly people is increasing, as fewer children are being born and people are living longer. This creates a constantly growing need for health care and social services and patients are also becoming more and more demanding about the volume and quality of the services provided.

The more extensive and systematic implementation of e-health solutions helps make the health system more efficient, improves people's health via more effective prevention, raises the awareness of patients and also contributes to the more reasonable use of health resources. E-health solutions also save patients time.

What did we find and conclude on the basis of the audit?

The National Audit Office is of the opinion that e-health objectives have not been achieved, as despite the initial plans, data in the e-health system still cannot be used for treatment purposes, national statistics, keeping registries or supervision. Digital Prescription is the only e-solution created by the state that is actively used. The use of the Electronic Health Record and image reference has been modest and Digital Registration has not taken off in the five years since its completion. The National Audit Office is of the opinion that the reason behind the weak launch of e-health is the aimless and random activity of the Ministry of Social Affairs in the performance of the strategic manager's role in the development and implementation of e-health.

- **E-health has not had a strategic manager who proceeds from the interests of the state and this has held back the implementation of e-health.** The passivity of the Ministry of Social Affairs in the strategic management of e-health can be illustrated with this example: when the risks of the e-health projects and the options for managing them were ascertained on the order of the Ministry of Social Affairs at the beginning of the development of e-health, nothing was done

when the risks materialised. The Ministry of Social Affairs, whose duty it should be to represent the interests of the state, has been more of an onlooker in the management of e-health. The Minister of Social Affairs does appoint four members of the supervisory board of the Estonian e-Health Foundation (EHF), but they have also failed to represent the state's interests adequately. The supervisory board of the EHF is the one whose guidelines the foundation follows in its work. The role of health service providers is the dominant one on the current supervisory board. The outcome of this is that despite the state's desire to implement e-Health Information Systems on a broader scale, this has not been done. For example, Digital Registration was completed in 2008 but it has still not been implemented due to opposition from health service providers. Managing treatment queues centrally, however, would be a good opportunity to guarantee the transparency of the health system. Digital Registration would provide the Ministry of Social Affairs with a lot of important information for making health policy decisions and distributing health insurance money to the Estonian Health Insurance Fund.

- **The creation and implementation of e-health has cost considerably more than planned and it is unknown how much more money it will still require.** The initial e-health development and implementation plans estimated that the total cost of the project would be 2.8 million euros plus later management expenses. However, the amount spent by the end of 2012 (incl. annual management expenses) was 12.4 million euros, and as much as 15 million euros had been spent by the end of 2013. Development expenses have increased year on year and some additional costs are fully understandable, but at present it is unclear how much money the development and/or implementation of the unfinished e-health projects will still require.

- **E-health does not help to save health insurance money or use the working time of doctors more reasonably.** At present, e-health is largely a database and offers very few e-services that would make the present work organisation of health service providers more efficient and the use of health insurance money more reasonable. One of the first services provided via e-health is e-consulting, which was implemented in March 2013. However, family doctors can only use it to refer patients to specialists in two specialities and this option has found very little use to date. The option of the Social Insurance Board to determine the degree of disability and/or permanent incapacity for work on the basis of the data in e-health was implemented earlier and it has reduced the workload of doctors, especially family doctors. The e-ambulance project is also a positive example – it will be completed soon and should make the work of ambulances as well as managing the system as a whole more efficient. The Estonian Health Insurance Fund, which could be an initiator of the development of e-services in the area of health and the motivator of their implementation, has not yet stepped into this role.

- **The state's institutions do not yet benefit from the data in the e-health system, as a lot of data is missing or its quality is low.** E-health data are not yet used for the preparation of health statistics,

supervision, making funding decisions or the broader development of health policy. This means that the objective of e-health to create opportunities for using collected data, improving the level of medicine, preparing national and departmental statistics, managing health care and scientific research has not been achieved. The only exception is the option created for the Ministry of Social Affairs to determine the degree of disability and/or permanent incapacity for work on the basis of the data in e-health. It is also a problem that the data is meant for use in the treatment of patients and state authorities have no access to the collected data. E-health has therefore not reduced the administrative burden of either service providers or state agencies.

- **Although health service providers must submit medical files to the e-health system, this is not done systematically and a lot of data is not submitted at all.** As a lot of data is missing and accessing the data existing in the e-Health Information System is cumbersome, doctors rarely use the data already submitted to e-health in their everyday work. The reason why such a situation has emerged is the fact that the Ministry of Social Affairs, which is supposed to be the strategic manager in this area, has not requited the service providers to use e-health.

- **The success of e-health depends on strengthening the leading role of the Ministry of Social Affairs.** In the last couple of years the Ministry has acknowledged many of the problems that have emerged in the development and implementation of e-health and sought solutions to some of them. It is important that the ministry recognises and performs the role of the strategic manager of e-health, because the further development of e-health depends on this.

What did we recommend as a result of the audit?

The **National Audit Office advised** the Minister of Social Affairs to determine the state's interests in the implementation of e-health and thereafter set out the tasks of the Ministry of Social Affairs and the Estonian e-Health Foundation in the implementation of e-health. The National Audit Office also advised to complete and implement the e-health projects that have already been started (above all, Digital Registration and Electronic Health Record) before the creation of new services is taken on.

The National Audit Office also advised the minister to immediately require health service providers to start using the e-Health Information System and, if necessary, tie payment for services to the use of the e-Health Information System. At the same time, the ease of use of e-health should be developed further in cooperation with the Estonian e-Health Foundation.

The **Minister of Social Affairs** found in his response that in the development of e-health, the state has proceeded from its general interests in relation to the objective of e-health to collect, exchange and cross-use data electronically. This is required for the treatment of patients, organisation of health policy, supervision and keeping national registers. The minister agreed that it's important to describe in greater detail the specific activities that are necessary for the achievement of the state's goals in cooperation with partners.

The minister confirmed that the Ministry of Social Affairs has always demanded that health service providers use the Health Information System, but it has not imposed sanctions on those who do not use the service at all or only do it sporadically. The minister promised to take the National Audit Office's suggestion on board and in cooperation with the Estonian Health Insurance Fund consider the options of tying the use of the Health Information System to payment for services in the coming years. The Minister added that making the Health Information System easier to use is a goal already established in cooperation with the Estonian e-Health Foundation.

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Overview

1. Estonia's population is aging and the share of elderly people is increasing, as fewer children are being born and people are living longer. This creates a constantly growing need for health and social welfare services and patients are also becoming more and more demanding about the volume and quality of the services provided.

2. The demographic situation of Estonia (increasingly more dependent people per taxpayer) puts pressure on social and health expenditure. The pressure on health expenditure increases the need to be more efficient and cost-effective. This in its turn means that help must be sought from technological applications, which in health primarily means information technology, as the level of the technology used for treatment and diagnosing is already high enough. Whilst the development of technology in medicine generally reduces the price of individual treatment procedures, but paradoxically increases the cost of medical treatment, information technology is regarded as the opportunity to make health services cheaper and more accessible.[1] However, this calls for significant changes in the organisation of work in health care institutions.

Importance of e-health solutions

3. The more extensive and systematic implementation of information systems helps to make the health system more efficient, improves people's health via more effective prevention, raises the awareness of patients and, above all, contributes to the more reasonable use of health resources. Estonia has so far been a pioneer in the development and implementation of e-health solutions both at the level of medical institutions and the state, but Denmark, Finland, Sweden, the United Kingdom and many other countries have made good progress in the implementation of e-health solutions in recent years.

4. The European Commission characterises e-health as follows:

- e-health refers to tools and services whereby **information and communication technologies** are used, which can improve prevention, diagnosis, treatment, monitoring and management.
- e-health can benefit the entire community by **improving access to care as well as the quality of care,** and by making the health sector more efficient.
- e-health includes information and data sharing between patients and health service providers, hospitals, health professionals and health information networks; electronic medical records; telemedicine services; portable patient-monitoring devices; operating theatre scheduling software; robotised surgery and basic research on the virtual physiological human.

5. Population aging and the resulting need to make the health system more efficient via the implementation of e-health solutions is topical all over Europe. The President of Estonia has led the European Union e-health workgroup established by the European Commission in 2011 and

[1] IT + Health Care. EST_IT@2018 Report on Use of Information Technology in Health Care. Estonian Development Fund, Estonia in Focus, 2010, no. 7.

one of the results of the group's work is the report 'Redesigning Health in Europe for 2020'.[2] e-health solutions play a very significant role in the organisation of health care, incl. in e-health solutions between states, as the free movement of patients within the borders of the European Union means that the information concerning patients must also move outside of their countries of residence.

Start of the development of e-health in Estonia

6. The first visions of e-health in Estonia were prepared in 2004. The Government approved the Estonian Health Information System Development Plan 2005-2008 already in 2005. The Estonian e-Health Foundation (EHF) was established in November 2005. It is managed by a supervisory board whose members are representatives of the founders of the EHF and the Estonian Health Insurance Fund. The council has 11 members.

7. The main function of the EHF was to develop the Health Information System, but the Ministry of Social Affairs also wanted it to become a broader health care centre of excellence. The initial articles of association of the EHF also contained other activities in addition to the development of the Health Information System, such as the harmonisation of medical terminology, development of registers and coordination of the preparation of treatment guidelines. However, the EHF never started to function in this manner. The articles of association of the foundation were amended in 2011 to decrease the number of the agency's functions, which now only entail the development and establishment of the e-health system.

Treatment guidelines – evidence-based guidelines for diagnosis and treatment of diseases. They may also contain advice for the prevention of diseases or strategies for training patients.

Objectives of e-health

8. The main objectives of the implementation of e-health have been making the health system more efficient, improving the quality treatment and increasing patient orientation. Based on the 2006 vision of the Electronic Health Record, the National Audit Office has formulated that the following objectives will be achieved as a result of the implementation of e-health:

- **health service of higher quality** – patients receive better, more timely and competent health services, as the physicians who treat them can quickly access all the information about the patient's health status that is necessary for treatment;
- **transparency and security of health data usage** – patients can obtain thorough overviews of their health data and find out how such data has been used by health service providers, the state and everyone else who has access to the Electronic Health Record;
- **improved and more efficient planning and organisation of health** – medical statistics become considerably faster, more accurate and detailed, thereby making it possible to plan and organise health in a manner that is better and more efficient;
- **saving money on medical expenses (optimal use of funds), more efficient and effective service provision** – doctors are better informed about the health status of their patients, the health services that have already been provided to them and the tests

Did you know that

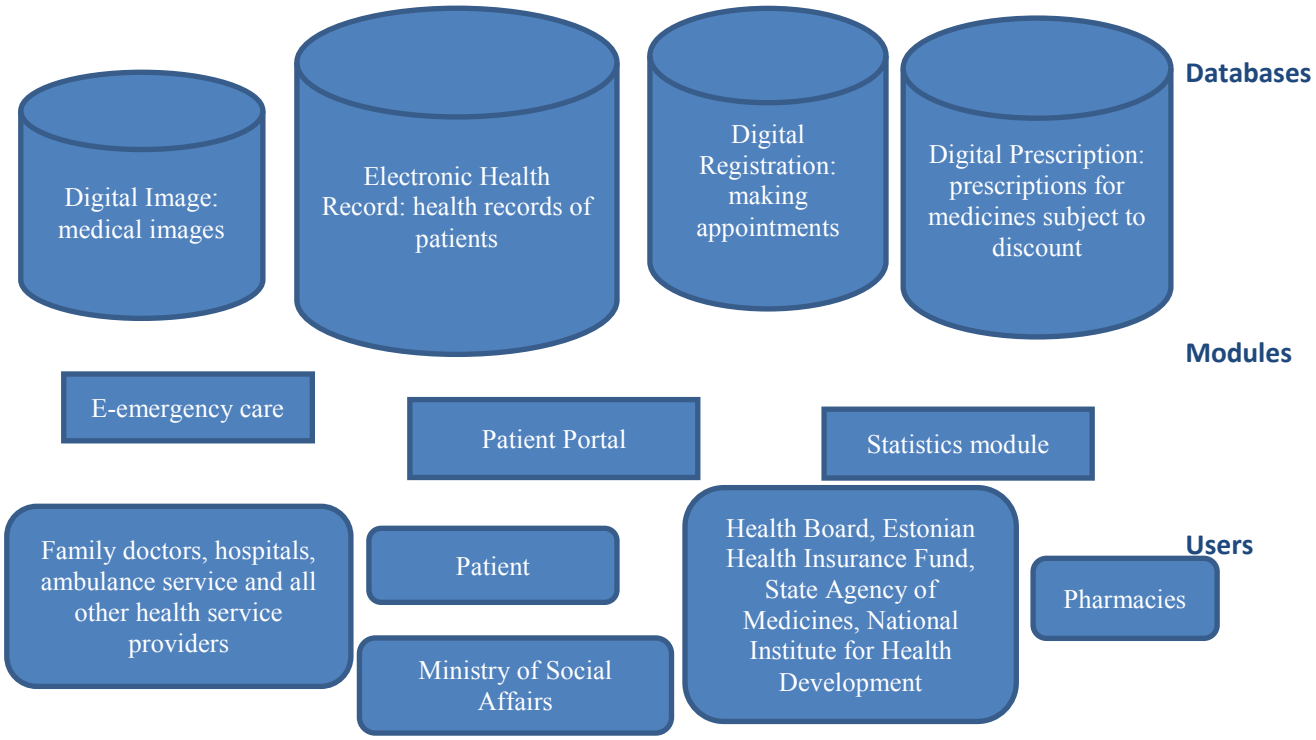
the Estonian e-Health Foundation was established by the Ministry of Social Affairs, the North Estonia Medical Centre, the Tartu University Hospital, the Estonian Ambulance Association, the Estonian Society of Family Doctors and the Estonian Hospital Association.

[2] Report 'EU Task Force on eHealth: Redesigning Health in Europe for 2020". See http://ec.europa.eu/digital-agenda/en/news/eu-task-force-ehealth-redesigning-health-europe-2020.

done in the past, which allows them to avoid duplication of tests/analyses and pointless appointments with specialists, and leaves the doctors with more time to devote to their patients.

9. The establishment of the e-Health Information System started in 2006 with four main projects: Electronic Health Record, Digital Prescription, Digital Registration and Digital Image (see also Figure 1).

Figure 1. The e-health system simplified



Source: National Audit Office

The four main projects of e-health:

10. The Electronic Health Record is the database that contains the most important personal data, all cases of hospitalisation, appointments and other health data of people. It is the central e-health system and the basis of the other e-health services. The main objective of the Electronic Health Record was to ensure that patients get better and more efficient medical services.

11. Digital Prescription is an electronic prescription for a medicine, which the doctor issues for the patient on a computer. The purpose of this project was to create a system that would allow digital prescriptions to move between doctors, the Estonian Health Insurance Fund and pharmacies.

12. The purpose of Digital Registration was to create a centrally administered system for registering appointments with doctors. Digital Registration was supposed to give patients an overview of all available appointments with doctors nationwide. The Patient Portal should allow

the patient or the patient and the family doctor to register appointments with the necessary specialists and to cancel the appointments if needed.

Medical images – a picture or another visual image of either the body or its physiological processes, which contains information about the patient.

13. The Digital Image database basically contains image references that show where the medical images made of the patient can be found. The purpose of the Digital Image was to make the images and descriptions of medical tests created in the course of radiological examinations accessible and usable for the doctor, the family doctor, the radiologist and the patient irrespective of where and when they were taken. The initial plan was to create an information system within the e-health system for storage of medical images. However, a public procurement for the establishment of a shared picture archiving and communication system (PACS) had been organised on the initiatives of several hospitals at the time when the establishment of the Digital Image was being planned (2004/2005). As the other hospitals decided not to establish the system, the Tartu University Hospital and the North Estonian PACS established the Foundation of Estonian PACS in 2006 and launched their PACS in the same year. It was decided not to establish a duplicate PACS within the e-health system and a system that only contains image references was established instead (see points 168-171).

14. The initial plan was to complete the four main projects in 2007, but the deadlines of all projects had to be postponed and the works were finally completed by the end of 2008. The development of the Digital Prescription was overseen by the Estonian Health Insurance Fund, the rest by the Estonian e-Health Foundation. The project was financed with the support of the EU structural funds in the total amount of 2.2 million euros (see also points 181-190). The Health Information System was supposed to start working in full from 1 January 2013, i.e. five years after its completion. 15 million euros has been spent on the development and operation of e-health by the end of 2013.

Requirements for the use of e-health

15. Pursuant to the Health Care Services Organisation Act, all health service providers are obliged to submit the following to the Health Information System:

- data for keeping waiting lists;
- information about the location of medical images;
- information about the health care services provided to the patient.

The Minister of Social Affairs established with his regulation the composition of the data to be submitted to the Health Information System and the procedure for its preservation as well as the types of medical images, the IT requirements set for them and the procedure and conditions of making them accessible.

16. Patients have access to their data held in e-health. Health service providers have access to the personal data held in the e-health system for the provision of health care services. Patients have the right to prohibit a health care service provider from accessing their personal data in e-health.

Additional e-health projects

17. In addition to the four main projects, the EHF started developing new modules and services in 2006 that would improve the use of e-health. The

option created of the Ministry of Social Affairs to determine the degree of disability and/or permanent incapacity for work on the basis of the data in e-health has been implemented so far. The development of this service was overseen by the Estonian Society of Family Doctors. The e-service 'E-consulting via the Health Information System' had also been implemented in March 2013, and it's purpose is to improve access to diagnostics and treatment by giving family doctors the option of consulting a specialist and referring the patient to the specialist if necessary (see points 106–110).

18. The e-ambulance module that is currently under development should be launched in the beginning of 2014. E-ambulance will make it possible for ambulance teams to quickly access the patient's health data in e-health. An e-ambulance card will also be created within the scope of the project and it will be the tool of the ambulance team that they can use to enter/collect data about each case where an ambulance was required: health data of the patient, information about the health service provided by the ambulance team, information about the event that caused the need to call an ambulance, etc.

19. A statistics module for the preparation of statistics on the basis of the data entered in e-health has also been completed, but it hasn't been implemented yet.

20. The Doctor Portal, whose purpose is to provide the e-health end user's interface to the providers of specialised medical care services who don't have their own information system, was completed in the middle of 2013. This gives smaller service providers the opportunity to enter data in e-health without incurring large expenses.

21. Pursuant to the Health Care Services Organisation Act, e-health is financed by the state. Since 2012, the Estonian Health Insurance Fund compensates the cost of the Health Information System interface contract entered into with the Estonian e-Health Foundation to the hospitals and family doctors who guarantee 24-hour preparedness. The hospitals and family doctors in their turn pay this money to the EHF.

22. The IT component in the labour expenses of the Estonian Health Insurance Fund's health service prices and in the capitation fees of the patients of family doctors, which contains the expenses of the IT hardware and software required for the provision of the service, was increased in the middle of 2009. This also includes the costs associated with joining e-health and the necessary developments for which the state has not prescribed separate funds. Money for testing e-health was allocated via the Ministry of Social Affairs only in the course of the e-health pilot project to those who took part in the project.

23. At present, most hospitals in Estonia have one of the three information systems (Ester and its older versions, Liisa, eHL). Family doctors mostly use the perearst2 information system in their work. The developers of the information systems of service providers must adjust their systems to make them compatible with e-health if any changes are made in the latter.

Use of the e-Health Information System

All the necessary data are not entered in the e-health system

24. If health care professionals are to benefit from e-health in their daily work, the state must guarantee that the information system is easy to use, i.e. it must be simple and convenient. The data in the information system must be complete and reliable. The actual benefits of e-health will become evident if the quality of the data is good and all the parties use the system actively. Making the use of e-health mandatory is not enough to guarantee this.

25. The National Audit Office assumes that all the documents that must be submitted pursuant to law are submitted to the e-Health Information System. This guarantees that the entire medical information of the patient is available and can be used when necessary.

Submission of the data of medical specialists to e-health system

26. Service providers must submit 14 different kinds of documents to the e-health system: ten different notices, two case histories, referrals and responses to referrals, and information of medical images for the image reference. The outpatient and inpatient case histories are the main sources of information for doctors.

Outpatient case history – summary of an outpatient incidence case, which covers the activities related to the tests and treatment of a patient carried out in a health care institution within the scope of a specialty in medical care that does not require overnight hospitalisation.

27. An analysis of the e-health data for 2012 indicated that 1338 institutions had joined e-health by the end of 2012 (only a couple of per cent of the institutions have not joined). 453 (34%) facilities have sent documents to the e-health system and 438 (33%) have sent case histories. This means that only a third of the institutions that have joined e-health have actually entered data in the system. 1441 facilities had joined e-heath by the end of the first nine months of 2013 and 665 of them have sent at least one case history to e-health.

Inpatient case history – summary of inpatient incidence case that covers the activities related to the tests and treatment of a patient from hospitalisation until discharge from hospital.

28. In order to find out whether health service providers perform the obligation to enter data in e-health, the National Audit Office compared the number of the case histories entered in e-health with the medical invoices, which the health service providers had sent to the Estonian Health Insurance Fund in 2012. Case histories were selected from amongst the documents that are submitted to e-health, because a health service provider should prepare both an invoice and a case history about each case.

Case – a single incidence case that covers the tests and services provided to an insured person in the course of the incidence case.

29. However, comparing cases/invoices and case histories does not tell the whole story, as health service providers cannot agree on when a case history must be prepared. This is particularly problematic in the case of outpatient care where the preparation of a case history depends largely on the doctor's discretion. This means that some doctors submit one case history for several invoices whereas others submit a case history for each invoice. An inpatient case history is prepared when the patient is discharged from hospital. This is why the National Audit Office compared outpatient and inpatient cases and case histories separately by to the hospitals that had submitted documents.

Specialised medical care – outpatient or inpatient health service provided by a specialist or dentist and the health care professionals working with them.

30. The statutes of the Health Information System stipulate that health service providers must submit outpatient case histories within one working day and inpatient case histories within five working days after the documents have been approved by health care professionals. The fact that every health care facility has determined for itself when medical documents must be prepared and approved is a source of confusion.

Day care – outpatient health service in the course of which the patient's status must be monitored for a short time and in the case of which the patient leaves the health care institution on the same day.

31. The analysis that was carried out revealed that inpatient cases and case histories coincide to the extent of 95% on average (also includes cases of inpatient nursing care) in the case of the hospitals that have submitted documents and inpatient case histories alone to the extent of 99%. Submitting case histories of day care is not mandatory at present, but they have still been submitted to the extent of 48% (only in comparison of the hospitals that have submitted them). The statistical analysis revealed that in the case of day care, there is the risk that some hospitals send summaries of day care incidence cases to e-health as inpatient or outpatient case histories.

