Information Technology in Public Administration of Estonia

YEARBOOK 2008

MINISTRY OF ECONOMIC AFFAIRS AND COMMUNICATIONS
Department of State Information Systems

Information Technology in Public Administration of Estonia

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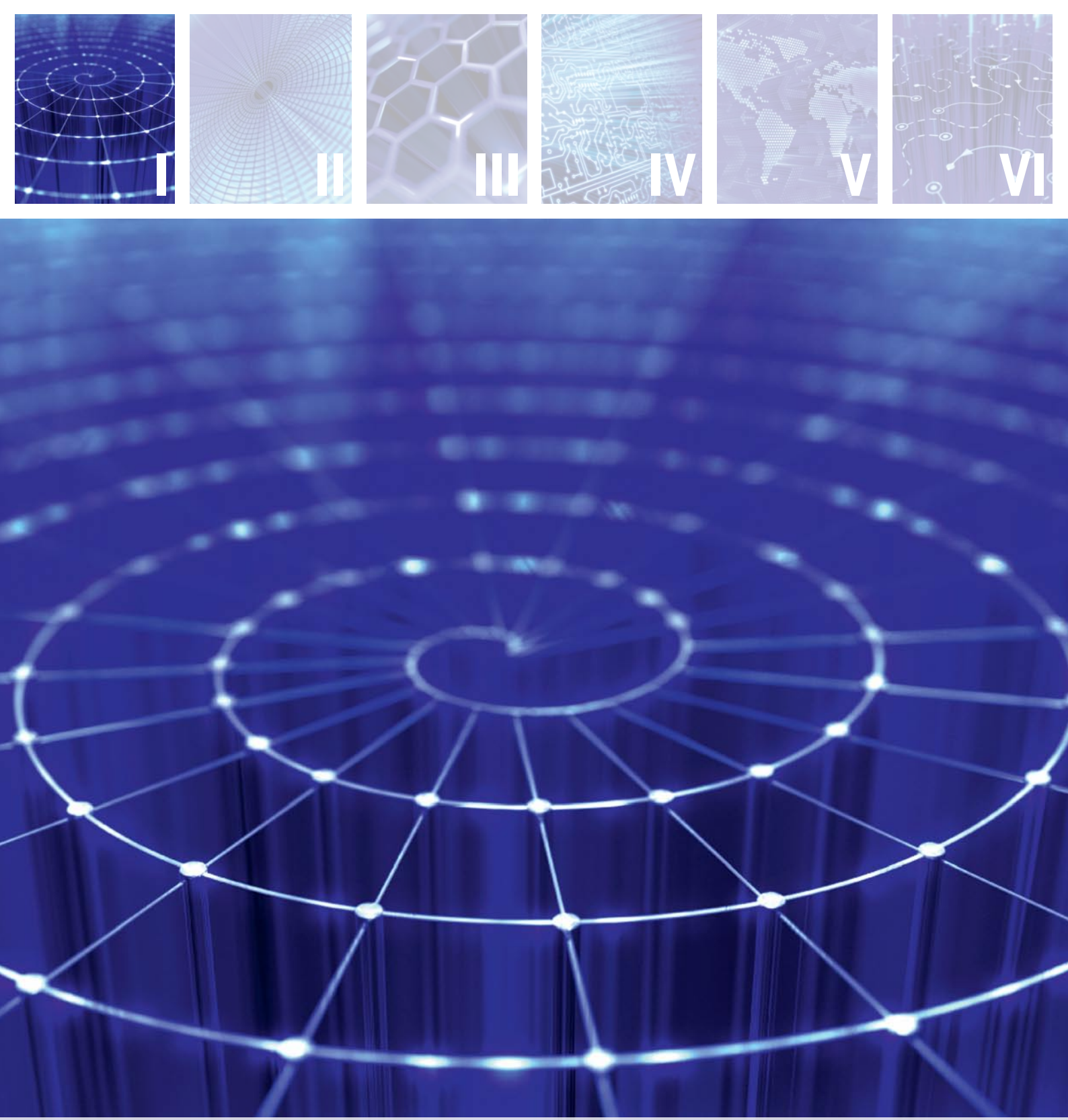

Development of citizen-centred, efficient and inclusive society

1.1 Improving skills and widening opportunities for participation

1.1.1 Participatory democracy over the internet

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More and more new possibilities are developed in eEstonia in order to hold a dialogue between the citizens and the state. At the initiative of the State Chancellery, the participation portal osale.ee[1] was launched as one of the eDemocracy tools in Estonia in 2007. The portal is the Government's main channel for inclusion and open decision-making. This is an environment, where the state invites parties to express their opinions on legislation and strategies. Citizens can make proposals to the government on how to improve the life in Estonia. Osale.ee allows people to learn more about the work of administrative agencies, while representatives of the public power gain a better understanding of society's expectations.