32. There are more than twice as many inpatient cases of hospitals than case histories, i.e. case histories have been submitted for 43% of cases. The North Estonia Medical Centre and the South-Estonian Hospital had submitted more inpatient case histories than others and the Haapsalu Neurological Rehabilitation Centre had submitted more outpatient case histories than others. It can be said that hospitals have been submitting inpatient case histories rather regularly in recent years, but the submission of outpatient case histories is still random. The problem is that only 28 of all 38 hospitals that provide the specialised medical care service had submitted any case histories in 2012. This means that 26% of hospitals have not submitted a single case history.

33. In addition to hospitals, the National Audit Office also analysed how all providers of specialised medical care and other services, incl. hospitals and dental practices, nursing care and rehabilitation providers, submit case histories. We found out that half of those who had submitted case histories had done so in less than a quarter of cases (see Table 1).

Table 1. Ratio of the number of outpatient case histories submitted to e-health and the outpatient care invoices submitted to Estonian Health Insurance Fund in 2012

Share of submitted case histories, %	Number of institutions
100	1
99–75	3
50–74	7
49–25	12
24–0.01	29
0	791*

* Covers all specialised medical care, dental care and nursing care providers who have joined e-health but haven't submitted any case histories.

Source: Data of EHF, analysis by National Audit Office

34. In total, only 8% of the specialised medical care providers who have joined e-health had sent case histories to the e-Health Information System in 20121], i.e. 92% of the institutions hadn't submitted anything.

35. According to the Ministry of Social Affairs, service providers in some specialties don't send data to the e-Health Information System on principle. For example, dentists don't send their case histories to e-health, as they find that the present form of case histories does not correspond to the nature of their service. Some psychiatrists don't send case histories either, as they consider their cases to be special and some of them find that psychiatric information is somehow more sensitive than other

medical information. There is no justified basis for considering psychiatric information more sensitive. The EHF is currently developing a case history form that is suitable for dentists.

Submission of the data of family doctors to e-Health Information System

36. In order to assess the extent to which family doctors use e-health, we compared the number of the case histories submitted by family doctors with the number of persons who received health services from the same family doctor in 2012, assuming that there should be at least one case history per person. The analysis indicated that the majority (80%) of family doctors had submitted less than a quarter of case histories and 33 institutions had only submitted one case history (see Table 2). Although the number of case histories submitted was small, the number of institutions that had submitted case histories was rather high, i.e. 77% of all family medicine centres. However, 23% of institutions had not submitted any case histories. This means that almost a quarter of all family medicine centres send no information about any of their patients to the national central system. 496 institutions that provide family doctor services, i.e. basically all such institutions, had submitted at least one case history in 2013.

Table 2. Ratio of the number of case histories submitted to e-health and number of persons who visited family medicine centres in 2012

Share of submitted case histories, %	Number of institutions
Over 100*	24
99–75	7
50–74	13
49–25	21
24–0.01	294
0	113

* There can be more case histories than patients who visited family medicine centres, as some patients may have visited the centres several times over the year due to different complaints.

Source: Data of EHF, analysis by National Audit Office

Sending referrals via the e-Health Information System

37. In addition to case histories, it is also possible to send referrals to other doctors via e-health. 10,314 referrals from 164 institutions were sent to the Health Information System in 2012, i.e. the remaining referrals were onpaper. There were considerably more responses to referrals in the e-Health Information System – 638,753 – but they had been submitted by just 21 institutions. There are more responses to referrals, because the results of lab tests, etc. are returned electronically. 11,967 referrals and 487,854 responses to referrals were sent in the first nine months of 2013, i.e. the use of e-health has also increased a little in this aspect. However, the unused potential of electronic referrals and responses is still vast.

Adding image references to e-Health Information System

38. The audit indicated that information about images or image references was sent to the PACS or image reference 475,837 times in 2012. The data of 267,435 images was sent to the image reference in the first nine months of 2013. This means that the use of image reference has decreased in 2013 in comparison to the previous year.

39. The North Estonia Medical Centre, Tartu University Hospital, West-Tallinn Central Hospital and some other large hospitals don't submit information about their images to image reference. The images of the first

two are stored in the PACS of the Foundation of Estonian PACS, where 80-85% of the medical images taken in Estonia are stored. The West-Tallinn Central Hospital has its own PACS.

40. Since several large hospitals don't submit their images to image reference, it can be assumed that image reference contains no information about the majority of the images taken in Estonia and it has therefore not served its purpose.

41. As the images are not accessible and visible in a shared system and it's necessary to separately enter the PACS of the Foundation of Estonian PACS in order to view the images stored there, doctors may refer the patient to have another image taken because they don't know it has already been done. This wastes health resources as well as the time of patients. It can be said that the solution of the PACS created on private initiative is working very well. The problems in the implementation of image reference and its connection to the PACS is discussed in greater detail in points 168-171 of the report.

Read more

about the implementation of the Digital Prescription in the 2012 audit report of the National Audit Office 'Organisation of Compensation of Medicines'.

42. The Digital Prescription is the application most used by health service providers. In 2011, 90% of all prescriptions were issued in this system and the percentage in 2012 was 96%. The application has helped save the time of patients and in addition to patients, doctors and the Estonian Health Insurance Fund are also satisfied with the system, as it is more accurate than before and gives the reassurance that prescriptions are issued correctly.

43. It is no less important that prescribing the active substance without adding the name of the medicine has rocketed since the implementation of the Digital Prescription. This allows patients to save money, as they can go and buy the cheapest medicine. Cost-sharing by patients in the price of prescription medicines has decreased over the years: in 2010, it was 8 euros per prescription on average and in the first half of 2013 6.4 euros per prescription.

44. The **National Audit Office** is of the opinion that the e-Health Information System is still underused and doctors don't fully perform the obligation to use e-health. Although doctors generally show appreciation for the options of e-health when they speak, they have actually been rather modest in using the system. There is still no agreement when medical information has to be submitted to e-health and it's therefore impossible for the EHF to analyse the extent to which doctors actually comply with the law. However, usage statistics for 2013 demonstrate that the use of some e-health functions has increased, but the quantity of information sent to image reference is smaller than before.

Comments of the management board of Estonian e-Health Foundation: In its essence, e-health has been a model of cooperation whose aim is to increase the effectiveness of the treatment process and the involvement of patients in the provision of health services via the combination of technical solutions and information systems. This is why all the necessary parties must be involved in the process. The foundation has seriously focussed on the development of such cooperation in 2012 and 2013. In our opinion, many users of the Health Information System were sceptical about its use in 2011. The presumed reasons include the users not having enough information about the options of the Health

Information System and the resulting inadequate quantity of data in the system as well as the inadequate ease of use required for the implementation of the system in local information systems. Limited collection of feedback from users is another reason.

The usability of the Health Information System, incl. the speed at which information can be found and accessed, is of primary importance in addition to the existing data. Getting used to the changes, i.e. the experience of using the Health Information System and getting into the habit of using it, also plays an important role in implementation. Parallels can be drawn with the X-road and ID card that are the foundation of the Estonian e-state. The Estonian Information System Authority estimates that the implementation of both of these took five years. In the technical sense, the application of the Health Information System was completed in December 2008 and data exchange started in January 2009.

E-health developments in the last two years: The usability of the Health Information System has improved significantly in the last two years. Statistics indicate that more data is requested from and sent to the Health Information System. The most important statistical indicators are as follows:

- Whilst 42% of family doctors didn't submit documents to the Health Information System in January 2012, the relevant indicator in 2013 was 23% in January and 8.4% in August.
- The percentage of inpatient case histories sent to the Health Information System in 2012 in comparison to the data of the Estonian Health Insurance Fund was 97.8%. This can be considered the maximum result, as achieving 100% is realistically impossible.
- The number of people living in Estonia whose medical data had been sent to the Health Information System increased by 20% in 2012 and reached 82% by the beginning of 2013. The data of over 1.1 million people are in the health information at present.
- The use of the Patient Portal has more than doubled in 2013 in comparison to the average levels of 2011 and 2012 and the increase is continuing.
- Most important statistical indicators:
  - Maximum number of queries made by health care professionals in the Health Information System in one day – 13,700.
  - The number of queries made in one month has increased from 60,000 in May 2011 to 260,000 in October this year.
  - The number of queries made in the Patient Portal in one month has increased from 5000 (the average number until 2012) to *ca* 14,000 queries in November this year.
  - Submission of documents in one month tripled in the period from April to September, reaching more than 90,000 documents per month.

- The number of documents sent by family doctors in one month has increased 3.5 times by now over the year 2013, reaching 70,000 documents per month.
- The service developed for the Social Insurance Board is used by an average of 80 doctors and experts every day.
- In total, the Health Information System has 8611 users among health care professionals.

Updating the services, which is a topical issue in the area of e-health in many developed countries, has helped to increase the usability of the system considerably. The implementation of a digital stamp for family doctors from this year onwards deserves a mention, as it allows them to enter documents in the Health Information System without signing each of them separately, as is the inpatient case history form with a better information breakdown and shortcut menus. The latter will be implemented from 2014 and after the pilot project, the solution will also be applied to the other documents in the Health Information System.

The data in e-health is underused by doctors

45. The National Audit Office assumes that in addition to the submission of documents, the information submitted by others is also actively viewed when patients are treated. Submission of data to the e-Health Information System is important, but the quality of treatment can primarily be improved if the data sent to e-health is used by health service providers after submission.

Accessing data in e-health

46. In consideration of the above, the National Audit Office investigated how much health service providers access the data already submitted to e-health.

47. 494 institutions had made queries in the e-Health Information System, incl. 459 family doctor service providers, 30 hospitals and 5 medical specialists. 89% of the institutions that made queries made 5000 or fewer queries in a year. 793 institutions had made queries in the nine months of 2013. This means that the number of institutions that have made at least one query has increased dramatically. However, no account is generally kept of the number of documents concerning a person that a health service provider accessed, but the number of health care professionals who made queries is recorded instead.

Doctors' opinion of e-health

48. In order to find the reasons why health service providers are so lazy in using the options of e-health, the National Audit Office carried out a survey of doctors to find out what they think of e-health (the questionnaire is enclosed as Annex A). Paradoxically, almost two-thirds of the respondents found e-health to be a useful tool in their everyday work. Many of the respondents found that e-health makes the treatment of patients easier and more flexible (29.7%), and also makes it simpler and improves its quality (23.8%). The main reasons why doctors say they don't use e-health in their own opinion were as follows:

- using it takes too much time – 23%;
- there is no information about how to use it – 19%;

- as data must be entered in their own databases anyway, they don't think duplicating it in e-health is necessary – 12%.

Connecting e-health and the information systems of health service providers

49. The ease of use of e-health also depends on how the health service provider's information system is connected to e-health. The state has decided that it will establish the central e-health systems and health service providers must develop their own IT databases.

50. The information technology component is included in the price of the health service (and it was increased in 2009), but service providers claim that it doesn't cover their actual expenses (incl. the costs of joining, developing and use of e-health). The Development Fund[3] has also pointed out that whilst Estonian health care institutions spend 0.9% per year on IT development, the growth potential of IT expenses in health expenditure has be estimated as up to 5% in relation to the development of e-health in the European Union. This suggests that health service providers currently spend too little on IT.

51. As the information systems of service providers have not been developed centrally and in the same manner, and the health service providers don't have equal opportunities to order development works, the convenience of using e-health is also different in different institutions.

52. One of the problems that was highlighted is that the quantity of data in e-health that can be technically processed in the databases of health care institutions is small. This concerns the uniform standardisation of data, which has been a problem in e-health projects (see points 70 and 137–139). Hospitals, family doctors and other health service providers have had to adapt their information systems to e-health, but this has been difficult due to the lack of sufficiently detailed document standards (incl. lists).

53. However, it's important to note that in the opinion of the EHF, it is necessary to keep moving towards uniform components in the development of the information systems of service providers, as they will end up making e-health easier to use for all users. For example, the digital stamp solution led to a sudden increase in the submission of documents to e-health by family doctors. A uniform logging system and text entry helper are currently under development and they should also make the use of e-health easier for end users.

Digital stamp – confirmation that the electronically submitted documents really come from the institution that submitted them. Previously, doctors had to separately sign all the documents that were sent to e-health, but the digital stamp service means that queries are made in the institution's database after certain intervals to check whether there are any new confirmed documents. If there are any new documents, the digital stamp signs them. This means that documents are automatically signed in the institutions that use the digital stamp.

54. The fact that a patient is usually treated by one health service provider is also an obstacle to the use of e-health. In such a case, the records of the patient's treatment are kept in one place, i.e. the information system of the particular service provider, and the doctor has no need to look for information elsewhere. The health care professional doesn't see the benefits of e-health in situations like this and finds that adding anything to e-health is unnecessary.

55. The **National Audit Office** is of the opinion that doctors haven't been using the data sent to the e-health system sufficiently so far. As long as data is not sent to e-health, there is no point in viewing the data, as

[3] IT + Health Care. EST_IT@2018 Report on Use of Information Technology in Health Care. Estonian Development Fund, Estonia in Focus, 2010, no. 7.

treatment information has not been entered in most cases. It is therefore very important that doctors start using e-health. The EHF in its turn has to guarantee that the system is easy enough to use, so that the doctors who are not using e-health at present due to the fact that it takes too much time or they don't know how to use it would start using it more.

The Ministry of Social Affairs has not established sanctions for the institutions that haven't used e-health.

56. The Health Board supervises the providers of general medical care, emergency medical care, independent nursing care and independent midwife care. The board has the right to issue precepts to these institutions for elimination of omissions and to apply sanctions for failure to comply with precepts.

57. The National Audit Office assumes that if a health service provider fails to perform an obligation assigned to them, the state will demand the performance of the obligation and apply sanctions if necessary.

58. Although submitting documents to e-health is mandatory, failure to do so has not resulted in any precepts or sanctions. Neither had the Health Board checked whether the requirement to use e-health has been complied with.

Comments of the Director General of the Health Board: The Health Board is aware of the situation where a large number of health service providers are not performing the obligation to send data to the e-Health Information System as required in Subsection 59^2 (1) of the Health Care Services Organisation Act.

We will check the data you have given us and would like to advise you that the board already inspected the submission of documents to e-health by school health service providers in 2012, and in 2013 we started routine supervision regarding the performance of Subsection 59^2 (1) of the Health Care Services Organisation Act and in the course of targeted studies, we have pointed out to various health service providers that it is necessary to perform the obligation arising from Subsection 59^2 (1) of the Health Care Services Organisation Act. The experience of the board suggests that service providers proceed to comply with the proposal of the board to enter data in e-health. The board issues a precept if the previous proposal has not been complied with.

More specifically, the Health Board has carried out the following activities in checking the performance of the aforementioned obligation:

2012

the board inspected the provision of school health services in Ida-Viru County on 9 November 2012 and found that two schools don't have a computer and therefore cannot send documents to e-health. Ida-Viru Central Hospital as the provider of the school health service said that computers and telephones have been installed in all schools, incl. two Kiviõli schools (Kiviõli Secondary School No. 1 and the Russian Upper Secondary School), since January 2013 and that all data is entered electronically via the e-health system.

2013

1) on 5 June 2013 the board issued memo no. 1.3-7/3484-9, where it made TUH the proposal to guarantee that the data submission obligation set forth in Clause 59^2 (1) 2) of the Health Care Services Organisation Act is performed in the future by the health care professionals concerned, which in its turn guarantees the patient's right to information stipulated in Subsection 59^2 (1) of the Health Care Services Organisation Act and Subsection 4 (1) of Regulation No. 47. TUH responded that all the required developments cannot be undertaken at the same time the resources that can be used for the development of hospital information systems are limited and the developments must therefore be divided in several stages as permitted by the budget.

The structural units that take and describe medical images were transferred to a new information system in Tartu University Hospital in 2011 and 2012. As a result of this, the development focus mainly was on the stabilisation of the new information system and on guaranteeing the 24-hour operation of the relevant structural units. All the medical images taken and/or described in the Tartu University Hospital and their descriptions (i.e. responses to referrals) are automatically sent to the information system of the Foundation of Estonian PACS to guarantee that the images and their descriptions can be accessed by Estonian health service providers. In the next stage, the descriptions of images (responses to referrals) will also be made accessible to patients via the Health Information System. The plan is to complete the relevant development of the information system in the second half of 2013. The approval of a new and functioning standard for responses to referrals by the Estonian e-Health Foundation is a premise to the completion of the development;

2) on 29 October 2013 the board made proposal no. 12.6-1.4.35/9612 to Linda HIV Foundation for performance of the obligation to send data. Linda HIV Foundation responded on 5 November 2013 that there was an IT fault in the e-health user interface of the foundation, which was eliminated by AS Medisoft on 22 October 2013. The information of all the patients of Linda HIV Foundation has now been entered in the e-Health Information System as required;

3) the board made sole trader Riina Sinisoo the proposal to send case histories of home nursing care to the e-Health Information System once the technical issues have been resolved. On 20 November 2013 Riina Sinisoo explained the submission of data to e-health. She has been unable to submit a single case history due to purely technical reasons;

4) the board checked the provision of independent home nursing care services in Saaremaa and in its letter no. 12.6-1.2.8/78272 of 17 September 2013 made Kuressaare Hospital the proposal to submit case histories of home nursing care. On 30 September 2013 Kuressaare Hospital responded that they are ready to start submitting case histories of home nursing care to the information system from 1 November 2013;

5) the board inspected the provision of independent nursing care services in Lääne-Viru County and in its letter no. 12.6-1.5.1/10091 of 13 November 2013, it made OÜ TNP Konsultatsioonid the proposal to start submitting case histories of home nursing care to the Health Information

System as soon as possible. The Board must be informed about the commencement of said activities by 2 December 2013;

6) the board inspected the prescription of psychotropic medicines in AS Kordamed. In its letter no. 1.3-8/9254 of 21 November 2013, the board made Kordamed the proposal to apply measures to improve the efficiency of the submission of data about the health services provided by Dr I Troitski to patients to the Health Information System. We're expecting their response by 27 December 2013;

7) on 10 September 2013 the Board paid an inspection visit to the practice of family doctor Sigrid Mau at Tööstuse 5, Kohila, Rapla County. The inspection visit revealed that the submission of data by Dr Mau to the e-Health Information System had been irregular. In its memorandum no. 1.3-8/8043-3 of 26 September 2013 the Board made Dr Mau the proposal to start submitting data to the e-Health Information System regularly and emphasised that it constantly inspects such activities;

8) the Board is investigating the submission of data to the e-Health Information System by AS Medicum and Muuga Family Medicine Centre.

The Health Board will start cooperating with the Social Insurance Board and the Data Protection Inspectorate from 1 January 2014, as the latter has a lot of experience in the supervision of databases for the purpose of guaranteeing data quality, in order to improve the options of the Social Insurance Board to use the health data of persons held in the tis for the performance of medical expert analyses.

Comments of the management board of Estonian e-Health Foundation: The Health Board has carried out various supervision procedures as a result of receiving complaints from patients about the failure to send data. No sanctions have been directly applied by today, but the need to perform the obligation has been pointed out to service providers in supervision procedures. We consider it important to mention that the user statistics of the Health Information System indicate that data submission and use increased significantly in 2013, largely as a result of the fact that cooperation has been chosen as the solution to improve data submission instead of punishment.

59. According to the Minister of Social Affairs, there have been several problems in the central e-health system and this is why no pressure has been placed on service providers. The Estonian Hospital Association also sent a request to the Minister of Social Affairs in the end of 2009 to postpone the deadlines for launching data exchange by two years (until 1 January 2012) as a result of the budget cuts caused by recession. However, submission of data to e-health still hasn't been demanded or inspected after 1 January 2012.

60. There are plans to connect payment for health services to the submission of data to e-health in cooperation with the Estonian Health Insurance Fund.

61. The **National Audit Office** is of the opinion that the ministry has not guaranteed supervision of the documents sent to e-health, as it has not

been considered necessary, whilst supervision authorities have no access to the data. One of the main reasons for the underuse of e-health is that the state has established the obligation to submit data, but hasn't demanded performance of the obligation.

62. **Recommendation of the National Audit Office to the Minister of Social Affairs:** immediately require the health service providers to start using the e-Health Information System and, if necessary, create the legal framework to tie payment for services to the use of the e-Health Information System.

Response of the Minister of Social Affairs: The Ministry of Social Affairs is of the opinion that the Health Care Services Organisation Act stipulates the obligation to use the Health Information System in sufficient detail. The same act also states that the Health Board is obliged to inspect the performance of the relevant requirements. In cooperation with the Estonian Health Insurance Fund, we are considering the options of connecting the obligation to use the Health Information System to payment for services. We can also consider the need to amend legislation as a result of the aforementioned action.

63. **Recommendation of the National Audit Office to the Minister of Social Affairs in cooperation with the Chairman of the Management Board of the Estonian Health Insurance Fund:** analyse whether the share of the IT component in the service price list is sufficient to guarantee active use of e-health and, if necessary, consider the possibility of giving additional financial support to health service providers in the creation of IT solutions related to e-health.

Response of the Minister of Social Affairs: We will take the proposal on board and in cooperation with the Estonian Health Insurance Fund, we will assess the implementation of the IT component by health service providers and the adequacy of the relevant component for the performance of the development activities demanded by the state. The Ministry of Social Affairs is of the opinion that it's important to guarantee consistency in relation to development so that necessary updates or changes are also guaranteed after the development of information systems has been completed. The Ministry of Social Affairs finds that additional financial support can be tied to the size of the IT component, not to separate remuneration. The last-mentioned manner of support does not guarantee that the relevant development is updated or changed (if necessary) after its implementation.

Response of the Chairman of the Management Board of the Estonian Health Insurance Fund: The compliance of the expenditure of hospitals with service descriptions was evaluated in 2013 and the IT expenses in the descriptions were somewhat smaller than the actual expenses of the hospitals. However, when expenses are evaluated, it is necessary to look at the big picture, i.e. does the total revenue generated cover the expenses of hospitals. The revenues of most hospitals were smaller than their expenses and the unit costs of three components (utility expenses, maintenance, patient administration) were increased as a result of this. The cost of the patient administration unit also contains the IT expenses. In order to improve the recognition of IT expenses, the IT expenses included in patient administration will be shown as separate expenses in the next year.

The actual IT expenses in the service prices of general medical care and school health care were also analysed in comparison to the actual expenses and the share of IT in service prices will be increased from 1 January 2014 as a result of this.

64. The **National Audit Office advises the Minister of Social Affairs and the director general of the Health Board** to establish a plan for supervising the use of e-health by the second half of 2014 and to execute the plan.

Response of the Minister of Social Affairs: We will take account of the proposal and in cooperation with the Health Board, we will review supervision activities in relation to the obligation to submit data to the Health Information System, and prepare the relevant plan for implementation.

Response of the Director General of the Health Board: As the Health Board already inspects the submission of data to e-health, we suggest that the recommendation of the National Audit Office regarding inspection of data submission to e-health could be: increase the efficiency of the use of e-health, prepare a supervision plan by 2014 and implement it.

65. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:

- keep making e-health easier to use and developing the factors related to the speed of the system, and provide training to users; and
- agree with the service providers by the end of 2014 on the format in and the time by which case studies must be prepared and approved; prepare the relevant guidelines.

Response of the Minister of Social Affairs: We will take the proposal on board and in cooperation with the Estonian e-Health Foundation, we will plan to organise more training for users when new services are created. In planning each of the development activities, we will proceed from the goal that the Health Information System must be easy to use. We're also aware that the capacity criteria of the system must be made to comply with the increasing quantities of data held in the system.

We'd like to point out that Regulation No. 131 Statutes of Health Information System of 14 August 2008 regulates the procedure for submission of the relevant documents on the basis of the type of health service. The relevant regulation also sets forth which documents must be submitted to the Health Information System. The Ministry of Social Affairs is of the opinion that amending the relevant procedure is not necessary, as it already works and has been implemented by health service providers. The case histories are created and approved by the health service provider and every doctor decides when updating the patient's case history is no longer necessary and when it can be approved. The Ministry of Social Affairs finds that the moment of approval of a document cannot be stipulated with a certain time criterion in the context of legislation. We also find that doing this would be unnecessary, as what really matters is the doctor's decision that the data is complete and that

documentation can be deemed to have been completed. Sending an approved document to the Health Information System has been regulated with the aforementioned regulation of the Government of the Republic.

Response of the management board of the Estonian e-Health Foundation: A lot has been done to increase the organisational capacity of the Foundation in the last two years. A new and more efficient structure has been created and competency in analytics, IT administration and testing capacity has been increased. An advisory body consisting of medical experts and representatives of health service providers has been established in the Foundation, which has helped to create new developments and update existing ones. For example, the implementation of the new Patient Portal this summer has considerably increased its usage and the awareness of patients of the Health Information System has grown as a result. This is also illustrated by the fact that we and the Health Board are receiving increasingly more requests to require health service providers to send data to the Health Information System.

The state's institutions don't generally use e-health data

66. One of the objectives of e-health was to collect data for improving the level of medicine, preparing national and departmental statistics, managing health care and scientific research. Data is collected in non-personalised format.

67. The National Audit Office assumed that the data in e-health is usable and that it is used in the Ministry of Social Affairs to develop the health policy, in the Health Board and the Estonian Health Insurance Fund to plan supervision and in the National Institute for Health Development for statistics.

Health statistics based on e-health data

68. The National Institute for Health Development (NIHD), the main compiler of health statistics, has not used the data submitted to e-health for national statistics so far. The NIHD has looked into the possibility of using e-health data for statistics several times on its own initiative, but has always found too many omissions and decided not to use them for statistics. For example, based on a study completed in 2012, the NIHD found that the share of inpatient case histories submitted to e-health is big, but still not complete.

69. The analysis also revealed that the use of terms and definitions sometimes differs in institutions and some characteristics are missing in the inpatient case history, which may not be necessary in the course of treatment, but are necessary for national statistics. The right and properly thought-through fields in e-health documents are the basis for good statistics, which can later be used by all parties.

70. Although the standardisation of e-health has been worked on since the establishment of the system (see also points 137–139), both interviews and the records of the EHF's supervisory board indicate that the currently used standards are inadequate and lists are not the same in all state agencies engaged in health care. A statistics definitions workgroup, which is overseen by the NHID, was created in 2012 in order to solve the problems arising from the different use of terminology and to harmonise the use of terminology.

Standards – a data composition prepared and recognised on the basis of a consensus, the part of mandatory data, the lists/classifications used in institutions and in the e-Health Information System.
Lists – set of collated values.

71. A survey of doctors revealed that doctors themselves rate the quality of the data in e-health as rather satisfactory (43%) and good (32%). At the same time, 38% of the respondents couldn't say whether the document fields in e-health in which information is entered are sufficiently standardised and suitable for statistics as well as for doctors seeking medical information. 30% of the respondents thought that they are suitable. The survey of doctors therefor also shows that the understandings of the parties are different and that the present standardisation has not been sufficient (see also points 137-139 of the report).

72. A statistics module for obtaining statistical data from the e-Health Information System was prepared in 2013 and according to plans, it will start working in the beginning of 2014. State agencies as well as service providers could use it to obtain the data needed for supervision and policy-making from the e-Health Information System. All interested parties could say what they needed when the statistics module was being prepared. The extent to which these requests were taken into account will become clear once the module is taken in use.

Registers not belonging to the e-health system

Medical registers – the registers that collect, process and distribute the national statistical data related to health and medicine in Estonia

Did you know that…

there are around ten medical registers and databases in Estonia: the information system of contagious diseases NAKIS, the register of myocardial infarction EMIR, the medical birth register and pregnancy termination database, cancer register, register of causes of death, drug rehabilitation database, PACS.

73. Service providers must submit health data to medical registers and databases. In addition to this, reports must also be submitted to various state agencies. Registers are administered by various agencies, but the main ones are NIHD and the Health Board. There are several ways of submitting registry data – some must be submitted on paper, some online. There are around ten different registers.

74. National health registers have been structured in such a manner that data cannot be collected for them via e-health applications (except NAKIS, where some information can soon be submitted via e-health). In addition to the lack of technical solutions, it is also a problem that the quantity of the information that should be submitted to the registers should be considerably larger than the quantity that is presently submitted regarding a regular incidence case. Although the registers were going to be reorganised according to initial plans to make them e-health based, these plans have been abandoned by now.

75. However, part of the data in the registers is the same as in e-health and submitting the same data to e-health and medical registers is time-consuming for service providers. For example, the Health Board receives weekly information about cases of flu from the EHF, but health service providers must still submit this information to the information system of contagious diseases. Also, some health statistics must be submitted separately on paper or via A-web. The statistics module described above should partly solve the entry of duplicate data in registers and the Health Information System in the future, especially if the submission of data in e-health were to become systematic.

76. The National Audit Office is of the opinion that the creation of e-health has not reduced the administrative burden of health service providers in the submission of health statistics or information to registers.

Comments of the management board of Estonian e-Health Foundation: Health statistics are currently prepared according to the regulation of the Minister of Social Affairs 'Requirements for the Preparation of Health Statistics and Reports of Economic Activities in the

Health Sector, Data Composition and Submission Procedure'. The statistics established with the regulation are sent by health service providers online via A-web. A-web is the environment where health statistics and statistics of economic activities in the health sector are collected and it can be accessed via the websites of the Ministry of Social Affairs and the National Institute for Health Development. In order to prepare health statistics on the basis of the data in the Health Information System, it was necessary to develop the relevant module in the Health Information System that would make it possible to prepare statistical analyses on the basis of the collected data. The relevant development was prepared with the finances of the European structural funds. The development of the statistics module started in 2010. Financing of the project from the European structural funds will end in December this year. The first stage of the statistics module (incl. analysis, testing, user training) has been developed with the finances of European structural funds and the objective of the module was to develop the statistics prepared on the basis of inpatient case histories sent to the Health Information System.

The National Institute for Health Development carried out an analysis of the data sent to the Health Information System. Health service providers were assigned the obligation to send inpatient case histories, notices about the opening of inpatient incidence cases and notices of closure of inpatient incidence cases as of 1 January 2009. Data that could be analysed had been submitted to the Health Information System by the time the analysis was carried out and such data made it possible to ascertain the omissions that could be found in the data and what the solution of the statistics module should be like. Today, activities to improve data quality have been initiated both on the basis of the analysis carried out by the National Institute for Health Development as well as the analyses carried out by the foundation itself.

The purpose of the statistics module is to make statistical analysis of health data possible for the officials of the National Institute for Health Development and the Ministry of Social Affairs. The relevant legal regulation has been processed in the Riigikogu (third reading on 21 November 2013; http://riigikogu.ee/index.php?op=ems&page=eelnou&eid=5990ad14-54f0-4d89-a4ae-111ac1b8d162&).

Use of e-health data in the supervision work of the Health Board

77. The e-health data could also be used to make supervision more effective. Supervision of health service providers (e.g. family doctors, ambulance service, providers of specialised medical services) is a duty of the Health Board.

78. Unfortunately, the Health Board does not use the data in e-health for planning its supervision activities at present. In addition to the problems that have been repeatedly highlighted above, especially the fact that data is missing from the system, the use of e-health data is also made difficult by the fact that they are primarily meant for treatment purposes and the Health Board has no access to them. The Health Board may request data separately from the EHF, but a special request for data can take time and it is also a burden on the EHF. As said above, the EHF prepares flu incidence statistics for the Health Board every week. The statistics module, which is being developed or, more specifically, is currently in

the testing stage, should make it possible to access a certain part of the data.

79. Under the partial leadership of the Health Board, there are plans to start the first developments of the cross-usage of data in family medicine in order to cover data from e-health, the information system of family doctors and the Estonian Health Insurance Fund. This makes it possible to compare the data held in different databases and to notice and analyse significant deviations for planning supervision.

80. In addition to this, the Health Board is looking forward to the implementation of the new service of the e-Health Information System – the e-ambulance. As a result, the ambulance resource will become manageable for the Board on a daily basis and the data necessary for supervision will basically be immediately accessible.

Use of e-health data in making financing decisions in the Health Insurance Fund

81. In addition to the Health Board, the Estonian Health Insurance Fund (EHIF) is also obliged to supervise the services provided. Namely, the EHIF has to make sure that the services indicated on medical invoices have actually been provided. This can be done by comparing case histories and the services listed on medical invoices.

82. At present, the EHIF performs 'random' checks whereby some of the medical invoices are also compared to the treatment documents (medical records, case histories) when they are reviewed. Unfortunately, the Estonian Health Insurance Fund doesn't currently have access to the data in e-health and a medical invoice cannot be automatically matched to a case history. Having this option would make it easier for the Estonian Health Insurance Fund to plan inspections and allow them to check the correctness of a considerably larger number of invoices.

83. If the patients could also see their medical invoices in e-health, it would allow them to see whether the services listed on the invoice were actually provided to them and this would again increase the transparency of treatment. Although linking and comparing medical invoices and the data to be entered in e-health was discussed when e-health was planned *ca* ten years ago, it remained just an idea for the time being.

Use of e-health data in the Ministry of Social Affairs for health management

84. As described above, the data in e-health cannot yet be fully used for treatment purposes, national statistics, registry keeping or supervision. The main obstacles are the lack of data and the restricted access. This is why the Ministry of Social Affairs hasn't used e-health data for policy-making so far.

85. In addition to the data in the e-Health Information System, it would also be possible to develop health policy via centrally observable waiting lists, i.e. the Digital Registration. The Digital Registration would give an overview of the actual use of appointments and more choice to patients. This could also be used to obtain the information that the Ministry of Social Affairs could use for making health policy decisions as well as the information the Estonian Health Insurance Fund needs for making financing decisions. However, the Digital Registration has not been implemented.

Determining the degree of disability and incapacity for work on the basis of the data in e-health

86. The only state agency that actively uses the data in e-health is the Social Insurance Board, as a module for determining the degree of disability and/or permanent incapacity for work has been developed for them in e-health, which also gives them access to the data in the e-Health Information System. The development of this service was initiated by the Estonian Society of Family Doctors.

87. The **National Audit Office** is of the opinion that the state's institutions are not yet benefitting from the data in e-health. E-health data are not used for the preparation of health statistics, planning supervision, making funding decisions or the broader development of health policy. This means that the objective of e-health to create opportunities for using collected data, improving the level of medicine, preparing national and departmental statistics, managing health care and scientific research has not been achieved. Neither can the Health Board and the Estonian Health Insurance Fund access the person-based data in e-health, even though they may need it for their supervision and inspection activities.

Comments of the management board of the Estonian e-Health Foundation: The Health Information System is a database that belongs to the state's information system in which sensitive personal data are processed. Strict criteria have been established for issuing data from such databases and the principles that were discussed with doctors, representatives of patients and ethics specialists upon the creation of the database are currently being followed. Data exchange in the Health Information System must be thoroughly analysed and it must take place in consideration of all the security requirements established for the database. When access is granted, it is important to ensure that this does not damage the main purpose for which the data in the Health Information System are used: the provision of health services. If a patient is not interested in the possibility of their data being sent to other institutions, they may choose to prohibit access to their health data and thereby also prohibit their data from accessing health care professionals.

A good example is the data exchange in the Social Insurance Board regarding the determination of the disagree of disability and additional expenses, ascertainment of permanent incapacity for work and extension of certificates of temporary incapacity for work, which was implemented in summer 2012. The data exchange is based on clear legal regulation and a safely developed data exchange interface.

Data exchange related to the health certificates of vehicle drivers is currently being developed in cooperation with the Road Administration within the scope of the e-certificate project. Negotiations with the Ministry of Defence are currently ongoing and their aim is to grant the medical committees operating in the ministry's area of administration access to the data held in the Health Information System.

The Health Information System currently gives data to the register of contagious diseases administered by the Health Board. The Health Information System also sends flu statistics to the Health Board. Partial connection of the nursing care information system InterRAI to the Health Information System is being discussed.

88. **Recommendation of the National Audit Office to the Minister of Social Affairs:** create the legal framework that would allow the Health

Board and the Estonian Health Insurance Fund to access the data in the e-Health Information System for the performance of their functions.

Response of the Minister of Social Affairs: Pursuant to the Health Care Services Organisation Act, the Health Board already has the right to access the data in the Health Information System. The Health Board has also used this right in relation to supervision procedure. As for the Estonian Health Insurance Fund, we have started preparing the first version of the draft and once it enters into force, the Estonian Health Insurance Fund will have the legal right to access the relevant data for the performance of its functions.

89. **Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation and the Director of the National Institute for Health Development:**

- develop the e-Health Information System in cooperation with registers so that hospitals don't have to duplicate data and as much information as possible can be obtained from the same place; and
- coordinate the terminology and lists used in e-health with the parties in such a manner that the data in different databases and registers could be compared to and connected with each other.

Response of the Minister of Social Affairs: The Ministry of Social Affairs has started the establishment of electronic data exchange between health registers via the Health Information System. When each subsequent health register is transferred to digital data exchange or when a new register is established, we plan for it an interface with the Health Information System for the purposes of data submission. It is important that national health registers collect data, if possible, from existing documents that have already been sent to the Health Information System and we will continue implementing the relevant principle also in the future.

Pursuant to the Health Care Services Organisation Act, health service providers are obliged to use the classifiers, lists, address data and Health Information System standards of the state's information system. All the and lists standards published by the Estonian e-Health Foundation have been previously approved and their use is mandatory nationwide. Other lists, classifiers and standards may also be used in different databases and information systems, but they must be recoded to the nationally required format when documents are sent to the Health Information System. The Ministry of Social Affairs is of the opinion that the described system is functional and we will continue using it in the implementation of new lists, classifiers and standards. We will keep increasing the focus on the standard guidelines, which in its turn will guarantee that the data required by the state is unambiguously defined and understandable for data submitters.

Response of the management board of the Estonian e-Health Foundation: According to plans, the data exchange between national medical registers was supposed to take place via the Health Information System, but these developments must first be thoroughly analysed. The

objective is to have sending data to registers via the Health Information System reduce the data submission burden of doctors.

The document standards of the Health Information Systems that are used today were mostly created within the scope of the Electronic Health Record project in cooperation with the representative organisations of the various persons who submit documents as well as the specialists who are engaged in the development of data compositions for information systems in their daily work for health service providers.

The standards of all the documents listed in the regulation can be viewed in the publication environment on the website of the Estonian e-Health Foundation. In addition to the mandatory documents established with the regulation, the Health Care Services Organisation Act also stipulates that the provided health services must be documented using the state information system's classifiers, lists, address data and Health Information System standards, i.e. the standard published today also contains the standards of documents the submission of which is not required pursuant to the regulation. Health service providers have sent such documents to the central system – childbirth case histories, day care case histories and nursing care case histories can be given as examples.

In addition to standards, it's also important to have a common terminology, which is created on the basis of cross-sectoral cooperation, incl. cooperation with the medical terminology committee established by the National Institute for Health Development. The preparation of terminology started in 2013 and the work will continue in 2014, already in cooperation with the Ministry of Social Affairs and the National Institute for Health Development.

A cross-sectoral workgroup was also created in 2013 with a directive of the foundation's management board: Workgroup of the Lists and Classifiers Used in the Area of Health. The standardisation procedure and process are being updated and we will establish a position whose main task will be to analyse data quality and to coordinate improvement activities.

Response of the Director of the National Institute for Health Development: The National Institute for Health Development agrees fully with the proposals made in the draft of the National Audit Office's audit report Activities of the State in Implementing the e-Health System regarding the continuation of cooperation with the e-Health Foundation in order to develop the e-Health Information System in cooperation with registers and to coordinate the terminology and lists used in e-health between the parties in such a manner that it would possible to compare and link the data in different databases and registers. The existing data sources must constantly be developed and new sources should be sought in order to prepare more effective, reliable and quality statistics. Several data sources are used in health statistics and the e-Health Information System is a significant source of data. The use of data from the Health Information System for the purpose of statistics makes it possible to obtain more detailed data and at the same time reduce the burden on HSPs as data submitters.

It's important to meet the following preconditions in order to use the e-Health Information System as a source of data for statistics:

1. Develop the standards that all HSPs and other parties use in the same manner (terminology, definitions).

2. The number of the HSPs that send data to e-health and the quantity of the documents that are sent must increase. All establishments must submit data about all cases for the preparation of exhaustive statistics.

3. The quality of the data must be high. Logical checks have been developed and implemented in the statistics module in order to detect errors.

4. It must be kept in mind that the indicators and phenomena that do not subject to logical checks must also be checked manually. This also applies to notifications of medical registers.

5. The data composition and submission of register notices must be reviewed in terms of the suitability of electronic data exchange (i.e. legislative drafting).

6. The NIHD, the information systems of HSPs and the HIS must be developed to such a level that all notices would only be received electronically and that logical checks were on.

7. A legal framework must be created for the use of the statistics module, which is currently being done.

8. The HSD of NIHD applies for the status of the agency that prepares statistics in order to gain access to various administrative data sources. It's not possible at the moment. This is the only case when the data from different sources can be linked at the level of persons to produce quality statistics.

9. The HSPs as the main users of the HIS must be involved in the developments and provided financing for their activities.

10. The NIHD is interested in, agrees with and is already contributing to the development of the statistical system of the HIS. The NIHD has requested financing for additional activities from the Ministry of Social Affairs for several years, but hasn't received any support. The NIHD will continue contributing in the given situation, but the contribution is not as big as required.

11. The plans for the HIS include the development of a data processing and publication system. The NIHD considers this unreasonable, as such systems already exist in the NIHD and they are working well.

I would like to emphasise here the statement made in an interview with the employees of the NIHD that the observations made in the audit report according to which the e-Health Information System has not been implemented yet as expected are not so much the results of shortcomings in the information systems, but of the presentation of unrealistic expectations or promises when the information system was still in the stage of an idea as well as the underestimation of the time required for the system's implementation.

The purpose of e-health – to increase patient orientation – has not been met.

90. One of the objectives of e-health is to increase patient orientation in health care. For example, this means that patients have easier and faster access to health services, and that the services provided to them are of higher quality.

91. The National Audit Office assumed that the active use of e-health and the necessary modules that facilitate the provision and receipt of services help to increase patient orientation.

92. The EHF has created the Patient Portal where patients can access their medical information. Patients can also use the portal for expressions of will: appoint authorised persons who can fill digital prescriptions, notify of their readiness to donate organs after death, close their health data so that they're not visible to doctors. A new, easier-to-use version of the Patient Portal was opened in July 2013.

93. The Patient Portal should also give access to the Digital Registration, which hasn't been implemented yet, so that patients could make appointments with doctors. The Digital Registration would also allow patients to see which specialists in which institutions have the shortest waiting lists. At present, making an appointment with a specialist generally requires the patient to call the specific service provider. Some hospitals have also created e-registration (see point 166). As the length of the waiting lists of various service providers cannot be compared, the patient may have to wait longer to see a specialist.

94. As there isn't enough data in e-health and the digital image system does not contain information about all images, it may lead to the duplication of images or other tests, and the benefits perceived by the patients have therefore probably been small. However, patients have accepted the Digital Prescription and it is used.

95. The **National Audit Office is of the opinion** that e-health doesn't usually make access to health services easier, quicker or better for patients. However, there is a positive example – the Digital Prescription – which allows both doctors and patients to use their time more efficiently.

E-health does not help save health insurance money or use the working time of doctors and nurses more reasonably.

96. One of the objectives of e-health was to improve the efficiency and quality of the provision of health services and to reduce the amount of paperwork done by doctors. In order to achieve these goals, the e-Health Information System must make it possible to use the e-services that help to use the health insurance money and the time of doctors and nurses more efficiently in addition to the use of the health data of patients. Such e-services must bring about changes in the organisation of work inside health care institutions as well as between the institutions.

97. The National Audit Office assumed that the achievement of the objectives of e-health is at the forefront of the development of e-health and the implemented systems make it possible to use health insurance money and the time of health care professionals more reasonably.

98. Until recently, the development of the central e-health system or the Health Information System primarily contained the development of the central system as a database. The needs of health service providers, which in the case of doctors means that the system should be easy to use and informative, were not placed in the foreground. As e-health was being planned, it was found that the system must be easy and convenient to use, and contain easy-to-find information about every patient, but the present e-health does not meet these conditions.

99. The exceptions among the e-health projects are the Digital Prescription, which was developed and implemented by the Estonian Health Insurance Fund, and the PACS developed and implemented by the Foundation for Estonian PACS, which certainly helps doctors and nurses to use their working time more reasonably. These systems also save the time of patients (see points 168-177).

100. The e-health module required for determining the degree of disability and/or permanent incapacity for work also helps both doctors and patients to save time. It helps the medical experts of the Social Insurance Board to access the data stored in the e-Health Information System and (family) doctors no longer have to describe the health status of patients separately for the Social Insurance Board (see point 86).

e-Consulting test project

101. The e-consulting test project was carried out in cooperation between the North Estonia Medical Centre and the Estonian Society of Family Doctors from March 2011 to August 2012. e-Consulting via the Health Information System, which is one of the first e-services developed by the EHF, implemented via the e-Health Information System (from 1 April 2013) and financed by the Estonian Health Insurance Fund, was born as a result of this.