Participation portal is the Government's main channel for inclusion

Consultations

During the first one and a half years, more than sixty consultations have been carried out over the portal. All ministries have held public discussions and several non-official web conversations have taken place. For instance, when the Estonian National Committee for UNICEF organised meetings between the members of its youth assemblies and Estonian ministers, questions could be asked from ministers prior to meetings also through the participation portal.

Government agencies mainly organise written consultations. This means that in the course of drafting a law or elaborating a strategy the draft of the document is published on the participation portal and everybody can express his or her opinion. Upon the end of the consultation, the relevant ministry gives feedback on all opinions expressed. The summary of a consultation has frequently become a part of the explanatory memorandum of an act.

Relevant ministry gives feedback on all opinions expressed

There are approximately 4,000-5,000 clicks per consultation. The most widely read consultations include, for instance, eCitizen Charter with 13,900 clicks, and the Employment Contracts Act with 8,500 clicks.

The portal has nearly 2,000 registered users, of whom most represent organisations, e.g. business organisations or citizen associations.

Initiatives by citizens

In June 2008, the direct democracy portal TOM (Today I Decide) that so far had functioned as an independent portal was joined with the participation portal. Through these two portals citizens have submitted to the Government more than 1,270 ideas and proposals. Ideas are forwarded to relevant officials in ministries, who then respond to the citizens.

Development trends of eDemocracy

There is no doubt that issues that are important for the society can be discussed in the web environments of different media publications and internet

1 http://www.osale.ee (only in Estonian).

forums. In those environments, however, comments are made anonymously, creating, thus, no obligations for anyone. In the participation portal, the state is obliged to respond to citizens just as in case of other memoranda or requests for explanations.

State is obliged to respond to citizens

The difference between the participation portal and traditional correspondence lies in the openness of the dialogue and in the democratic nature of the discussion in the former. The citizen gets accustomed to using the participation environment, when he or she feels that the state cares about his opinion and officials are willing to communicate.

The state is interested in developing eDemocracy. As an example, one could bring out the following most recent initiatives: the energy policy blog[2], blog for discussing the Employment Contracts Act initiated by the Ministry of Social Affairs, and the blog[3] initiated by the Ministry of Justice in order to introduce the Public Service Act.

2 http://energiafoorum.blogspot.com (only in Estonian)

3 http://ajaveeb.just.ee/

1.1.2 Programme for increasing awareness of the information society

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Coping in the information society requires new skills, new knowledge and high participatory capability for the use of e-services. In order to ensure equal possibilities for all participants in the information society and to harness ICT solutions to the maximum, information society related knowledge and information has to be disseminated systematically.

Information society related knowledge has to be disseminated systematically

Programme "Increasing awareness of the information society"

The aim of the programme funded by the Structural Funds of the European Union is to widen the uptake of existing e-solutions; promote the development of new e-services; and ensure, by raising awareness of information security, the sustainable development of the information society. The total volume of the programme is 50 million Estonian kroons (3,125,000 euros) and the programme will be carried out in the years 2007-2013.

The target groups of the programme include consumers of both existing and future e-services; parties related to the development of e-services; and entrepreneurs, whose increased awareness of the information society will increase their motivation to apply IT solutions. In addition, the programme contains activities aimed at increasing the awareness of opinion leaders and representatives of media, contributing thus to increased interest and positive attitudes towards new e-solutions.

The programme's implementation plan for 2007-2008 focused on three action lines:

1. informing the general public of electronic functions of the ID card (i.e. electronic authentication and digital signing);
2. introducing the possibilities of the state information system;
3. increasing awareness about information security.

Nationwide campaigns

In spring and autumn of 2008, nationwide campaigns were held to increase the use of the electronic functions of the ID card. There are over a couple of hundred e-services available in Estonia that can be securely used with the national ID card.

Campaigns to increase the use of the electronic functions of the ID card

By today, there are more than one million ID card owners in Estonia, but only 16% of them make use of its electronic functions. To this end, inhabitants of Estonia, including the Russian-speaking population, were invited to participate in a campaign aiming to establish a new world record – the most digital signatures to a single document. All in all, 11,000 legally competent and verifiable digital signatures were given. An original world record was, thus, established. Of all the people having participated in the campaign, 18% gave digital signature for the first time. The second phase of the campaign was held in autumn 2008. This time the campaign aimed at reminding people that in their pocket they all have the ID card, which they use for scraping the ice from car windows at best. The focus of this part of the campaign was centred on breaking widespread myths about the ID card. Thus, an information brochure on the electronic use of the ID card was sent to 250,000 households. Since the ID card is not a basic commodity, people's attitudes are difficult to change and, thus, information about the card has to be consistently disseminated in order to gradually start shaping new behaviour models.