102. The e-consulting test project demonstrated that the e-consulting service allows patients to avoid unnecessary appointments and duplication of tests (i.e. that the same test is done by the family doctors as well as the specialist).

103. In the test project, the family doctor did all the agreed tests and referred the patient to the provider of the relevant specialised medical service with an e-referral. The specialist reviewed the results of the tests done by the family doctor and the referral, and decided whether the patient needed any extra tests (by the specialist) and prioritised the health issue of the patient. If the patient needed additional tests and/or appointments with specialists, an employee of the provider of the specialised medical service (usually a nurse) called the patient and made an appointment with the specialist for the patient. The state of the patient's health was considered when the appointment with the specialist was made and the patients with more serious problems had to wait less for an appointment. If the specialist decided that the patient didn't need to see the specialist, they wrote their response to the e-referral and the provision of the specialised medical services was limited to e-consulting. The feedback given by the specialist reached the patient via the family doctor.

Cardiology is a specialty of internal medicine that deals with the treatment and prevention of cardiovascular diseases.

Urology is the branch of surgery that focuses on the treatment of congenital defects, acquired diseases (incl. tumours) and injuries of the genitourinary organs.

Pulmonology is a specialty of internal medicine that deals with the treatment and prevention of all lung and respiratory tract diseases.

104. The results of the test project indicated that in the specialty of cardiology, referral to the specialist was limited to just e-consulting (an appointment with the specialist wasn't necessary at all) in 10% of all cases and the same indicator was 16% in urology and 4% in pulmonology. The share of patients referred to medical specialists who were subjected to additional tests by the specialists first of all was 78% in cardiology, 47% in urology and 40% in pulmonology, so that the usual primary appointment with a specialist was skipped altogether. This saved time for both doctors and patients. Also, specialists did not do the same tests again that had already been done by the family doctor. It's also significant that those who needed help more urgently managed to see specialists quicker.

105. What might be seen as a problem in the test project is the fact that the family doctors who participated in the project did not refer all of the patients who needed services in these specialties to specialists using the e-consulting service. Many family doctors only used e-consulting to refer the patients whose condition was serious and whose need to see a specialist was more obvious. The majority of patients, however, were referred to specialists in the usual manner. This means that the effect of the test project's results would've probably been even bigger if the family doctors who participated in the project had referred all the patients who needed services in these specialties in the given period to specialists via the e-consulting service.

New e-consulting services financed by the Estonian Health Insurance Fund

Endocrinology is a specialty of internal medicine that deals with the treatment of diseases related to hormones. Diabetics form the biggest group of endocrinology patients.

106. The health service e-Consulting via the Health Information System in the specialties of urology and endocrinology, which was launched on 1 March 2013 and is financed from health insurance funds, has unfortunately failed to repeat the success of the test project until now: the service was only used 200 times in the first four months. The number of patients referred to urologists and endocrinologists in the same period was 100 times higher.

107. The most obvious reasons why the use of the new services has so far been insignificant are the limited effort made by the Estonian Health Insurance Fund to popularise the new service and the limited uses of the service: all family doctors can use it, but only a few hospitals provide the service.

108. There are plans to expand the service e-Consultation via the Health Insurance System to three new specialties in 2014.

109. At present, the prevailing practice of referring patients to specialists means that the family doctor writes a referral on paper (e-referrals are rarely used) and the patient or, if requested by the patient, the family doctors makes an appointment with a specialist working by a suitable health service provider. Before referring the patient to the specialist, the family doctor does the tests they consider necessary, as the tests that must be done before the patient is referred to a specialist haven't always been agreed on. The specialist will not review the information in the patient's referral before the patient arrives for the first appointment (with the paper referral, or the doctor tales a look at the e-referral in the e-health during the patient's visit). Urology and endocrinology are the exceptions in the use of the e-consulting service. This means that the first appointment with the specialist is spent on getting to know the patient's problem, and the patient is then referred for additional tests if necessary. If the patient's

problem requires a specialist's attention, the first appointment is usually followed by a second.

110. Based on the above, the simplified conclusion is that the reason for referring a patient to a specialist is questionable if the referral is only limited to one appointment. The fact that an additional test was done in the case of this one appointment with a specialist does not necessarily mean that the referral was justified. The test or analysis carried out by the specialist may have been one that could've been done by the family doctor before the referral.

National Audit Office's analysis of the practice of referral to specialists in three specialties

111. Considering the results of the test project and the problems in the usual referral of patients to specialists, and looking to identify appointments with specialists that could be prevented, the National Audit Office analysed the usual practice of referral to specialists in the specialities of cardiology, urology and pulmonology in the first half of 2012.

112. The analysis indicated that the service obtained by patients referred to specialists bordered on just one appointment in 47.6% of cases in cardiology, 37% in urology and 39% in pulmonology. The share of patients referred to specialists received no other services apart from an appointment in 14.1% of cases in cardiology, 23% in urology and 9.5% in pulmonology (see Figure 2).

Did you know that…

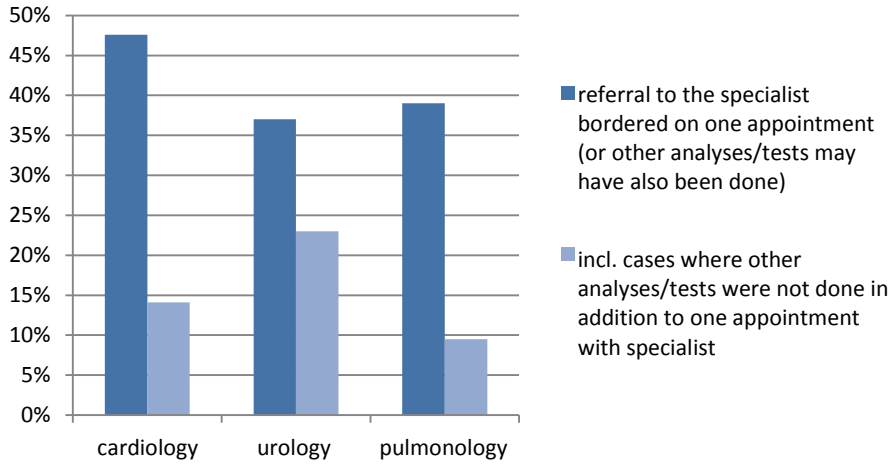
During the period analysed by the National Audit Office (medical invoices started in the first half of 2012), one patient had visited a cardiologist a record 22 times. The record number of appointments with a pulmonologist was 21 and with a urologist 15.

More than 75% of the analysed patients visited the doctor once or twice.

113. The large number of cases that bordered on one appointment indicates that many patients with smaller problems get appointments with specialists. The majority of such appointments could probably have been avoided if the e-consulting service was used. The expert opinion given in an earlier audit of the National Audit Office, Organisation of the Family Doctor Service, indicated that half the patients referred to a cardiologist didn't actually need a consultation with the specialist.[4] The methodology used for the two analyses is very different, but the similar indicators obtained in the specialty of cardiology clearly indicate that the present referral practice wastes the time of doctors and patients as well as insurance funds.

[4] The National Audit Office's audit Organisation of the Family Doctor Service of 2011, points 24-32

Figure 2. Referrals to specialists that bordered on one appointment in the first half of 2012 in the specialties of cardiology, urology and pulmonology



Source: Estonian Health Insurance Fund, analysis by the National Audit Office

114. Based on the results of the test project and the ordinary practice of referral to specialists revealed by the analysis of the National Audit Office, it can be said that a very large number of patients whose health concerns could be resolved without an appointment with a specialist currently end up seeing a specialist. e-Consulting makes it possible to shorten waiting times and to use the working time of doctors and nurses as well as health insurance funds more reasonably. It would also save the time of patients, because unnecessary appointments would no longer be made and patients with serious health issues would be able to see specialists quicker.

115. The **National Audit Office is of the opinion** that using the e-consulting service actively would also improve the cooperation between specialists and family doctors and increase the motivation of doctors to use e-health solutions in their daily work. The Estonian Health Insurance Fund has done a good job and added e-Consulting via e-Health to the list of medical services, but hasn't motivated doctors to use it more actively.

116. The use of health insurance funds could be made more efficient and purposeful by the considerably more intensive assistance of the Estonian Health Insurance Fund in the creation (in cooperation with specialist societies) and development (in cooperation with the EHF) of e-services that would promote a more reasonable use of health care resources.

Specialist society – association of doctors established for the purpose of advancing their specific area and improving its quality; giving medical advice and preparing treatment guidelines; organising specialist conferences; etc.

117. The cooperation between the Estonian Health Insurance Fund and the EHF hasn't been particularly intensive so far. Since these two organisations signed a memorandum of cooperation on 28 February 2013, the cooperation between them should improve in the future. The plan to tie payment for services to the use of e-health should help to improve the use of e-health solutions by health service providers.

118. Recommendations of the National Audit Office to the Chairman of the Management Board of the Estonian Health Insurance Fund:

- keep developing e-consulting services and ask specialist societies for their opinion on how the e-consulting system could be structured in the best possible manner in their specialty;

- set the use of e-consulting in all medical specialties as the goal to be achieved in a couple of years; and
- require that all health service providers use the e-consulting service.

Response of the Minister of Social Affairs: The e-consulting service can be implemented in three new specialties from 2014. We will take the proposal on board and in 2014 we will develop a plan for the inclusion of the next specialties in the e-consulting system. In terms of making the use of the relevant service mandatory in the future, we will first assess the problems associated with the service after its initial implementation.

Response of the Chairman of the Management Board of the Estonian Health Insurance Fund: The service 'e-consulting via the Health Information System' (code 3039) has been included in the list of health services since 1 March 2013 and it is used by family doctors when referring patients to a urologist or endocrinologist with e-referrals sent via the Health Information System. The Estonian Health Insurance Fund pays the family doctor within two days of the submission of the e-referral if the e-referral and specialist's response prepared in the course of provision of the health service contain the data set forth in the annexes to Regulation No 9 of the Minister of Social Affairs of 19 January 2007 'Procedure for taking over the obligation to pay fees from the insured person by the Estonian Health Insurance Fund and methodology for calculation of the fees payable to health service providers', and the required response is sent to the family doctor via the Health Information System within two days after the e-referral was sent. The Estonian Health Insurance Fund will pay for the services marked with the code 3039 under the same conditions also in the case of an e-appointment. The Estonian Society of Family Doctors has suggested updating the list of specialities in the case of which the Estonian Health Insurance Fund takes over the obligation to pay fees from the insured person as follows: pulmonology, rehabilitation, rheumatology, cardiology, otorhinolaryngology. The requirements for the referral and response can be developed ONLY in cooperation with specialist societies.

The specialties in which the implementation of requirements for referrals and responses is planned for 2014:

- rheumatology
- pulmonology
- otorhinolaryngology.

The Estonian Health Insurance Fund is of the opinion that interfacing all specialties at the same time (without specifying the data fields) would not help to launch e-consulting as planned. However, we will continue cooperating with the Estonian Society of Family Doctors and specialist societies in 2014 for the development of requirements for referrals in additional specialties.

The Estonian Health Insurance Fund has come up with the draft contract for financing treatment, which makes launching the e-consulting service mandatory for all HSPs. However, as the implementation of this service requires organisational changes, it is likely that not all HSPs will be able to launch it fully in 2014.

Summary of the chapter Use of the e-Health Information System

119. The **National Audit Office is of the opinion** that at the moment, the e-Health Information System does not achieve any of the goals established for it at the start of the project. e-Health does not make it possible to provide better health services, does not guarantee a better and more effective planning and organisation of health care or the optimal use of money. The reasons are mostly related to the data missing from the e-health system, the failure to implement systems (incl. Digital Registration) and the underuse of the information contained in the system. Use of the Digital Prescription and the PACS established on the initiative of hospitals is an exception, as doctors need these applications in their everyday work to save time and facilitate making treatment decisions.

120. The reasons why e-health does not comply with the goals that were set for it are analysed in the next chapter.

Difficulties in implementing the e-Health Information System

The risks of developing e-health were known, but never managed

121. The risks associated with the development and implementation of a project that threaten its success must be identified whenever an IT project is launched. The critical success factors, which are the important premises or conditions for the project being a success, are usually separately highlighted. Measures that work must be found for risk management. If risks are the circumstances that threaten the success of a project, then critical success factors are the measures for managing risks.

Critical success factors – the premises or conditions the achievement or preservation of which determines whether or not the project will be a success; which answer the question of what is the biggest obstacle to the success of an activity or where nothing must go wrong; and which are the measures for managing the risks that pose the biggest threat to the success of the project and/or the desired situations (opposite of risks)

122. Risks must be consistently considered and managed when a project is being planned and implemented. If the risk management measures don't work during the implementation of the project, working options for managing the risks must be found during the process. Risk management is a constant process and a natural part of project management.

123. The National Audit Office assumed that the risks that threaten the successful implementation of the project were identified in the initial stages of the project, the options for managing them were found and the risks were also managed during the implementation of the project.

Analyses before the implementation of the e-health project

124. Three analyses were completed in early 2004, before the preparation of the Health Information System Development Plan or the establishment of the EHF:

- the goal of the analysis of the organisational formats of the Electronic Health Record (completed by the Ministry of Social Affairs and PricewaterhouseCoopers) was to find the best organisational output for e-health.
- The risk analysis of the Electronic Health Record Development Plan (Ernst & Young) focussed on the risks to the implementation of the e-health project and the options for managing these risks, and it also contained recommendations for updating the information system development plan.

- The feasibility study of the Electronic Health Record project (HeiVäl Consulting Group) assessed the impact, efficiency, critical success factors, costs, etc. of the e-health project.

125. The critical success factors and/or risks of the development and implementation of e-health, as well as options for risk management, were also discussed in all three analyses.

Risks of the e-health project

126. The risks identified in the above three analyses, particularly in the Risk Analysis of the Electronic Health Record Development Plan, were considered in the preparation of the e-Health Development Plan 2005-2008. The Government of the Republic approved the development plan in January 2005. The e-Health Development Plan 2005-2008 contained a separate sub-chapter about risks and their management (see Table 3).

Table 3. Risks associated with the implementation of the Electronic Health Record project.

Risks		
Organisational	**Technological**	**Socio-political**
Inadequate change management plan	Multitude of different systems	Inadequacy of legal system
Limited experience in the implementation of a central management strategy	Multidimensionality of functions	Political risk
Lack of a working structure for register management	Undeveloped data standards	Public relations risk
Keeping the data of patients confidential	Existing IT infrastructure does not support the necessary functions	
Insufficient competency in the area of IT skills and options of organisations	Updating and perfection of existing systems	
Underestimation of the total cost of launching the project	System development is time-consuming	
	Inability of system developer to guarantee the necessary IT support	
	Increase in the system administration expenses	

Source: e-Health Development Plan 2005-2008

127. The risks of the Digital Prescription, Digital Registration and Digital Image were separately discussed in the e-Health Development Plan 2005-2008, but they are largely the same as the risks of the Electronic Health Record. The measures for managing each of these risks were also developed. Annex B to this report contains an extract of the risks highlighted in the risk analysis of the Electronic Health Record Development Plan, the feasibility study of the Electronic Health Record project and the e-Health Development Plan 2005-2008, the options for managing these risks and the list of critical success factors.

128. Based on the material in Annex B, the National Audit Office has prepared a brief summary of the conditions for achieving the objectives of e-health, which are as follows:

- all of the classifiers, message formats and data standards required for the Electronic Health Record have been developed and used by everyone who participates in the system;
- users can find the necessary information quickly and easily;
- the data in the information system of the Electronic Health Record are complete and reliable;
- information about all patients is accessible;
- the system is simple and easy to use;
- the leaders of the project are competent and consider the actual needs of the users of the information system;
- changes are successfully managed in the course of the project (systematic user training, uniform policy for the acquisition of software, etc.);
- the workload of doctors will not increase in comparison to the present situation (the situation before e-health);
- time is realistically planned, costs are thoroughly analysed and budgeting is accurate.

129. As indicated above, possible risks had been thoroughly identified before the launch of the e-health projects and the critical factors the achievement of which would make the launch of the projects a success had also been defined. Risk assessments overlap significantly in different analyses, which is why they can be considered entirely adequate.

Unrealistic schedule of e-health

130. Although the implementers of the project were well aware of the risks, they failed to manage them and therefore didn't achieve the objectives of the project. The schedule of the projects was one of the reasons why such a situation occurred. Namely, the e-health projects were financed with the funds of the 2003-2007 programme period of the European Union and they could only be used during a certain period of time. All of the four main e-health projects should have been completed by the end of 2007.

131. This means that the schedule was extremely unreasonable despite the preliminary work done before the establishment of the e-health system and before the actual launch of the e-health project (conditionally from 14 November 2005 when the Estonian e-Health Foundation was established). The persons involved in the e-health project who were interviewed in the course of several audits were of the opinion that the decision-makers knew from the start that the schedule was far too optimistic.

132. Various risk analyses had also indicated that people tend to underestimate the volume of development and implementation activities in the case of such massive projects. It was emphasised in the analysis of the organisational formats of the Electronic Health Record that the establishment of a new organisation (the EHF) for the development of e-

health was a slow solution, as the organisation and the development of e-health started from scratch.

133. The unrealistic schedule is one of the most significant reasons why many critical risks materialised. There simply wasn't enough time left for risk management.

Risk management in the course of the e-health project

134. The **inclusion of target groups** has been a key success factor in the development and implementation of e-health and therefore also the biggest stumbling block that could cause failure. The risk analysis of the Electronic Health Record Development Plan highlighted that it's important to guarantee positive cooperation with the main parties, incl. with large hospitals and family doctors whose interest in the results of the project is one of the most important success factors. Considering the tight schedule of e-health (there was no time for risk management) and the information obtained from the interviews and analyses carried out in the course of the audit, it can be said that the involvement of target groups has been problematic throughout the development of e-health.

135. The underuse of e-health, especially the small number of times when data has been accessed (see points 24-55), also indicates that the involvement of target groups has been insufficient. Inactive use is a sign of problems in the user-friendliness of e-health and of the failure of e-health to meet the needs of users.

136. The Development Fund also highlighted in its report[5] that cooperation between the contracting entity and the contractor is one of the premises to the successful establishment and implementation of health information systems: solving problems jointly helps to improve mutual understanding between IT developers and medical professionals (the main users of e-health). The Development Fund is of the opinion that so far, the contact of the parties to e-health (developers and users) with IT and health care has been rather modest on both sides and this has sometimes obstructed development.

137. The second critical success factor without which e-health cannot be fully implemented is **standardisation.** In terms of e-health, standardisation means common IT data standards, which guarantee communication between the information systems of e-health and service providers, and also document standards (data composition, mandatory data, lists/classifiers used).

138. Documents can only be standardised with the active assistance of the target groups. Since cooperation with the target groups has been inadequate, it has made the standardisation of documents and the development of data submission rules more difficult. As described in the previous chapter, the lack of standards and agreements is one of the reasons why the use of e-health is so insignificant.

139. And yet, the EHF has so far standardised more documents than approved by the Ministry of Social Affairs with its regulation, which is why there is no basis for using them. As the ministry has estimated that

[5] IT + Health Care. EST_IT@2018 Report on Use of Information Technology in Health Care. Estonian Development Fund, Estonia in Focus, 2010, no. 7.

the activities of the EHF in involving target groups (particularly doctors) have until recently been inadequate, then this has probably been the reason why many standardised documents haven't been approved with a regulation of the Minister of Social Affairs.

Change management

140. Inadequate change management was a significant risk in the development and implementation of e-health. The impact of the introduction of e-health on the organisation of work of health service providers was seen as significant, which in its turn created the need for a well thought-through management of changes. Changes can be managed if the target groups (the main users of e-health) understand why the changes are necessary. Change management comes with the necessary user support and training.

141. Looking at the implementation of e-health to date, including the problems in the involvement of target groups, low activity of use and poor user-friendliness, the management of change in the development and implementation of e-health can be seen as inadequate.

142. There are many reasons why the involvement of target groups, standardisation and change management have been inadequate, and they are closely connected to each other. The most significant of them are the aforementioned optimistic project schedule and the pressure to complete the activities by a certain deadline. Another reason is the low motivation of health service providers. Such demotivation is the result of the administrative compulsion to use e-health (although it is not sufficiently user-friendly and necessary for work) as well as inadequate financing (the IT component in the price of the health service does not cover the actual expenses of the health service providers).

143. The target groups also had no financial stimuli for having a say in the process and the optimistic schedule meant that the time during which the target groups could have a say at all was very short. The development was already completed and its use was made compulsory before the needs of the users (doctors) had been identified.

144. Although the e-health projects were not developed or implemented according to plan, new projects were still undertaken all the time. This has made it difficult to focus on the completion of unfinished projects, which in its turn has led to the failure of e-health projects (see also points 161-179).

145. The reluctance of doctors to document their activities has also been highlighted as a reason of the problems in the implementation of e-health. Getting used to innovation and learning to use them simply takes time.

146. The **National Audit Office is of the opinion** that many significant risks were not managed during the implementation of e-health projects. The Ministry of Social Affairs was aware of the risks and the ways in which they could be managed, but this knowledge was not used. The EHF was given an unrealistic schedule for the development of e-health from the time of its establishment, which in its turn was the reason why there was no time for risk management. The factors associated with the involvement of target groups, standardisation and change management were the weakest. Therefore, it can be said on the basis of this chapter and points 149-179 of the report that none of the premises for the

achievement of the objectives of e-health listed in point 128 were fully achieved.

147. Although the risks were not managed in the course of the development and implementation of e-health, the subject of risks has not been mentioned at all in the e-Health Development Plan 2013-2015. Although the strategic goals and principles discussed in the development plan contain answers to the management of many risks that have materialised, the risks of the present development stage of e-health should also be dealt with in the development plan.

148. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:

- determine possible risks when new development works are planned and the ways in which they could be managed;
- add the risks and the options for their management in the e-Health Development Plan in 2014 (as was the case with the e-Health Development Plan 2005-2008).

Response of the Minister of Social Affairs: We will consider the recommendation and define possible risks when planning future development works with the Estonian e-Health Foundation. We will also introduce options for risk mapping and management to the e-Health Development Plan.

Response of the management board of the Estonian e-Health Foundation: In cooperation with the supervisory board of the foundation, we have highlighted the following main development risks from previous periods:

- Preliminary and feasibility analysis. The foundation has increased its analytical capacity to carry out the relevant analyses itself on the basis of its competencies either in part or in full, depending on their scope. This capacity must certainly be increased also in the coming years. A quality analysis will allow us to avoid many of the risks that materialised in several previous developments, which had to be changed as a result of the system's processes or the expectations of users, or which haven't been implemented as efficiently as expected. Also, budgeting for developments today is done on the basis of analogies, which is similar to the state's budgeting process, but doesn't guarantee adequate accuracy. Budgeting after the preparation of a feasibility study or detailed analysis would increase the accuracy considerably and this is the direction we're going in at the moment.
- Scope of the development. One risk factor that can be highlighted is that the scope of the developments is too large and a sufficient consensus cannot be found due to the big number of parties; the developments must be changed several times, which makes the entire development process long and sometimes also expensive. The development of a solution in a smaller scope as a 'pilot solution' and its implementation after the relevant testing for other users has been rated as more efficient than the present methodology and the plan is to develop new solutions in this manner. A positive example is the

service for the Social Insurance Board, which was implemented in eight months, completed by the deadline and immediately became actively used.

- Solely central development of the system. Earlier developments were mostly implemented on a central basis, whereby the end user was left responsible for the development of its own system by the principle 'you can use the central part'. This decision has been justified, but it hasn't guaranteed adequate efficiency in the introduction of the system. At present, all solutions are planned on a much broader basis in cooperation with the information system developers of health service providers and the resources required for said developments are planned at the same time.

- Clear division of responsibility. In the course of developments, it's very important to specify clearly from the start which of the parties is responsible for which results and to record it in an approved document. This practice hasn't been implemented yet, but it will be used from 2014 onwards.

- Implementation of services – information and training. Training end users 'in the workplace' is important for the introduction of the system. The training must be carried out in the format of computer studies and with the IT support of the health service provider, and the developers must also be involved if necessary. This approach has justified itself and we will also continue using it in the future.

- Updating services. Many of the existing developments were carried out on a project-basis, which meant that the focus on updating the service diminished when the project ended. Updating IT solutions, incl. e-health solutions, is one of the main issues in developed countries. The service-based approach will also be implemented in e-health from this year onwards. It requires the additional development of the relevant competency and the creation of capacity, which will be done within the next three years. Obtaining feedback from users is important here. In order to achieve this, we will be carrying out annual satisfaction polls among Health Information System users from this year onwards.

The Ministry of Social Affairs has not performed the leading role in the development and introduction of e-health.

149. The Ministry of Social Affairs was seen as the one with the key role in strategic management and inspection in the analysis of the organisational formats of the Electronic Health Record. The Estonian e-Health Foundation was to become the centre for e-health development on a broader scale, but the levers of financing, legislation as well as involving and influencing the target groups have been held by the Ministry of Social Affairs.

150. The National Audit Office assumed that the Ministry of Social Affairs had been the strategic leader in the development and implementation of e-health that sets the objectives of e-health and inspects their achievement, involves target groups and motivates them to use e-health.

Ministry of Social Affairs as the strategic manager of e-health

151. The Ministry of Social Affairs has always had the option to stand for the rights of the state in the development and implementation of e-health. The Ministry of Social Affairs has the most representatives on the supervisory board of the EHF, an official of the ministry has been the head of the steering group of the e-health project, the ministry signs the administration contract with the EHF and since 2008, the ministry has had an e-Health Department whose tasks have been directly related to the development and implementation of e-health projects. In addition to the above, the Ministry of Social Affairs is responsible for legislative drafting as well as the performance and supervision of the obligations assigned by law.

152. The functions of the e-Health Department of the Ministry of Social Affairs set forth in the statutes[6] overlap significantly with the functions and activities of the EHF. The interviews carried out in the course of the audit revealed that the parties directly involved with the development or implementation of e-health don't have a clear understanding of what the functions of the e-Health Department of the Ministry of Social Affairs are when it comes to the development and implementation of e-health and how exactly do they differ from the role of the EHF.

153. The Ministry of Social Affairs has also made principal decisions, which has dented the integrity of the initial concept of e-health projects. In 2006, two regional hospitals (co)founded by the state established the Foundation of Estonian PACS and later in the same year, the Estonian Health Insurance Fund was assigned the task to develop and implement the Digital Prescription, although the initial plan was to establish both the Digital Prescription and the Digital Image as parts of e-health.

Role of the Estonian e-Health Foundation in the management of e-health

154. The Estonian e-Health Foundation was assigned relatively broad functions in its articles of association when it was established. The Ministry of Social Affairs and the EHF have entered into a long-term administration contract, which contains a more detailed description of the functions of the EHF and the agreement that a contract for allocation of money will be entered into every year. The main functions of the EHF for each year are approved by the supervisory board.

155. The interests of the state and other parties should be represented in the supervisory board of the EHF, which is why its composition is very diverse. However, there are also some threats here. Namely, the people interviewed in the course of the audit are of the opinion that the interests and ideas of the members of the EHF supervisory board are so different that it makes it difficult to focus on the implementation of e-health as a whole. It has also been pointed out that the present composition of the supervisory board is tilted towards the interests of hospitals (especially the big ones) and the supervisory board does not make any decisions that are not acceptable for large hospitals. For example, the opposition of large hospitals is the reason why the Digital Registration has not been implemented, although it was completed in 2008 (see also points 164-167).

[6] The statutes of the e-Health Department of the Ministry of Social Affairs are being amended.

156. It's also difficult to criticise large hospitals. The North Estonia Medical Centre and Tartu University Hospital, which are represented on the supervisory board of the EHF, treat the majority of Estonian patients and since the latter don't move much between hospitals, the hospitals have all the medical information they need without using e-health applications. These hospitals have no motivation to introduce e-health solutions. They keep saying that new solutions are welcome, but are in no rush with their implementation. The members appointed to the EHF supervisory board by the Minister of Social Affairs have failed to guarantee that the state's needs and opinions are sufficiently represented.

157. As the Ministry of Social Affairs has not performed the role of a strategic manager in the development of e-health and the supervisory board of the EHF hasn't managed to do it either, then in practice, the key role in the development of e-health and representation of the state's interests has belonged to the management board of the EHF. However, the work plan of the EHF is approved by the supervisory board whose members have different interests and it therefore contains many single projects that are all developed at the same time, so the management board of the EHF has not been able to represent the interests of the state in the achievement of the objectives of e-health in its everyday work. The EHF has no levers it could use to motivate all target groups to participate in the development of e-health. It is also impossible for the EHF to demand the use of e-health.

158. The **National Audit Office is of the opinion** that all in all, the fact that the Ministry of Social Affairs has failed to perform the role of the strategic leader and 'contracting entity' in the development and implementation of e-health has been a significant obstacle to the development and implementation of e-health. The ministry hasn't had a clear standpoint or a consistent strategy in the development and implementation of e-health and the members of the EHF supervisory board appointed by the Minister of Social Affairs have not managed to defend the state's interests sufficiently.

159. The National Audit Office is of the opinion that the passivity of the Ministry of Social Affairs in the strategic management of e-health projects and the single decisions that damage the integrity of the concept of e-health have also had an indirect impact on the way that health service providers regard the credibility of the EHF and e-health projects.

160. It is positive that the Ministry of Social Affairs has tried to solve several problems in the last couple of years and this has also included reviewing and reducing the functions of the EHF.

Comments of the management board of the Estonian e-Health Foundation: In terms of its solutions, e-health covers the entire health sector and in addition to acute care extends also to nursing care, health statistics, various registers and the relevant parts of the social sphere. Such a broad platform is natural, as it arises from the principal nature and objectives of e-health. On the other hand, this creates additional risks upon the implementation and use of developments and in the clear specification of responsibility.

The leading role in the development of e-health cannot belong solely to the Ministry of Social Affairs, the foundation or the Estonian Health

Insurance Fund. The result of e-health can only be good if the aforementioned parties and the parties that use e-health services and provide health services cooperate with each other.

In our opinion, the supervisory board of the foundation has contributed considerably to the strategic development of the foundation in the last two years (it's not possible for the management board to assess the participation of the supervisory board in earlier years). Strategic development trends have been developed in cooperation with the foundation's supervisory board and they have also been successfully implemented on schedule. Cooperation with the members of the supervisory board who represent the most important partners of the foundation, incl. family doctors, hospitals, the ambulance service, the Ministry of Economic Affairs and Communications and the Ministry of Finance, is constant and the members of the supervisory board are involved in all of the most important developments.

The Ministry of Social Affairs as the agency that shapes the area certainly plays a significant role in making strategic decisions about health care. In our opinion, both the previous and the present Minister of Social Affairs have taken an interest in the developments in e-health and given their support to this area. Cooperation with the Ministry of Social Affairs has been constructive in the last two years and several measures for making this cooperation even more productive have been developed.

Some principal e-health projects have failed

161. Four principal projects were initially developed within the scope of e-health: Electronic Health Record, Digital Prescription, Digital Registration and Digital Image.

162. The National Audit Office assumed that the four principal projects of health have been completed and implemented according to plan, which has been updated as necessary.

Implementation of the Electronic Health Record

163. The Electronic Health Record was completed in the end of 2008 and health service providers were immediately invited to join it. In the first years, the success of the Electronic Health Record was primarily measured according to the number of HSPs who'd joined it. The majority of service providers have indeed joined it by now, but it's still underused. The difficulties of using the Electronic Health Record are described in the subchapters 'All the necessary data are not entered in the e-health system' and 'Data in e-health finds little use by doctors' (points 24-55) and the reasons that have obstructed the development and implementation of e-health in points 121-160.

Failure of the Digital Registration

164. The objective of the Digital Registration was to create a nationwide system for keeping track of waiting lists for health services. The Digital Registration would have shown all free appointments and both patients and health care professionals would've been able to make appointments with specialists or cancel them if necessary. It was also presumed that such an overview of available appointments would help to plan and manage waiting lists.

165. The Digital Prescription was handed over to the EHF in the end of 2008, but it became evident that it could not be used with the Patient

Portal of the time, as the latter had been built on the old platform. The fact that nobody had tried to use the registration with actual data was also a problem. The new Patient Portal, which was implemented in 2013, has the option to make appointments with doctors working for five health service providers, but it's basically a solution that contains links to the websites of these health service providers. There have still been no attempts to use the Digital Registration with actual data. None of the service providers started submitting their data to the Digital Registration and the situation still hasn't changed.

166. Also, the majority of hospitals haven't developed their own e-registrations either, although it would allow patients to make appointments with doctors in the specific hospitals. The hospitals that have their own e-registration are the North Estonia Medical Centre (PERH), the East-Tallinn Central Hospital (ITK), the West-Tallinn Central Hospital (LTKH) and the Ida-Viru Central Hospital (IVKH). The e-registration of PERH had no available appointments reimbursed on the account health insurance funds as at 15 October 2013, so it's basically impossible to make an appointment with a doctor there. The e-registration of ITK is not working, as the hospital's patient portal iPatsient is being updated. This means that as at 15 October 2013, only two hospitals had e-registrations that patients could use.

167. In 2013 the Estonian Health Insurance Fund has demonstrated its readiness to take responsibility for completing the development and implementation of the Digital Registration project. The Estonian Health Insurance Fund's interest, position in health care, previous experience in the development and implementation of the Digital Prescription and the need to have an adequate overview of the length of waiting lists adds reassurance that the Digital Prescription can be successfully completed and implemented.

Difficulties of implementing the Digital Image

168. By the time the EHF started to create the Digital Image, the public procurement for a shared PACS had already been completed on the initiative of Tallinn hospitals and AS Tallinna Diagnostikakeskus (2004/2005). Once the results of the public procurement were clear, the majority of the initial partners were no longer prepared to finance the creation of a shared PACS.

169. In the end, the North Estonia Medical Centre and the Tartu University Hospital established the Foundation of Estonian PACS and later in the same year, the tenderer that won the public procurement also implemented the solution of the PACS. According to the explanations given by the representatives of the PACS, the two large hospitals were interested in the creation of the PACS and they needed it fast, which is why they decided not to wait until the state got around to it. The Foundation of Estonian PACS paid for the development and implementation of the PACS and the state's money has not been used for this purpose.

170. At least 80% of all medical images taken in Estonia are currently in the PACS of the foundation. As a result of the above, the EHF did not start establishing a separate information system for digital images, but planned to develop the image reference within the scope of e-health which would make it possible to display the images stored in different PACS in e-health.

171. The image reference in e-health was indeed completed, but international standards were not followed when it was made and in the opinion of the representative of the Foundation of Estonian PCAS, the solution is way too complicated. The image reference is indeed compatible with the systems of the PACS and it could be possible to view the images in the PACS through it, but the complexity of the image reference means that many clients of the PACS don't send their information to the image reference in e-health. This is the reason why service providers cannot view the images in PACS via the image reference in e-health. The image reference hasn't therefore been successful in its present format.

Digital Prescription as the success story

172. The National Audit Office also thoroughly analysed the development and implementation of the Digital Prescription[7]. Compared to the e-health projects developed by the EHF, the objectives of the Digital Prescription, which was developed by the Estonian Health Insurance Fund, have been achieved.

173. Although the development of the Digital Prescription also encountered its fair share of problems such as difficulties in involving target groups, a 1.5-year delay in the system's implementation and issues with the system's performance after its implementation, it achieved all of its objectives in the first year of implementation, incl. user activity, which proved to be considerably higher than planned. All parties (incl. patients) saw the benefits of the Digital Prescription and the new system was quickly accepted

174. One of the factors behind the success of the Digital Prescription was the fact that the Estonian Health Insurance Fund already had the well-functioning database of prescriptions subject to discounts, which was used as the basis when the new system was built using as many standard solutions as possible.

175. The Estonian Health Insurance Fund is of the opinion that the system's success was also guaranteed by the fact that the Estonian Health Insurance Fund itself was clearly interested in the results of the projects and that doctors also quickly realised how useful the Digital Prescription was for them. The Estonian Health Insurance Fund also focussed on one project at a time until it was completed and implemented.

176. In the opinion of the Ministry of Social Affairs, the solution of the initial problems that caused delays in the project was made possible by bringing all the parties around the same table to create the perception of a whole and a synergy of cooperation (see also points 42-43).

177. All in all, the Digital Prescription is the only one of the four principal projects that was implemented and is used as expected. The Electronic Health Record is used, but it does not meet the needs of doctors (see points 24-55) and the achievement of good results requires a lot more

[7] The contracting entity in the development and implementation of the Digital Prescription and the head of the steering group of the project was the Ministry of Social Affairs. However, the project manager on the contracting entity's side was an employee of the Estonian Health Insurance Fund and the Estonian Health Insurance Fund also managed the project on the operational level. The management of the Digital Prescription was transferred fully to the Estonian Health Insurance Fund in spring 2013.

work. The image reference is partially used, because the created standard is problematic and the two biggest hospitals in Estonia are therefore not using it at all (see points 38-41).

178. The **National Audit Office is of the opinion** that e-health projects have not been fully realised. The reasons of this are inadequate risk management and the failure of the Ministry of Social Affairs to perform its role as the strategic manager (see points 121-160). In addition to the principal projects, the additional e-health projects have also been plagued by problems (see points 66-86 and 106).

179. In conclusion, the Digital Prescription developed and implemented by the Estonian Health Insurance Fund and the PACS developed by the Foundation of Estonian PACS are successful, as the objectives the systems had to achieve were clearly specified at the start of the development: there was an obvious practical need for the systems (incl. for end users), there was interest in the results and previous experience and competency also existed. All this meant that the contracting entity was highly motivated. However, when it comes to the projects developed by the EHF, the objectives were not specified down to the minute detail when the process started and in fact, they couldn't even have been specified. The EHF itself was a brand new organisation without any experience and the projects it started to develop were unique in the world.

Comments of the management board of the Estonian e-Health Foundation: The foundation has to carry out a lot of developments at the same time and they include projects that were launched years ago, such as the Digital Registration and Digital Image, as well as new projects such as e-certificates and the service developed for the Social Insurance Board. Such 'past developments' have unfortunately caused a number of complicated situations. At the time when the realisation of the initial idea started, it was impossible to foresee all the risks that affected the implementation of the systems and these risks have materialised.

The Digital Registration mentioned by the National Audit Office is a good example of this. The technical solution has been completed and it is usable in the software where the relevant functionality has been created: Liisa, Perearst 2, Ester 3, North Estonia Medical Centre. This means that family doctors can use the registration service to make appointments, incl. for activities related to e-consulting, in specialties provided by the hospitals that use the aforementioned software. However, some development needs important for improving the usability of the system became evident in the course of the survey carried out by the foundation, but these developments cannot be made by the foundation, as they concern the information systems of the health service providers. For example, the doctor who makes an appointment cannot see available appointments in all hospitals at the same time, but has to open the relevant divisions in their computer one by one, which is cumbersome and time-consuming. In the course of negotiations, the developer of the Pererast2 software AS Medisoft has promised to complete the relevant development.

This is a good example of the dispersion of responsibility in the implementation and management of e-health developments. The foundation is responsible for the technical completion of the solutions assigned to it at the level of the central system. The foundation is first

provided with the initial terms of reference for the development of the solution and it is later specified in cooperation with the relevant parties. Several consensual decisions must be found in the course of the process to ensure that the system actually starts working. In the case of the latter, it's not always clear who should take responsibility for such decisions. Is it the person who implements the technical development, i.e. the foundation (incl. the founders and supervisory board); the coordinator of the health sector, i.e. the Ministry of Social Affairs; or the representatives of the users who have presented their requirements and should guarantee that data is entered in the system and the relevant developments are made in their own information systems?

It is known that more than a hundred people from among health service providers and the other representatives of the sector were involved in the establishment of e-health. Health service providers are convinced that the planned functionality, where a patient can see all available appointments via the Patient Portal and register for appointments in the same place, will never start working in this format. All parties certainly play an important role here, as the implementation of the solution is not delayed because of the technical side, but because of issues related to health care organisation and health care processes.

One of the problems that has been highlighted is the fact that the functionality of the image reference sent to the Health Information System has not met its objective and health service providers prefer to use the services of the Foundation of Estonian PACS instead. The functionality of accessing images via the image reference has been developed in Ester3 and partly also in Liisa software, but the fact that the majority of health service providers use the services of the Foundation of Estonian PACS means that there is no need for the present version of the image reference. Modification of the image reference has been planned as a development and its goal is to make it possible to open the medical images and relevant responses in the PACS on the basis of the documents held in the Health Information System.

The establishment of e-health has not been sustainable

180. The National Audit Office is of the opinion that the expenses incurred in the development of e-health are justified if they generally correspond to plans and the completed projects have become implemented.

Money spent on the development of e-health

181. According to the development plan of the Health Information System, the planned cost of the e-health development was 2.2 million euros (35 million kroons) and the cost of interfacing 0.6 million euros (10 million kroons). The administration stage was to be financed from the health insurance budget. The amount of the European Social Fund's money spent on four projects was 2.2 million euros as planned, but the total amount that had been spent on the development and administration of the system by the end of 2012 was 12.4 million euros. 2.5 million euros has been allocated to the EHF for 2013. In general, the development costs of e-health have been covered from foreign funds and administration expenses from the state budget. With the money allocated for 2013 included, the total amount of money spent on the e-Health Information System is *ca* 15 million euros, but the system still isn't working as planned (see Table 3).

Table 3. Money spent on e-health, 2005-2013 (euros)

	EHF	Ministry of Social Affairs	Total
2005	6853		**6853**
2006	25,3091	46,042	**299,132**
2007	462,193	852,044	**1,314,237**
2008	1,009,156	692,582	**1,701,738**
2009	1,178,362	465,488	**1,643,849**
2010	1,433,602	639,943	**2,073,545**
2011	1,834,204	538,859	**2,373,063**
2012	2,504,797	488,047	**2,992,844**
2013 budget	2,500,000	245,491	**2,745,491**
Total			**15,150,752**

Source: Data of EHF and MSA, analysis by National Audit Office

The expenses of e-health may increase

182. Other services, which could be provided to persons and service providers within the scope of e-health, were also planned in addition to the main projects when the establishment of e-health started. The development of new services started in the situation where the four main projects had not yet been completed or fully implemented. This led to the situation where the problems in the implementation of the main projects (especially the Electronic Health Record) caused delays in the new services and smaller projects, and probably led to the additional expenses of updating them.

183. According to the Ministry of Social Affairs, changes have to be made in the project that has been the biggest failure so far, i.e. the Digital Registration, to ensure that it can be implemented in the future. However, this means that more money is needed to launch the system.

184. The fact that the Ministry of Social Affairs does not have an accurate overview of the money so far spent on the development of e-health or the sources of the money is also a problem. The EHF has received money from the state budget every year and at the same time, it has also requested money for single projects from other sources (mostly EU funds).

185. It is also unknown how much the completion and implementation of the currently unfinished e-health projects will cost in the coming years. There has never been a financial view in the e-health development that would outline the expenses over several years or for an even longer period.

186. Only the first e-Health Development Plan 2005-2008 included the four-year financial outlook for 2004-2007. The amount of money allocated to the EHF from the state budget is known only for the current financial year, which means that the EHF has had no security about long-term financing. This in its turn has created the situation where specific plans are made for one year. There is no financial outlook at all in the e-Health Development Plan 2013-2015 either.

Large hosting expenses of Digital Prescription

187. 2.1 million euros was spent on the hosting and maintenance of the Digital Prescription in four years, but the quality of the service received was poor. A public procurement was declared to obtain the Digital Prescription hosting service. Three tenders were received and the winner was the same tenderer who had developed the Digital Prescription.

Availability requirement i.e. the availability of data is the previously agreed quick and easy access to usable data (i.e. at the necessary/required time and within the necessary/required time) for authorised consumers (persons or technical devices). Availability is the primary requirement for all the data and other information assets in every information system; the entire system is useless if availability disappears.

SAP – abbreviation of Systems, Applications and Products in Data Processing. SAP is the global market leader in the area of business software.

188. The main problems were related to the performance of the system. The hosting service provider also failed to meet the availability requirements for the Digital Prescription. As all the knowledge concerning the Digital Prescription was in the hands of the developer and they also hosted the system, then at first it was impossible for the Ministry of Social Affairs or the Estonian Health Insurance Fund to assess the scope and reasons of the performance problems. The host referred to problems in the communication between the Digital Prescription and the other registers, which were impossible for the Estonian Health Insurance Fund to check. It later became evident that the real reason was the host's lack of administration competency Systems built on the SAP platform.

189. As the quality of the hosting service was poor, the Estonian Health Insurance Fund decided to start hosting the Digital Prescription itself. The Estonian Health Insurance Fund is hosting the Digital Prescription since 31 March 2013 (the expiry of the hosting contract) and in their opinion, the cost of hosting will decrease by 60% when compared to the fees previously paid. The transfer of the hosting of the Digital Prescription to the Estonian Health Insurance Fund went smoothly.

190. The **National Audit Office is of the opinion** that the establishment and implementation of e-health has cost considerably more than planned. The total amount already spent is *ca* 15 million euros and the Digital Prescription is the only one working as planned. The Electronic Health Record is partially functional. The state does not know how much the completion and implementation of the currently unfinished e-health projects will cost in the coming years.

191. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:

- complete and implement the e-health projects that have already been started (above all, the Digital Registration and the Electronic Health Record) before the creation of new services is taken on;
- prepare the budget of the e-health development projects for the same period as the e-Health Development Plan (incl. for projects that have been completed, but are not used, such as the Digital Registration);
- reorganise access to and archiving of digital images in such a manner that the service providers could access all digital images via the Digital Image in e-health; and, if necessary, consider merging the Foundation of Estonian PACS and the Estonian e-Health Foundation.

Response of the Minister of Social Affairs: We will consider the proposal when planning our activities and setting priorities in the new development activities.

In cooperation with the Estonian e-Health Foundation, we will plan the inclusion of the budgets of development projects in future e-health development plans to give an overview of the estimated scope of the activities and guarantee that the criteria for implementing the developments are followed.

The Ministry of Social Affairs has already started implementing the Estonian PACS for the purposes of a central information system. A draft has been prepared pursuant to which the Estonian PACS will become the authorised processor of the Health Information System in terms of archiving images. When the relevant provisions enter into force, health service providers will be obliged to send images to the Estonian PACS and it will be possible for them to access the images and the relevant medical documents via the Health Information System.

Response of the management board of the Estonian e-Health Foundation: The implementation of the e-health system has taken a long time. The specific features of the system, which are related to the users' age, computer skills, development of local information systems and health organisation issues, must certainly be considered here. The most significant development in the usability of the system has occurred this year. The awareness-raising planned in cooperation with the founding members and supervisory board of the foundation, whose members are representatives of important target groups such as the Estonian Hospital Association, Estonian Society of Family Doctors, the heads of the three largest Estonian hospitals, has led to the situation where a significant share of health care professionals use the system and the result achieved in terms of inpatient case histories and the documents submitted by family doctors is close to the maximum.

As stated above, when it comes to the usability of e-health, it is extremely important that the services are updated and developed further. This should not be forgotten when new services are developed.

It includes improving the performance of the system, improving the breakdown of information, creating a search system, collating information from different databases and creating access to information on a web-basis and independently of the hardware platform – via tablets and mobile devices.

At the moment, users have to log in separately into their own information systems, the Health Information System and the PACS, but when shared authentication (which already works at the level of a central system) becomes available, users will be able to enter all of these system with one authentication and, once the additional development is completed, collect all the information that meets the defined criteria automatically onto the user's desktop. Such a solution would make the work processes more efficient and allow users to save time.

As the interoperability and integration of health systems must be increased, it is necessary to develop an application layer of X-road, which would help to expand data communication between health services.

Examples of this are the nationwide implementation of the nursing care service InterRAI and secure exchange of information about unfinished cases.

The Medical Council, which has been operated by the Foundation since 2012 and consists of medical experts as well as the authorised representatives of health service providers, has highlighted the need to develop user interface and document display standards as well as the need to create unified components to make the work process of the physicians working with different information systems more efficient.

In order to solve any issues, the Foundation cooperates with health service providers and their information system developers.

The Foundation and the Foundation for Estonian PACS are cooperating to improve the exchange of information about medical images. The Ministry of Social Affairs has prepared a draft act pursuant to which the Foundation of Estonian PACS will become the authorised processor of the Health Information System in terms of archiving images. The draft contains the requirement that health service providers must send medical images to the PACS administered by the Foundation of Estonian PACS.

192. **Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the Chairman of the Management Board of the Estonian Health Insurance Fund and the management of the Estonian e-Health Foundation:**

- make the development and implementation of the Digital Registration a task of the Estonian Health Insurance Fund; and
- link paying health service providers for their services to the obligation of maintaining electronic waiting lists in the Digital Registration.

Response of the Minister of Social Affairs: Thank you for the proposals. We will consider implementing them in cooperation with our partners.

Response of the Chairman of the Management Board of the Estonian Health Insurance Fund: Launching the Digital Registration is one of our priorities according to the memorandum the Estonian Health Insurance Fund and the Estonian e-Health Foundation have entered into. Specification of the project's terms of reference started in autumn 2013. The plan is to have the document approved by all the significant project parties in spring 2014 and the preparation of a new detailed analyses will start thereafter. Based on the results of the detailed analysis, the parties will make a joint decision on how much of the information system that has already be completed must be changed and who will be responsible for its completion. The Estonian e-Health Foundation will be the general manager of the project.

Response of the management board of the Estonian e-Health Foundation: The technical solution has been completed and it is usable in the software where the relevant functionality has been created: Liisa, Perearst 2, Ester 3, North Estonia Medical Centre. This means that family doctors can use the registration service to make appointments, incl. for

activities related to e-consulting, in specialties provided by the hospitals that use the aforementioned software. However, some development needs important for improving the usability of the system became evident in the course of the survey carried out by the foundation, but these developments cannot be made by the foundation, as they concern the information systems of the health service providers. For example, the doctor who makes an appointment cannot see available appointments in all hospitals at the same time, but has to open the relevant divisions in their computer one by one, which is cumbersome and time-consuming. In the course of negotiations, the developer of the Pererast2 software AS Medisoft has promised to complete the relevant development.

Future of the e-Health Information System

The impact of the e-Health Information System on the organisation of health care is not assessed

193. The objective of e-health is to make the health care system more efficient, improve the quality of treatment and increase patient orientation. In order to assess the extent to which e-health has influenced the provision of health services, it is necessary to have specific indicators that show how many of the e-health goals have been achieved and how much the treatment quality and patient orientation have improved.

194. At present, the objectives of e-health (see point 8) are generic and the level of their achievement cannot be assessed on the basis of them. The achievement of e-health goals and their impact have not been assessed so far. It would also be a difficult thing to do, as there are no indicators for assessing the impact and achievement of goals.

Attempts to develop indicators that characterise the impact of e-health

195. On the initiative of the EHF, Praxis made an attempt to develop indicators to characterise the impact of e-health in the analysis Assessment of the Economic Impact/Net Revenue of the Estonian Health Information System of 2010. The theoretical framework for the assessment of the possible impact was created as a result of the analysis, which also covered the benefits of e-health for patients, health service providers and the society. A problem appeared in the development of numeric values for all the efficiencies and in finding the mutual weights of the efficiencies. Developing the possibilities of measuring the efficiencies highlighted in the analysis and agreeing on the desired target levels would make it possible to use them to assess the achievement of e-health goals. It's positive that the EHF and the Tallinn University of Technology have started developing more precise indicators for assessing the impact of e-health.

196. The EHF's development plan 2013-2015 includes the organisation's performance card, but the indicators on the card do not characterise the performance or impact of e-health, but rather give a reflection of satisfaction with the system, it's working speed, the completion of project plans in terms of finances and time, and the development of the organisation. It's no less important that at the moment, nobody has an overview of the extent to which e-health is used for treatment (e.g. there are no specific agreements about when case histories must be submitted, the number of times medical documents are accessed cannot be measured).

197. Considering the above, the **National Audit Office is of the opinion** that the state has no overview of how much the applications are used at all (see points 24-55). The possibilities of measuring the achievement of e-health goals and the total benefits of e-health for the health care system that have been suggested so far don't answer the question of how e-health improves the quality and efficiency of health care. All in all, it's impossible to assess the level of achievement of e-health goals: for example, has e-health made the health system more efficient and improved the quality of the provision of health services, is the health care system more patient oriented.

198. Recommendations of the National Audit Office to the Minister of Social Affairs:

- develop the performance indicators of the e-health system to obtain an overview of the benefits of e-health for the organisation of health care;
- monitor the performance indicators of the e-Health Information System regularly.

Response of the Minister of Social Affairs: We're planning to develop the performance indicators of the Health Information System in cooperation with our partners and will prepare them on the basis of the goals set upon the establishment of the Health Information System.

The success of the further development of e-health depends on strengthening the leading role of the Ministry of Social Affairs.

199. The further development and implementation of e-health projects can only be successful if the state formulates its goals and selects a realistic action plan for the final implementation of e-health projects. It's important to take another look at the risks that influence the development and implementation of e-health, the options of managing such risks and taking account of them in the future.

200. Only the Ministry of Social Affairs can be the strategic manager of e-health. The ministry can guarantee better cooperation with target groups, motivate them to use e-health and guarantee better cooperation between the EHF and other organisations (incl. Estonian Health Insurance Fund, Health Board, National Institute for Health Development).

Management of the e-ambulance project

201. The initiative of the Ministry of Social Affairs to organise regular meetings of the workgroups of various e-health projects (which are also attended by representatives of the target groups) has been a positive example from the last couple of years.

202. Another positive example is the e-ambulance project, where the Health Board has played an important role (organising the ambulance service is their task). The Board has made a significant contribution to the initiation of the e-ambulance project, and it is also competent and motivated. The Health Board has ordered the management of the e-ambulance project from the EHF.

203. The Estonian Health Insurance Fund and the EHF have signed a memorandum of cooperation on their own initiative which should

promote cooperation between the two. Negotiations are being held with the Foundation for Estonian PACS for merging the PACS and e-health.

204. The Estonian-Norwegian cooperation project Green Innovation, which is aimed at making e-health considerably easier to use, is in its initial stages. It will be possible to apply for funds via the project from February 2014. The e-Health Development Plan 2013-2015 also includes the development trends and principles that directly concern ease of use and the EHF will focus upon the development of e-health solutions. Making e-health easier to use is extremely important in the opinion of the National Audit Office.

205. All of the aforementioned initiatives are important and the National Audit Office is of the opinion that the Ministry of Social Affairs must understand its responsibility in the development and implementation of e-health projects. The Ministry of Social Affairs is the agency that must manage the development and implementation of e-health, make organisational changes if necessary, guarantee cooperation and motivate health service providers to use the e-Health Information System.

206. The **National Audit Office is of the opinion** that the Ministry of Social Affairs must be the strategic contracting entity, who is interested in the results, in the case of e-health. The ministry must determine in the e-health development plan what kind of a system it wants to see and when, and the administration contract must stipulate the obligations of the EHF and the ministry in the implementation of the development plan and in keeping the implemented e-health system going.

207. Recommendations of the National Audit Office to the Minister of Social Affairs:

- determine the interests of the state in the implementation of e-health and the functions that will be performed by the Ministry of Social Affairs and by the Estonian e-Health Foundation;
- analyse the possible risks related to the continuation of the e-health development with the present organisational format (Estonian e-Health Foundation, its supervisory board) and, if necessary, consider alternative organisational formats and decide what will guarantee the quickest achievement of e-health goals.

Response of the Minister of Social Affairs: The role of the Estonian e-Health Foundation is to implement the development activities related to e-health and the performance of the activities initiated by the Ministry of Social Affairs. The Estonian e-Health Foundation must guarantee that the Health Information System is implemented according to the required conditions and the established goals. The role of the Ministry of Social Affairs is to guarantee that further development trends correspond to the general concept of e-health implementation.

We appreciate the proposal and will assess the need to carry out an analysis related to the continuation with the present organisational format of the Estonian e-Health Foundation.

/digitally signed/

Tarmo Olgo
Director of Audit, Performance Audit Department

Recommendations made by National Audit Office and responses of the auditees

The National Audit Office made several recommendations to the Minister of Social Affairs, the Chairman of the Management Board of the Estonian Health Insurance Fund, the management board of the Estonian e-Health Foundation, the Director General of the Health Board and the Director General of the National Institute for Health Development. The Minister of Social Affairs sent his responses to the recommendations made by the National Audit Office on 6 December 2013, the Chairman of the Management Board of the Estonian Health Insurance Fund on 3 December 2013, the management board of the Estonian e-Health Foundation on 10 December 2013, the Director General of the Health Board on 28 November 2013 and the Director of the National Institute for Health Development on 2 January 2014.

General comments on audit report

General comments of the Chairman of the Management Board of the Estonian e-Health Foundation: The National Audit Office has raised extremely important issues concerning the development capacity and sustainability of e-health as such in its audit that focussed on the development and management of the e-health system, incl. the most important organisational aspects of e-health. In our opinion, it's important to point out that the audit was aimed at a retrospective approach to e-health, i.e. the functionality and development of the system was assessed until 2012. Many of the problems pointed out by the National Audit Office had been mapped at the same time by the supervisory board and management board of the Estonian e-Health Foundation (hereinafter the Foundation) in the last two years and several measures have been successfully applied with regard to them, which we will discuss in greater detail below.

Our opinions have largely been given in the context of the last two years, as an assessment of previous periods cannot be unbiased due to the changes in management and among staff members.

Comparison with other countries

According to the as yet unpublished survey carried out by the OECD in the area of e-health in 2012, Estonia ranks first among 30 countries in terms of the usability and accessibility of e-health. Many European countries, including Finland, Sweden, Norway, Germany and Denmark, have developed various e-health solutions, but they function either on the basis of hospitals or regions. Nationwide systems are still being developed. Estonia has solved this problem successfully due to the existence of the X-road, ID card and Mobile ID solutions.

Recommendations of National Audit Office	Responses of auditees
Requiring the use of e-health **62. Recommendation of the National Audit Office to the Minister of Social Affairs:** immediately demand that health service providers start using the e-Health Information System and, if necessary, create the legal framework to tie payment for services to the use of the e-Health Information System. **points 24-61**	**Response of the Minister of Social Affairs:** The Ministry of Social Affairs is of the opinion that the Health Care Services Organisation Act stipulates the obligation to use the Health Information System in sufficient detail. The same act also states that the Health Board is obliged to inspect the performance of the relevant requirements. In cooperation with the Estonian Health Insurance Fund, we are considering the options of connecting the obligation to use the Health Information System to payment for services. We can also consider the need to amend legislation as a result of the aforementioned action.
Financing the use of e-health **63. Recommendation of the National Audit Office to the Minister of Social Affairs in cooperation with the Chairman of the Management Board of the Estonian Health Insurance Fund:** analyse whether the share of the IT component in the service price list is sufficient to guarantee active use of e-health and, if necessary, consider the possibility of giving additional financial support to health service providers in the creation of IT solutions related to e-health. **points 45-61**	**Response of the Minister of Social Affairs:** We will take the proposal on board and in cooperation with the Estonian Health Insurance Fund, we will assess the implementation of the IT component by health service providers and the adequacy of the relevant component for the performance of the development activities demanded by the state. The Ministry of Social Affairs is of the opinion that it's important to guarantee consistency in relation to development so that necessary updates or changes are also guaranteed after the development of information systems has been completed. The Ministry of Social Affairs finds that additional financial support can be tied to the size of the IT component, not to separate remuneration. The last-mentioned manner of support does not guarantee that the relevant development is updated or changed (if necessary) after its implementation. **Response of the Chairman of the Management Board of the Estonian Health Insurance Fund:** The compliance of the expenditure of hospitals with service descriptions was evaluated in 2013 and the IT expenses in the descriptions were somewhat smaller than the actual expenses of the hospitals. However, when expenses are evaluated, it is necessary to look at

Recommendations of National Audit Office	Responses of auditees
	the big picture, i.e. does the total revenue generated cover the expenses of hospitals. The revenues of most hospitals were smaller than their expenses and the unit costs of three components (utility expenses, maintenance, patient administration) were increased as a result of this. The cost of the patient administration unit also contains the IT expenses. In order to improve the recognition of IT expenses, the IT expenses included in patient administration will be shown as separate expenses in the next year. The actual IT expenses in the service prices of general medical care and school health care were also analysed in comparison to the actual expenses and the share of IT in service prices will be increased from 1 January 2014 as a result of this.
Supervision of the use of e-health **64. Recommendation of the National Audit Office to the Minister of Social Affairs in cooperation with the Director General of the Health Board:** establish a plan for supervising the use of e-health by the second half of 2014 and to execute the plan. **points 56-61**	**Response of the Minister of Social Affairs:** We will take account of the proposal and in cooperation with the Health Board, we will review supervision activities in relation to the obligation to submit data to the Health Information System, and prepare the relevant plan for implementation. **Response of the Director General of the Health Board:** As the Health Board already inspects the submission of data to e-health, we suggest that the recommendation of the National Audit Office regarding inspection of data submission to e-health could be: increase the efficiency of the use of e-health, prepare a supervision plan by 2014 and implement it.
Making e-health easier to use **65. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:** ▪ keep making e-health easier to use and developing the factors related to the speed of the system, and provide training to users; and ▪ agree with the service providers by the end of 2014 on the format and the time by which case studies must be prepared and approved; prepare the relevant guidelines. **points 28-30 and 49-55**	**Response of the Minister of Social Affairs:** We will take the proposal on board and in cooperation with the Estonian e-Health Foundation, we will plan to organise more training for users when new services are created. In planning each of the development activities, we will proceed from the goal that the Health Information System must be easy to use. We're also aware that the capacity criteria of the system must be made to comply with the increasing quantities of data held in the system. We'd like to point out that Regulation No. 131 Statutes of Health Information System of 14 August 2008 regulates the procedure for submission of the relevant documents on the basis of the type of health service. The relevant regulation also sets forth which documents must be submitted to the Health Information System. The Ministry of Social Affairs is of the opinion that amending the relevant procedure is not necessary, as it already works and has been implemented by health service providers. The case histories are created and approved by the health service provider and every doctor decides when updating the patient's case history is no longer necessary and when it can be approved. The Ministry of Social Affairs finds that the moment of approval of a document cannot be stipulated with a certain time criterion in the context of legislation. We also find that doing this would be unnecessary, as what really matters is the doctor's decision that the data is complete and that documentation can be deemed to have been completed. Sending an approved document to the Health Information System has been regulated with the aforementioned regulation of the Government of the Republic. **Response of the management board of the Estonian e-Health Foundation:** A lot has been done to increase the organisational capacity of the Foundation in the last two years. A new and more efficient structure has been created and competency in analytics, IT administration and testing capacity has been increased. An advisory body consisting of medical experts and representatives of health service providers has been established in the Foundation, which has helped to create new developments and update existing ones. For example, the implementation of the new Patient Portal this summer has considerably increased its usage and the awareness of patients of the Health Information System has grown as a result. This is also illustrated by the fact that we and the Health Board are receiving increasingly more requests to require health service providers to send data to the Health Information System.
Guaranteeing access to e-health **88. Recommendation of the National Audit Office to the Minister of Social Affairs:** create	**Response of the Minister of Social Affairs:** Pursuant to the Health Care Services Organisation Act, the Health Board already has the right to access

Recommendations of National Audit Office	Responses of auditees
the legal framework that would allow the Health Board and the Estonian Health Insurance Fund to access the data in the e-Health Information System for the performance of their functions. **points 66-87**	the data in the Health Information System. The Health Board has also used this right in relation to supervision procedure. As for the Estonian Health Insurance Fund, we have started preparing the first version of the draft and once it enters into force, the Estonian Health Insurance Fund will have the legal right to access the relevant data for the performance of its functions.
Increasing the use of e-health **89. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation and the Director of the National Institute for Health Development:** ▪ develop the e-Health Information System in cooperation with registers so that hospitals don't have to duplicate data and as much information as possible can be obtained from the same place; and ▪ coordinate the terminology and lists used in e-health with the parties in such a manner that the data in different databases and registers could be compared to and connected with each other. **points 66-87**	**Response of the Minister of Social Affairs:** The Ministry of Social Affairs has started the establishment of electronic data exchange between health registers via the Health Information System. When each subsequent health register is transferred to digital data exchange or when a new register is established, we plan for it an interface with the Health Information System for the purposes of data submission. It is important that national health registers collect data, if possible, from existing documents that have already been sent to the Health Information System and we will continue implementing the relevant principle also in the future. Pursuant to the Health Care Services Organisation Act, health service providers are obliged to use the classifiers, lists, address data and Health Information System standards of the state's information system. All the and lists standards published by the Estonian e-Health Foundation have been previously approved and their use is mandatory nationwide. Other lists, classifiers and standards may also be used in different databases and information systems, but they must be recoded to the nationally required format when documents are sent to the Health Information System. The Ministry of Social Affairs is of the opinion that the described system is functional and we will continue using it in the implementation of new lists, classifiers and standards. We will keep increasing the focus on the standard guidelines, which in its turn will guarantee that the data required by the state is unambiguously defined and understandable for data submitters. **Response of the management board of the Estonian e-Health Foundation:** According to plans, the data exchange between national medical registers was supposed to take place via the Health Information System, but these developments must first be thoroughly analysed. The objective is to have sending data to registers via the Health Information System reduce the data submission burden of doctors. The document standards of the Health Information Systems that are used today were mostly created within the scope of the Electronic Health Record project in cooperation with the representative organisations of the various persons who submit documents as well as the specialists who are engaged in the development of data compositions for information systems in their daily work for health service providers. The standards of all the documents listed in the regulation can be viewed in the publication environment on the website of the Estonian e-Health Foundation. In addition to the mandatory documents established with the regulation, the Health Care Services Organisation Act also stipulates that the provided health services must be documented using the state information system's classifiers, lists, address data and Health Information System standards, i.e. the standard published today also contains the standards of documents the submission of which is not required pursuant to the regulation. Health service providers have sent such documents to the central system – childbirth case histories, day care case histories, nursing care case histories can be given as examples. In addition to standards, it's also important to have a common terminology, which is created on the basis of cross-sectoral cooperation, incl. cooperation with the medical terminology committee established by the National Institute for Health Development. The preparation of terminology started in 2013 and the work will continue in 2014, already in cooperation with the Ministry of Social Affairs and the National Institute for Health Development. A cross-sectoral workgroup was also created in 2013 with a directive of the foundation's management board: Workgroup of the Lists and Classifiers Used in the Area of Health. The standardisation procedure and process are being updated and we will establish a position whose main task will be to analyse data quality and to coordinate improvement activities. **Response of the Director of the National Institute for Health Development:** The National Institute for Health Development agrees fully

Recommendations of National Audit Office	Responses of auditees
	with the proposals made in the draft of the National Audit Office's audit report Activities of the State in Implementing the e-Health System regarding the continuation of cooperation with the e-Health Foundation in order to develop the e-Health Information System in cooperation with registers and to coordinate the terminology and lists used in e-health between the parties in such a manner that it would possible to compare and link the data in different databases and registers. The existing data sources must constantly be developed and new sources should be sought in order to prepare more effective, reliable and quality statistics. Several data sources are used in health statistics and the e-Health Information System is a significant source of data. The use of data from the Health Information System for the purpose of statistics makes it possible to obtain more detailed data and at the same time reduce the burden on HSPs as data submitters. It's important to meet the following preconditions in order to use the e-Health Information System as a source of data for statistics: 1. Develop the standards that all HSPs and other parties use in the same manner (terminology, definitions). 2. The number of the HSPs that send data to e-health and the quantity of the documents that are sent must increase. All establishments must submit data about all cases for the preparation of exhaustive statistics. 3. The quality of the data must be high. Logical checks have been developed and implemented in the statistics module in order to detect errors. 4. It must be kept in mind that the indicators and phenomena that do not subject to logical checks must also be checked manually. This also applies to notifications of medical registers. 5. The data composition and submission of register notices must be reviewed in terms of the suitability of electronic data exchange (i.e. legislative drafting). 6. The NIHD, the information systems of HSPs and the HIS must be developed to such a level that all notices would only be received electronically and that logical checks were on. 7. A legal framework must be created for the use of the statistics module, which is currently being done. 8. The HSD of NIHD applies for the status of the agency that prepares statistics in order to gain access to various administrative data sources. It's not possible at the moment. This is the only case when the data from different sources can be linked at the level of persons to produce quality statistics. 9. The HSPs as the main users of the HIS must be involved in the developments and provided financing for their activities. 10. The NIHD is interested in, agrees with and is already contributing to the development of the statistical system of the HIS. The NIHD has requested financing for additional activities from the Ministry of Social Affairs for several years, but hasn't received any support. The NIHD will continue contributing in the given situation, but the contribution is not as big as required. 11. The plans for the HIS include the development of a data processing and publication system. The NIHD considers this unreasonable, as such systems already exist in the NIHD and they are working well. I would like to emphasise here the statement made in an interview with the employees of the NIHD that the observations made in the audit report according to which the e-Health Information System has not been implemented yet as expected are not so much the results of shortcomings in the information systems, but of the presentation of unrealistic expectations or promises when the information system was still in the stage of an idea as well as the underestimation of the time required for the system's implementation.
Implementation of e-Consulting **118. Recommendations of the National Audit Office to the Chairman of the Management Board of the Estonian Health Insurance Fund:**	**Response of the Minister of Social Affairs:** The e-consulting service can be implemented in three new specialties from 2014. We will take the proposal on board and in 2014 we will develop a plan for the inclusion of the next specialties in the e-consulting system. In terms of making the use of the relevant service mandatory in the future, we will first assess the problems

Recommendations of National Audit Office	Responses of auditees
▪ keep developing e-consulting services and ask specialist societies for their opinion on how the e-consulting system could be structured in the best possible manner in their specialty; ▪ set the use of e-consulting in all medical specialties as the goal to be achieved in a couple of years; and ▪ require that all health service providers use the e-consulting service. **points 101-117**	associated with the service after its initial implementation. **Response of the Chairman of the Management Board of the Estonian Health Insurance Fund:** The service 'e-consulting via the Health Information System' (code 3039) has been included in the list of health services since 1 March 2013 and it is used by family doctors when referring patients to a urologist or endocrinologist with e-referrals sent via the Health Information System. The Estonian Health Insurance Fund pays the family doctor within two days of the submission of the e-referral if the e-referral and specialist's response prepared in the course of provision of the health service contain the data set forth in the annexes to Regulation No 9 of the Minister of Social Affairs of 19 January 2007 'Procedure for taking over the obligation to pay fees from the insured person by the Estonian Health Insurance Fund and methodology for calculation of the fees payable to health service providers', and the required response is sent to the family doctor via the Health Information System within two days after the e-referral was sent. The Estonian Health Insurance Fund will pay for the services marked with the code 3039 under the same conditions also in the case of an e-appointment. The Estonian Society of Family Doctors has suggested updating the list of specialities in the case of which the Estonian Health Insurance Fund takes over the obligation to pay fees from the insured person as follows: pulmonology, rehabilitation, rheumatology, cardiology, otorhinolaryngology. The requirements for the referral and response can be developed ONLY in cooperation with specialist societies. The specialties in which the implementation of requirements for referrals and responses is planned for 2014: ▪ rheumatology ▪ pulmonology ▪ otorhinolaryngology. The Estonian Health Insurance Fund is of the opinion that interfacing all specialties at the same time (without specifying the data fields) would not help to launch e-consulting as planned. However, we will continue cooperating with the Estonian Society of Family Doctors and specialist societies in 2014 for the development of requirements for referrals in additional specialties. The Estonian Health Insurance Fund has come up with the draft contract for financing treatment, which makes launching the e-consulting service mandatory for all HSPs. However, as the implementation of this service requires organisational changes, it is likely that not all HSPs will be able to launch it fully in 2014.
Updating the e-Health Development Plan **148. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:** ▪ determine possible risks when new development works are planned and the ways in which they could be managed; ▪ add the risks and the options for their management in the e-Health Development Plan in 2014 (as was the case with the e-Health Development Plan 2005-2008). **points 125-147**	**Response of the Minister of Social Affairs:** We will consider the recommendation and define possible risks when planning future development works with the Estonian e-Health Foundation. We will also introduce options for risk mapping and management of the e-Health Development Plan. **Response of the management board of the Estonian e-Health Foundation:** In cooperation with the supervisory board of the foundation, we have highlighted the following main development risks from previous periods: ▪ Preliminary and feasibility analysis. The foundation has increased its analytical capacity to carry out the relevant analyses itself on the basis of its competencies either in part or in full, depending on their scope. This capacity must certainly be increased also in the coming years. A quality analysis will allow us to avoid many of the risks that materialised in several previous developments, which had to be changed as a result of the system's processes or the expectations of users, or which haven't been implemented as efficiently as expected. Also, budgeting for developments today is done on the basis of analogies, which is similar to the state's budgeting process, but doesn't guarantee adequate accuracy. Budgeting after the preparation of a feasibility study or detailed analysis would increase the accuracy considerably and this is the direction we're going in at the moment. ▪ Scope of the development. One risk factor that can be highlighted is that the scope of the developments is too large and a sufficient consensus

Recommendations of National Audit Office	Responses of auditees
	cannot be found due to the big number of parties; the developments must be changed several times, which makes the entire development process long and sometimes also expensive. The development of a solution in a smaller scope as a 'pilot solution' and its implementation after the relevant testing for other users has been rated as more efficient than the present methodology and the plan is to develop new solutions in this manner. A positive example is the service for the Social Insurance Board, which was implemented in eight months, completed by the deadline and immediately became actively used. ▪ Solely central development of the system. Earlier developments were mostly implemented on a central basis, whereby the end user was left responsible for the development of its own system by the principle 'you can use the central part'. This decision has been justified, but it hasn't guaranteed adequate efficiency in the introduction of the system. At present, all solutions are planned on a much broader basis in cooperation with the information system developers of health service providers and the resources required for said developments are planned at the same time. ▪ Clear division of responsibility. In the course of developments, it's very important to specify clearly from the start which of the parties is responsible for which results and to record it in an approved document. This practice hasn't been implemented yet, but it will be used from 2014 onwards. ▪ Implementation of services – information and training. Training end users 'in the workplace' is important for the introduction of the system. The training must be carried out in the format of computer studies and with the IT support of the health service provider, and the developers must also be involved if necessary. This approach has justified itself and we will also continue using it in the future. ▪ Updating services. Many of the existing developments were carried out on a project-basis, which meant that the focus on updating the service diminished when the project ended. Updating IT solutions, incl. e-health solutions, is one of the main issues in developed countries. The service-based approach will also be implemented in e-health from this year onwards. It requires the additional development of the relevant competency and the creation of capacity, which will be done within the next three years. Obtaining feedback from users is important here. In order to achieve this, we will be carrying out annual satisfaction polls among Health Information System users from this year onwards.
Reorganisation of e-health **191. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the management board of the Estonian e-Health Foundation:** ▪ complete and implement the e-health projects that have already been started (above all, the Digital Registration and the Electronic Health Record) before the creation of new services is taken on; ▪ prepare the budget of the e-health development projects for the same period as the e-Health Development Plan (incl. for projects that have been completed, but are not used, such as the Digital Registration); ▪ reorganise the viewing and archiving of digital images in such a manner that the service providers could view all digital images via the Digital Image in e-health; and, if necessary, consider merging the Foundation of Estonian PACS and the Estonian e-Health Foundation. **points 161-190**	**Response of the Minister of Social Affairs:** We will consider the proposal when planning our activities and setting priorities in the new development activities. In cooperation with the Estonian e-Health Foundation, we will plan the inclusion of the budgets of development projects in future e-health development plans to give an overview of the estimated scope of the activities and guarantee that the criteria for implementing the developments are followed. The Ministry of Social Affairs has already started implementing the Estonian PACS for the purposes of a central information system. A draft has been prepared pursuant to which the Estonian PACS will become the authorised processor of the Health Information System in terms of archiving images. When the relevant provisions enter into force, health service providers will be obliged to send images to the Estonian PACS and it will be possible for them to access the images and the relevant medical documents via the Health Information System. **Response of the management board of the Estonian e-Health Foundation:** The implementation of the e-health system has taken a long time. The specific features of the system, which are related to the users' age, computer skills, development of local information systems and health organisation issues, must certainly be considered here. The most significant development in the usability of the system has occurred this year. The awareness-raising planned in cooperation with the founding members and supervisory board of the foundation, whose members are representatives of important target groups such as the Estonian Hospital Association, Estonian Society of Family Doctors, the heads of the three largest Estonian hospitals,

Recommendations of National Audit Office	Responses of auditees
	has led to the situation where a significant share of health care professionals use the system and the result achieved in terms of inpatient case histories and the documents submitted by family doctors is close to the maximum. As stated above, when it comes to the usability of e-health, it is extremely important that the services are updated and developed further. This should not be forgotten when new services are developed. It includes improving the performance of the system, improving the breakdown of information, creating a search system, collating information from different databases and creating access to information on a web-basis and independently of the hardware platform – via tablets and mobile devices. At the moment, users have to log in separately into their own information systems, the Health Information System and the PACS, but when shared authentication (which already works at the level of central system) becomes available, users will be able to enter all of these system with one authentication and, once the additional development is completed, collect all the information that meets the defined criteria automatically onto the user's desktop. Such a solution would make the work processes more efficient and allow users to save time. As the interoperability and integration of health systems must be increased, it is necessary to develop an application layer of X-road, which would help to expand data communication between health services. Examples of this are the nationwide implementation of the nursing care service InterRAI and secure exchange of information about unfinished cases. The Medical Council, which has been operated by the Foundation since 2012 and consists of medical experts as well as the authorised representatives of health service providers, has highlighted the need to develop user interface and document display standards as well as the need to create unified components to make the work process of the physicians working with different information systems more efficient. In order to solve any issues, the Foundation cooperates with health service providers and their information system developers. The Foundation and the Foundation for Estonian PACS are cooperating to improve the exchange of information about medical images. The Ministry of Social Affairs has prepared a draft act pursuant to which the Foundation of Estonian PACS will become the authorised processor of the Health Information System in terms of archiving images. The draft contains the requirement that health service providers must send medical images to the PACS administered by the Foundation of Estonian PACS.

Development of the Digital Registration **192. Recommendations of the National Audit Office to the Minister of Social Affairs in cooperation with the Chairman of the Management Board of the Estonian Health Insurance Fund and the management of the Estonian e-Health Foundation:** ▪ make the development and implementation of the Digital Registration a task of the Estonian Health Insurance Fund; and ▪ link paying health service providers for their services to the obligation of maintaining electronic waiting lists in the Digital Registration. **points 164-167 and 183**	**Response of the Minister of Social Affairs:** Thank you for the proposals. We will consider implementing them in cooperation with our partners. **Response of the Chairman of the Management Board of the Estonian Health Insurance Fund:** Launching the Digital Registration is one of our priorities according to the memorandum the Estonian Health Insurance Fund and the Estonian e-Health Foundation have entered into. Specification of the project's terms of reference started in autumn 2013. The plan is to have the document approved by all the significant project parties in spring 2014 and the preparation of a new detailed analyses will start thereafter. Based on the results of the detailed analysis, the parties will make a joint decision on how much of the information system that has already been completed must be changed and who will be responsible for its completion. The Estonian e-Health Foundation will be the general manager of the project. Response of the management board of the Estonian e-Health Foundation: The technical solution has been completed and it is usable in the software where the relevant functionality has been created: Liisa, Perearst 2, Ester 3, North Estonia Medical Centre. This means that family doctors can use the registration service to make appointments, incl. for activities related to e-consulting, in specialties provided by the hospitals that use the aforementioned software. However, some development needs important for improving the usability of the system became evident in the course of the survey carried out by the foundation, but these developments cannot be made by the foundation, as they concern the information systems of the health service providers. For example, the doctor who makes an appointment cannot see available appointments in all hospitals at the same time, but has to open the relevant divisions in their computer one by one, which is cumbersome and time-consuming. In the course of negotiations, the developer of the Perearst2 software AS Medisoft has promised to complete the relevant development.
Establishment and monitoring of e-health performance indicators **198. Recommendations of the National Audit Office to the Minister of Social Affairs:** ▪ develop the performance indicators of the e-health system to obtain an overview of the benefits of e-health for the organisation of health care; ▪ monitor the performance indicators of the e-Health Information System regularly. **points 193-197**	**Response of the Minister of Social Affairs:** We're planning to develop the performance indicators of the Health Information System in cooperation with our partners and will prepare them on the basis of the goals set upon the establishment of the Health Information System.
Future of e-health **207. Recommendations of the National Audit Office to the Minister of Social Affairs:** ▪ determine the interests of the state in the implementation of e-health and the functions that will be performed by the Ministry of Social Affairs and by the Estonian e-Health Foundation; ▪ analyse the possible risks related to the continuation of the e-health development with the present organisational format (Estonian e-Health Foundation, its supervisory board) and, if necessary, consider alternative organisational formats and decide what will guarantee the quickest achievement of e-health goals. **points 149-160 and 199-206**	**Response of the Minister of Social Affairs:** The role of the Estonian e-Health Foundation is to implement the development activities related to e-health and the performance of the activities initiated by the Ministry of Social Affairs. The Estonian e-Health Foundation must guarantee that the Health Information System is implemented according to the required conditions and the established goals. The role of the Ministry of Social Affairs is to guarantee that further development trends correspond to the general concept of e-health implementation. We appreciate the proposal and will assess the need to carry out an analysis related to the continuation with the present organisational format of the Estonian e-Health Foundation.

Characteristics of the audit

Purpose of audit

The purpose of the audit is to provide an opinion on whether the Health Information System meets its objectives, which are making the health system more effective, improving the quality of treatment and increasing the focus on the patient.

Assessment criteria

The Health Information System serves its purpose if the different parties can perform their functions better via the information system and the manner in which the patient receives the health service they need is better and more efficient.

The National Audit Office is of the opinion that an information system is well implemented if:

- health service providers use the Health Information System for the provision of services of higher quality;
- the Ministry of Social Affairs, the Estonian Health Insurance Fund and the Health Board use the Health Information System when planning health services and managing the health system on a broader scale;
- the National Institute for Health Development can collect statistics about the health sector via the Health Information System and use it for research and surveys;
- the supervision authorities (Health Board, Estonian Health Insurance Fund, State Agency of Medicines) use data of the Health Information System when planning supervision;
- the health data of patients are protected and accessible to the patient, and the patient therefore receives better health services.

Scope and focus of audit

The audited period is 2005 to 2012, i.e. all the activities carried out since the establishment of the Estonian e-Health Foundation.

The Ministry of Social Affairs, the Estonian e-Health Foundation, the Estonian Health Insurance Fund and the Republic of Estonia Information System Authority (ISA) are the auditees.

The data for the analyses were obtained from the Estonian e-Health Foundation, the Estonian Health Insurance Fund and the Ministry of Social Affairs. An overview of the interviewees is given in Table 4.

Table 4. People interviewed in the course of the audit

Interviewed	Date of meeting
Raul Mill, Member of Management Board of EHF Laine Peedu, Legal Adviser at EHF Siim Tina, Infrastructure Manager at EHF Piret Kamber, Administrative Manager at EHF Marje Pihl, Financial Manager at EHF Kaire Põld, Procurement Manager at EHF	02.10.2012
Pille Kink, former Head of e-Health Department at Ministry of Social Affairs	20.11.2012
Kati Korm, Head of IT Development Department at Tartu University Hospital	10.12.2012

Tiiu Laud, Project Manager at Tartu University Hospital	
Tanel Ross, CEO of Estonian Health Insurance Fund Mari Mathiesen, Member of Management Board of Estonian Health Insurance Fund Kaie Mõtte, Development Manager at Estonian Health Insurance Fund Raimo Laus, Head of IT Department at Estonian Health Insurance Fund Erki Laidmäe, Head of Department of Pharmaceuticals at Estonian Health Insurance Fund Reet Kambla, Head of Internal Audit Department at Estonian Health Insurance Fund	02.01.2013
Tõnis Allik, CEO at North Estonia Medical Centre	23.01.2013
Taavi Lai, Head of e-Health Department at the Ministry of Social Affairs Ivi Normet, Deputy Secretary General of Health at Ministry of Social Affairs	06.03.2013
Andres Müürsepp, CEO at Järva County Hospital Janika Vingel, Information Systems Administrator at Järva County Hospital Tiiu Aule, Medical Director at Järva County Hospital	08.04.2013
Ain Suurkaev, CEO at Rakvere Hospital Sirje Kiisküla, Chief of Staff at Rakvere Hospital Tõni Tiimus, Neurologist at Rakvere Hospital Anu Kruusimägi, Rehabilitation Specialist & Doctor-Statistician at Rakvere Hospital Heidi Olesk, employee of IT Department at Rakvere Hospital Toomas Tuttelberg, employee of IT Department at Rakvere Hospital	10.04.2013
Triin Habicht, Head of Health Care Department at Estonian Health Insurance Fund Kersti Esnar, Head of Pricing Service at Estonian Health Insurance Fund Raimo Laus, Head of IT Department at Estonian Health Insurance Fund	22.04.2013
Eret Jaanson, family doctor Külvi Peterson, family doctor	15.05.2013
Madis Tiik, former CEO at EHF, Senior Adviser to SITRA in Finland, family doctor	12.06.2013
Raimo Laus, Head of IT Department at Estonian Health Insurance Fund	13.06.2013
Andrus Paats, CEO at Foundation of Estonian PACS	14.06.2013
Raul Mill, Member of Management Board at EHF Laine Peedu, Legal Adviser to the EHF Siim Tina, Infrastructure Manager at the EHF Valdo Praust, Security Manager at EHF Kaitti Kattai, Head of IT Division at EHF	17.06.2013
Maris Jesse, Director at National Institute for Health Development Toomas Veidebaum, Research Director at National Institute for Health Development Natalja Eigo, Head of Health Statistics Department at National Institute for Health Development	28.06.2013
Ivi Normet, Deputy Secretary General of Health at Ministry of Social Affairs	22.08.2013

The following activities were carried out in the course of the audit: analysis of documents and reports, organisation of a survey and data analysis, analysis carried out on the basis of COBIT (IT management and governance tool), observation of health service providers, incl. studying the functionality of the e-health system, and interviews.

Analyses of documents and reports

- Activity of the EHF and e-health planning The National Audit Office analysed the minutes of the supervisory board meetings of the EHF, the materials that were the basis of meetings, the

development plans and articles of association of the EHF, the contracts made between the EHF and the Ministry of Social Affairs, cooperation memoranda, training materials, the documents and analyses prepared when the e-Health Information System was planned, the studies that were carried out by the Praxis Centre for Policy Studies, the Estonian Development Fund, etc.

- Analysis of expenditure. The National Audit Office analysed the EHF's annual reports, budgets and the source documents of the amendments made therein, and the final reports of four projects.
- Foreign research. On the basis of foreign literature, the National Audit Office studied the e-health system used in neighbouring and other European countries and their implementation.

Data analysis

- The results of the test projects carried out for the implementation of e-consulting were analysed. The data of the outpatient medical invoices initiated by the Estonian Health Insurance Fund in the first half of 2012 in the specialties of cardiology, urology and pulmonology were used for comparison. The medical invoices of patients and the number of appointments that took place during the period of observation and other services received were studied. The National Audit Office also took a look at the number of patients in whose case the invoice issued by a specialist only included an appointment and the number of patients who were also given tests/analyses.
- The statistics of e-health usage were analysed. The EHF was therefore asked to provide monthly data about the documents sent and queries made by medical institutions in 2012.

Survey

Doctors were surveyed to find out what they thought about the benefits and use of e-health in their work.

The sample consisted of 200 doctors. The survey was successfully e-mailed to 177 doctors. The survey was carried out in both Estonian and Russian, but nobody responded in Russian (except for a few comments that had been added in Russian). The questionnaire of the survey was first sent to 11 doctors for testing; two of them responded. As they didn't request any changes in the content of the questionnaire, it was sent to all doctors as it was. 86 doctors of 24 specialities and from 37 institutions responded in total. Most of the respondents or 22% were family doctors. 51-60 was the biggest age group with 36%, followed by 41-50 with 30%. In terms of institutions, the biggest number of responses, i.e. 19, came from the North Estonia Medical Centre, followed by the Tartu University Hospital with 15 responses. There were respondents from 15 hospitals and 16 family medicine centres in total.

Observation

Service providers were observed to see what a doctor needs to do to send data to e-health and to access them in the information system, and what the doctor's view of the system looks like. Visits were paid to Järva County Hospital, Rakvere Hospital and Tartu University Hospital.

COBIT

The COBIT 5 IT management and governance tool was used as the basis. The IT processes that are the most important for the achievement of the objectives of e-health were selected on the basis of this in cooperation with the IT auditors of the National Audit Office. The evaluation of processes was followed by evaluation of management practices, the compliance of which was evaluated in the EJHF (the developer of the Electronic Health Record, the Digital Image and the Digital Registration) and in the Estonian Health Insurance Fund (the developer of the Digital Prescription). Interviews based on control questions were carried out with the people in charge in the EHF and the Estonian Health Insurance Fund and a selection of documents that fit in with the control questions were reviewed.

Time of completion of audit

The audit procedures were completed in August 2013.

Audit team

The audit team consisted of Audit Manager Liisi Uder, Senior Auditor Meelis Peerna and Auditor Pille Kuusepalu.

Contact information

Further information on the audit is available from the Communication Service of the National Audit Office:
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An electronic copy of the audit report (pdf) is available online at www.riigikontroll.ee.

A summary of the audit report is also available in English.

The number of the audit report in the internal records system of the National Audit Office is 2-1.7/14/70062/12.

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Previous audits of the National Audit Office in the area of the development of the state's information systems

12 February 2010 – **Results of the development of the state's information systems**

25 November 2008 – **Effectiveness of internal controls in the protection of personal data in national databases**

1 November 2007 – **Quality of public services in the information society**

29 September 2006 – **State support to local authorities in developing the information society**

18 March 2005 – **Management of state's IT sector and effectiveness of development plans**

23 February 2001 – **Effectiveness of information system development projects**

Previous audits of National Audit Office in the area of health

6 September 2012 – **Organisation of compensation of medicines**

8 April 2011 – **Organisation of the family doctor service**

2 February 2010 – **Sustainability of the hospital network**

30 September 2008 – **Strategies for promoting healthy lifestyle and attitudes**

4 September 2008 – **Purchase and use of medical equipment in health care institutions**

13 September 2007 – **State supervision over health care providers**

7 November 2006 – **Effectiveness of organisation of rehabilitation**

15 July 2005 – **Organisation of procurement in North Estonian Medical Centre**

5 July 2005 – **Organisation of pre-school children's health care**

15 April 2005 – **Need for and state commissioned education of health care professionals**

10 March 2005 – **Organisation of entry into contracts for specialised medical care in Estonian Health Insurance Fund**

14 September 2004 – **Organisation of primary emergency medical care**

16 June 2004 – **Accessibility of ophthalmology services**

19 December 2003 – **Health Care Project 2015**

11 December 2003 – **Monitoring demand for outpatient specialised medical care**

All reports are available on the website of the National Audit Office at www.riigikontroll.ee

Annex A. Questionnaire for doctors

Speciality ……
Age …..
Institution

1. Have you/has your institution joined the Health Information System?
   Yes
   No

2. Have you entered documents in the Health Information System in the last year (pursuant to § 2 of Regulation No 53 of the Minister of Social Affairs of 17 September 2008):
   Yes, outpatient medical case histories
   Yes, inpatient medical case histories
   Yes, day care case histories
   Yes, notices
   Yes, referrals and/or responses to referrals
   No, I haven't submitted anything
   Don't know

3. If you answered 'yes', please tick the most suitable answer.

Entered information	Always	In most cases	Sometimes
Outpatient medical case histories			
Inpatient medical case histories			
Day care case histories			
Notices			
Referrals and/or responses to referrals			

4. If you don't enter the health data of patients in the Health Information System, please give the reasons why you don't do it.
   Using the system takes too much time
   There is no information about how to use it
   The digital signature requirement is an obstacle
   Entering the data is too difficult
   As I have to enter the data in my hospital's information system anyway, I don't consider it necessary to duplicate it in the HIS.
   The data fields of documents are not suitable
   The HIS is not secure enough
   Other

5. Have you accessed the case histories of patients in the Health Information System in the last year? Please tick the most suitable answer.
   Always
   In most cases
   Sometimes
   Never

6. Do you think that entering case histories in the HIS is time-consuming?
   Yes
   No

7. Do you think that accessing case histories in the HIS is time-consuming?
Yes
No

8. How much time does the documentation of cases take after the implementation of the Health Information System in comparison to before the implementation of the Health Information System?
More
Less
Don't know
No difference

9. Are the fields of the electronic document where you enter the medical information of the patient and which is sent to the Health Information System suitable in your opinion?
Yes
No
Don't know
Please give reason

10. Can you log in the Health Information System via your institution's information system?
Yes
No
Please specify

11. In your opinion, is the Health Information System a useful tool in your everyday work?
Yes
No
Sometimes
Don't know

12. Have you felt in your work that the way you treat a patient has changed due to the Health Information System?
Yes, it's become easier (quality has increased)
Yes, it's become more convenient (more flexible)
Yes, it's become faster (more efficient)
Yes, it's become slower
No difference
Don't know

13. If you answered that it's become easier, more convenient and/or faster, then assess how often this has occurred.
Once
Once a week
Once a month
Once a quarter
Other

14. What is the quality of the data in the Health Information System?
Excellent
Good
Satisfactory
Poor
Don't know

15. What are the different options of e-health that you've used in addition to entering and/or accessing case histories?

Digital Prescription
PACS
e-Referral
e-Consulting
Other

16. What would motivate you to use the Health Information System more?

17. Please name the registers that are separate from the Health Information System and to which you and your institution also have to send data.

18. Have patients shown interest in the information held in the Health Information System?

Yes
No
Please specify

19. Have patients wanted their data not to be visible in the Health Information System?

Yes
No

Annex B. Extracts of various analyses e-health risks and options of their management

Risks associated with implementation of e-health. Risk analysis of the Electronic Health Record Development Plan. Ernst & Young, 2004

In this stage, the risks that arise in the establishment of the Electronic Health Record as a register can be divided into four major categories: risks that arise from technology, an organisation and it's culture, the general environment and the implementer. The structure of risks will change after the end of the strategy and procurement stage. In this report we can rely on these two stages when highlighting risks, as there are no more detailed overviews of the subsequent stages.

Technological risks are:

- **Multitude of different systems** – different registers, systems of hospitals, the family doctor system (FDS), statistics agencies, pharmacies, etc. The systems that will be connected to the Electronic Health Record are currently different in their essence and structure. Uniform data standards must be created for the purpose of connecting systems. The multitude of systems and their dispersion makes synchronised updating of the system difficult. Although the number of systems is considerably smaller than in other similar projects implemented at the international level, the difficulties that these projects have encountered give a good overview of the need for harmonisation. The integration of systems may cost significantly more than planned in the budgets.

- **Multidimensionality of functionalities** – different functionalities must usually be considered by user: different levels of user rights, patient rights, data ownership issues, etc. It is necessary to avoid security leaks and other factors that undermine the trustworthiness of the system, which may occur when extra functionalities are added. The success of the entire programme becomes less likely if the public becomes opposed to it.

- Data standards **have not been developed, the existing IT infrastructure does not support the complexity of the system to be established** – there are no common data standards at the moment. Resetting the registers to new standards requires a lot of work and time. Any additions to the system require new extra functions in its infrastructure. Perfecting the infrastructure in its turn requires new investments.

- **Perfecting and updating the existing systems** – the hardware and software currently used in Estonian medical institutions are of different ages and their functionalities are also not the same. The existing software solutions must be perfected in order to guarantee the performance of the system that will be established. The cost of the updating may comprise a large part of the cost of the hardware that will be procured for the new system.

- The **risk that the time schedule will not be adhered to during the development of the system** – it is rather natural in the case of IT projects of such magnitude that the schedule of the project cannot be determined accurately enough in the initial stages. The reason of this is that the system is very difficult to design and implement.

- The **system developer is unable to guarantee adequate IT support, incl. protect the system against viruses** – the spread of viruses in the system may threaten the confidentiality of sensitive data. It is also necessary to guarantee constant IT support for different services (incl. medical institutions, patients, statistics agencies, etc.).

- **Increase in system administration costs** – the development of additional functionality and guaranteeing IT support will lead to an increase in administration costs.

Organisational risks are:

- **Inadequate competency in the organisation in the area of IT skills and opportunities** – omissions in notifying about the changes that will be carried out and in the understanding of their importance by the parties. The concept and necessity of the Electronic Health Record must be understandable to all related parties. Specialists that can solve the problems that may occur should be involved in various workgroups.

- **Keeping the data of patients confidential** – the confidential nature of the information requires the existence of a thorough control system and data protection strategy. The existing legal system must be applied. However, the development and adoption of new acts is a time-consuming process. It's also important to analyse the attitude of patients towards the Electronic Health Record and its development: what do they expect and how has their attitude towards the changes in the quality of health services developed.

- **There is no working organisational structure for register management** – a theoretical model has been developed, but there is no working organisation that could coordinate the work between all the parties.

- **Centralised management strategy of the Electronic Health Record** – the strategy may not work, as the parties and their interests are different. The interests and expectations of hospitals differ considerably from the interests of statistical agencies and, for example, school doctors. Also, there is no competency in managing a project of similar scale in Estonia. This creates the need to involve international experience and competency.

- **Inadequate change management plan** – a change management plan must be developed in cooperation with the implementer of the system. The parties must be aware why the changes that are made are necessary. Central support and access to the necessary services must also be guaranteed to them (training, information events, etc.).

  The implementation of the Electronic Health Record requires the parties to incur relatively sizable additional expenses in relation to training their people and adapting their structure. The limited computer skills of the parties, their habit to use the old system to send data (use of medical records on paper), insufficient resources for the acquisition of modern equipment and the fact that they're used to the old organisation of work (subordination – responsibility chain) can be estimated as the biggest problems. The introduction of the Electronic Health Record in medical institutions creates the need to establish additional work roles. Entering data immediately may be difficult for medical specialists due to their massive workload. It may lead to the situation where both paper documents and the register system are used in medical institutions. At the same time, it increases the inefficiency of work and creates duplicating data media.

  It's also necessary to carry out computer training and teach people how to use the Electronic Health Record. These factors give reason to assume that the introduction of the Electronic Health Record will require extra money and time, which the parties have not considered in their budgets. For example: if the estimated number of the people working in the Estonian health sector and in other stakeholders is 18,000 and all of these people will start using the Electronic Health Record to a larger or smaller extent, then training expenses of 1000 kroons per person will total 18 million kroons!

- **Change management could be discussed in greater detail in the development plan, as the implementation of this project will bring about significant organisational changes for all parties.** This could be considered one of the most significant activities within the scope of the project. Informing the parties about the concept of the Electronic Health Record and the possible changes that may have to be made during its implementation should start as early as possible. Opinions of the cost of the changes must also be given.

Carrying out central training, creating additional jobs for consultants/data entry clerks in institutions, development of a common policy for software acquisition (to guarantee resources of the acquisition of computers also in less well-off organisations such as county family medicine centres, schools, etc.) could be considered to facilitate adaptation with changes.

- **Underestimation of the total cost of launching the project** The costs associated with the implementation of the project should be assessed in great detail to prevent the **risk of unexpected costs** and delays in the completion of the project due to the lack of investments. This is why accurate **budgeting** is so important.

  According to the opinion given in the development plan, the completion of the Electronic Health Record project will cost 30-50 million kroons. It has been added that a more detailed budget and business plan will become clear as a result of the analyses prepared by the contractor who won the public procurement.

  The estimated costs listed in the development plan include the development of the concept and objective of the register, data analysis, development of standards and classifiers, development and mapping of rules of procedure, analysis and amendment of the legal system, technological realisation, change management in organisations, preparation of the necessary documents and guidelines.

  The development of the Electronic Health Record is a long and complicated procedure. It's necessary to prepare a detailed project about the realisation of the register in order to be able to realistically assess the costs related to the development of the Electronic Health Record. In order to do this, the contracting entity must have an accurate overview of the cost of similar projects and the expenses associated with them. No additional cost analyses have been done at the moment.

  We advise to prepare an additional cost analysis before the procurement is declared to obtain reassurance about the total scope of the project and to avoid the appearance of unjustified expenses in the tenders. This means that the planned project must be outlined in detail and the cost must by analysed by cost groups. In order to avoid underestimating the costs, it pays to use case scenario analyses to highlight the different possible outcomes and to assess the adequacy of costs. International experience in financing and budgeting for a similar project could also be considered.

Risks depending on the general socio-political environment:

- **Inadequacy of the legal system** – the construction of the Electronic Health Record requires amendment of effective legislation that regulates data protection and the relationships between patients and doctors. The confidential nature of the data and the inevitable security risks associated with technology highlight the need to adjust the legal system.

- **Political risk** – most decisions made in the public sector are to a bigger or lesser extent associated with the policy to be implemented. The Electronic Health Record is a massive and long-lasting project. The sustainability of the project must also be guaranteed if the leading positions of different political stakeholders (political parties, other possible political target groups) change.

- **PR risk** – it's important to implement the correct PR activities that can draw the attention of the public to important key issues and keep up the support. A project of this complexity requires time and resources. Public attention concentrates from the long-term objective, which is better health services, to short-term problems such as the lack of resources and other possible problems. It's important to pay attention to two indicators in health care from the viewpoint of the general public:

  - **qualitative indicators** – how does the implementation of the Electronic Health Record improve the quality of the service for the patient;

- **quantitative indicators** – how will the quantity and efficiency of the provided services increase.

  If the general public don't find that the implementation of the Electronic Health Record is likely to improve the quality of health services, then it's difficult to find support for the implementation of the programme. Successful PR activities can minimise the probability of such attitudes emerging and gain more support from the public. The attitudes of the related parties can be shaped by disproving their value judgements.

As the system will be developed by the implementer selected as a result of a public procurement, then most of the risks are either directly or indirectly associated with that implementer. They will play an important role in designing the system and their participation must also be guaranteed in the general management of the programme. On the other hand, it means great responsibility for the institution that will be administering the Electronic Health Record, as the success of the programme depends on their management capacity. Cooperation between the two institutions must be constant and efficient, and guarantee the solution of possible problems.

Critical success factors of the e-health project. Risk analysis of the Electronic Health Record Development Plan. Ernst & Young, 2004

- **Define the organisation responsible for the administration and development of the Electronic Health Record and its structure.** It's important to establish an institution that is involved in the development of the Electronic Health Record, feels responsible for the results and is interested in the sustainability of the project. Developing the Electronic Health Record unevenly will not help implement the central concept and will reduce the success of the project, as the different related parties don't have a strong partner in the implementation of the concept of the Electronic Health Record and in the completion of the project who could manage relationships, keep up interest and guarantee the achievement of goals. A strong project manager must be able to manage the progress of this complex project. When the structure is created, attention should be given to the implementation of a suitable management model (central management, which guarantees that the important goals of the state are achieved) as well as to guaranteeing innovation (making tactical decisions, allowing lower levels to take initiative and responsibility), which helps to develop the Electronic Health Record more efficiently. Cooperation with the private sector promotes innovation and flexibility.

- **The responsible organisation should participate in the further development of the concept of the Electronic Health Record.** It's important to appoint a competent manager with good teamwork skills for the project. The organisation should review the present action plans, descriptions of the Electronic Health Record and the suggested solutions. The organisation itself should come up with additional proposals and ideas for improving the concept.

- **It's important to:**

  - **Establish the time schedule for the completion of the project:** assess the duration of the different stages, highlight possible risks and their impact on the execution. The execution of a test project with a one-year outlook could be planned in detail as the first stage. The test project will make it possible to demonstrate actual and measurable results, detail the project, assess its success or the factors that prevent it from becoming successful, set indicators and thereby lay the foundation for expanding the system both functionally and geographically. The project should be planned increasingly more specifically on the time horizon, i.e. a high-level long-term plan and then the immediately following stages in great detail.

  - **Systematise the architecture of the Electronic Health Record:** map the necessary functionalities and describe the requirements that would allow the outlining of clear tasks with measureable results for the persons who perform them. The present high-level description is good

for the preparation of the overall architecture, but quality indicators should be defined in more detail.

- As the Electronic Health Record is a massive project and covers different external organisations, **it is necessary to start developing the change management plan and commence with the necessary communication work.** Possible bottlenecks should be analysed, alternative solutions should be suggested for minimising the appearance of situations that could slow down the completion of the project. **It's important to keep an eye on the organisational issues and the importance of solving them in the case of this project.** It's important to guarantee positive cooperation with the main parties, especially with large hospitals and family doctors, **whose interest in the results of the project is one of the most important factors that make the project a success.** The procurement that will be organised is related to the solution of both technical and organisational issues, which is why all of the above aspects must be given attention. **The nature of the prevailing values and attitudes must be considered in change management.** It's difficult to manage organisations that don't share the same opinions of the need for changes. **Efficient PR activities also help a lot,** as they help make the general public understand the necessity of the project and to draw attention to the benefits the results will have for present and future patients.

- **Specify the procurement model** and decide on clear assessment criteria and competencies that are required. An overview of the options provided in Estonia and the qualifications and experience of the providers could be prepared for this purpose. Indicators for assessing the quality of the project should also start, as they would help to assess the compliance of the results of the different stages with the objectives.

- **Give attention to the budget of the project.** The cost structure should be analysed and initial opinions should be prepared on the basis of updated plans. Fixing the exact cost of the entire project is certainly impossible, but it is possible to analyse the possible areas whose costs may end up being higher than planned and which can become deciding factors for the success of the project and reduce the probability that impractical costs will emerge. Possible sources of financing and the probability and speed of their accessibility should also be analysed.

- **Possible political risk should be analysed.** The sustainability of the project must be guaranteed and it should not depend on political objectives (financing for the Electronic Health Record should be guaranteed irrespective of political priorities). Carrying out systematic risk analyses (e.g. by external organisations not associated with the project) should be considered, as they would highlight possible problems early and help to resolve them.

- **The PR programme related to the project should also be specified.** Informing the general public about the necessity of the project and the positive changes it will bring about helps to shape the general reputation of the project. The decisions and associated costs that fail to earn the public's approval, support and understanding, make the success of the project less likely. Successful communication of information increases people's faith in the project, starting with change management is easier if there is no string opposition in the organisation and people are not sceptical about the results of the project or its necessity for the health sector and the patients.

- **Involvement of international experience.** Similar projects carried out at an international level could be analysed and their experience could be used as the basis of making decisions (budgeting, change management, assessment, etc.). Involvement of international experts could also be considered in addition to analysing experience and ideas.

Critical success factors of the implementation of the e-health project. Feasibility study of the Electronic Health Record Development Plan. HeiVäl Consulting Group, 2004

- All parties:
  - All the classifiers and message formats required for the Electronic Health Record must be available at all times so they can be publicly used by all parties to the system. Full preservation of history in a usable format must be guaranteed, i.e. the reverse compatibility of all standards must be secured.
  - Users must be able to quickly and easily find the information they need from amongst the data in the system.
  - The data in the information system of the Electronic Health Record must be complete and reliable. Information about all patients must be accessible.
  - The consumption of public services must be convenient and easy.
  - Competency of the organisers of the project, consideration of the actual needs of the users by the organisers.
  - Systematic user training.
- Emergency medical care:
  - Time-critical information about a patient must be accessible in a minute or two.
  - Making queries in the information system and receipt of responses should be possible 24/7.
- Family doctors, medical specialists:
  - The workload of the doctors should not increase in comparison to the present situation.
  - It will be deemed that all patients have agreed to have their personal data processed by default and the family doctor must not request the separate consent of each patient.
- Hospitals, outpatient clinics:
  - Involvement of the senior managements of large medical institutions in the project.
- Pharmacies:
  - Gradual launch of the Digital Prescription, not mandatory for all pharmacies at the same time.

Risks associated with the implementation of the Electronic Health Record project. Health Information System Development Plan 2005-2008

The risks associated with the implementation of the Electronic Health Record are presented below by groups. Keywords for managing the risks are offered right after each specific risk. The risk analysis of the Electronic Health Record Development Plan gives a more thorough overview of the risks. The following risks emerged as the most important in the course of the implementation of the project:

- organisational risks;
- the risk arising from the legal system; and

- political risk.

Technological risks, however, are easier to manage.

Risks	Risk management options
Organisational risks	
Inadequate change management plan	1. Development of a change management plan. 2. Involvement of parties and information (informing the general public and the parties about the progress of the project, the possible associated problems and their solution). 3. Development of a training plan. 4. Learning about external (international) experience.
Limited experience in the implementation of a central management strategy	Learning about similar international initiatives.
Lack of a working structure for register management	Development of concepts of the institution's structure. Implementation of a test project
Keeping the data of patients confidential	1. Development of the fundamentals of the data handling security policy of organisations. 2. Preparation and execution of the security audit plans of organisations.
Insufficient competency in the area of IT skills and options of organisations	1. Analysis and assessment of the present situation. 2. Resource planning. 3. Development of the necessary training plans.
Underestimation of the total cost of launching the project	1. Detailed cost analysis and classification. 2. Development of the budgeting principles of the project.
Technological risks	
Multitude of different systems	Development of data standards for harmonisation of systems.
Multidimensionality of functionalities	Determination and analysis of necessary functionalities
Data standards have not been developed	1. Analysis of the present situation and definition of omissions. 2. Definition and development of the necessary data standards.
Existing IT infrastructure does not support the necessary functionalities	1. Analysis of IT infrastructure. 2. Identification of existing omissions and definition of resource requirements.
Updating and perfection of existing systems	1. Analysis and assessment of the present situation. 2. Development of plans for renewal of resources. 3. Budgeting.
System development is time-consuming	1. Development of the system development schedule on the basis of different possible case scenarios. 2. Learning about international experience.
The system developer is unable to guarantee the necessary IT support	1. Market analysis 2. Risk analysis by potential system developers.
Increase in the system administration expenses	1. Analysis of the potential administration costs of the system by different case scenarios. 2. Perfecting the specifications of the system.
Socio-political risks	
Inadequacy of the legal system	1. Analysis of the legal system. 2. Proposing legal amendments.
Political risk	1. Development of a national investment strategy.
PR risk	1. Preparation of a national PR plan for different case scenarios. 2. Informing the parties and the public about the progress of the project.

Risks of the Digital Prescription. Health Information System Development Plan 2005-2008

- Acceptance of the Digital Prescription by patients. Managed with the launch of a PR programme. The PR programme of the Electronic Health Record will also raise the overall awareness.
- Legal system (amendment of the Medicinal Products Act). The prescription centre must be included in the Medicinal Products Act to manage the risk. The process has been initiated.
- Organisational risks and risks associated with launch of the system. Management: as the Digital Prescription project is closely related to the Electronic Health Record, the technical knowledge and organisational competency associated with the organisation of the Electronic Health Record will be used to manage these risks.

Risks of the Digital Registration. Health Information System Development Plan 2005-2008

- Different level of the technical preparedness of hospitals. Will be managed by making it easy to join the X-road; the implementation of the Electronic Health Record will improve the technical preparedness of hospitals; the first one who join will develop technical solutions for the information systems of hospitals (Ester2, Ester3, EHL) and for interfacing the system of the Digital Prescription.
- Different level of the organisational preparedness of hospitals. Managed with the provision of training.
- Acceptance of the Digital Registration by patients. Managed with the launch of a PR programme. The PR programme of the Electronic Health Record will also raise the overall awareness.

Risks of the Digital Image. Health Information System Development Plan 2005-2008

- Launch of the data saving centre.
- Organisational risks.
- Risks associated with the structure of the system. As the Digital Image project is closely related to the Electronic Health Record, the technical knowledge and organisational competency associated with the organisation of the Electronic Health Record will be used to manage these risks.
- The project is directly related to the launch of the Electronic Health Record.