Campaign to increase public awareness about computer-related threats.

In autumn 2008, a month-long campaign was held in order to increase public awareness about threats related to the use of computers and possibilities to protect oneself against these. People were called upon to use strong passwords and not to click on unfamiliar links. To strengthen the idea of the campaign, provocative messages were put on billboards and video clips about cyber-crime related true stories were disseminated among the target group.

Information days held for civil servants

Furthermore, different information days were organised in the framework of the programme in 2008. The aim of the information days held for civil servants was to increase their awareness of the possibilities of the state information system. Seminars on the administration system for the state information system (RIHA) were held for the administrators as well as for the users of the system. Activities organised within the programme also include the presentation of the three-level baseline protection for information systems (ISKE) to auditors and a conference on computer security for the Estonian IT specialists dealing with the prevention of security incidents.

In 2009, activities aimed at increasing awareness about information security both within the public sector and among the general public of Estonia will be continued. Besides, an information campaign will be held for the general public on the State Portal eesti.ee[4]. People will be invited to give feedback on how to improve the portal and increase its user-friendliness. The priorities of the years to come will include the identification and recognition of best e-solutions.

Campaign for the general public on the State Portal

As an outcome of the activities of the programme, the general public in Estonia will have increased awareness of the fact that e-solutions can facilitate their life and that the use of these is secure.

4 http://www.eesti.ee

1.1.3 Digitisation of cultural heritage and making it available for the public

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Never before has the digitisation of cultural heritage and making it available been as topical as now. To this end, considerable efforts are made in many countries, including Estonia.

In autumn 2008, a prototype of the European Digital Library Europeana[5] was launched. Europeana is a portal, which joins the collections of libraries, museums and archives, covering, thus, the profuse cultural heritage of entire Europe. In addition, national culture portals and memory institutions can be linked to it. Europeana enables Internet-based access to nearly two million digital objects, including film material, photos, pictures, sounds, manuscripts, books, newspapers, and archival documents. In the first stage of the project Estonia will make available, through the portal, digital collections of the National Library's digital archive DIGAR[6].

European Digital Library Europeana

Co-ordination in the field of digitisation in the EU

The objective of the MINERVA project, launched in 2002, was to establish a network between the ministries and other organisations of European countries in order to discuss activities related to the digitisation of cultural and scientific heritage, exchange information, co-operate in disseminating information about digitisation, create a common European platform made up of recommendations and guidelines about the digitisation of cultural heritage, metadata, long-term preservation and publication. In 2004, MINERVA Plus initiative was launched, in the course of which new partners, including the Estonian Ministry of Culture, joined the MINERVA network. Within these projects, a National Representatives Group was established with a task to co-ordinate the digitisation of cultural heritage in member states. Activities launched within these two projects were followed up through the MINERVA EC project, which was operational from October 2006 to autumn 2008.

In a letter addressed to the Presidency of the European Council and the President of the European Commission in April 2005, six heads of state and heads of government expressed their support for the creation of a European virtual library. In July 2005, Commission President J. M. Barroso gave a positive response to this proposal, indicating the Commission's willingness to contribute to the creation of the European virtual library and pointing out community work already done in the field.

The Digital Libraries Initiative aims at enabling all Europeans to access the Europe's collective memory and use it for education, work, leisure and creativity. Efforts in this area contribute to Europe's competitiveness and support EU action in the field of culture.

Enabling all Europeans to access the Europe's collective memory

The creation of the European Digital Library required stronger co-ordination process on the European level. Thus, the European Commission established, with its decision of 22 March 2007, a relevant expert group. The task of the group is to report on digitisation related developments in member states and facilitate the implementation of Commission decisions.

Digitisation in Estonia

In Estonia, digitisation related work has primarily been directed at the establishment of technological basis. In addition, the Estonian National Library, Conservation Centre Kanut (CC Kanut), Estonian Public Broadcasting Company and the National Archives of Estonia have been assigned the role of serving as digitisation competence centres. Project-based approach has been avoided and digitisation activities have been regarded as part of the daily work of the competence centres. Such an approach ensures the assembling of high-quality technology and experienced specialists in the competence centres and guarantees, thus, high quality of digitisation works.

5 http://www.europeana.eu
6 http://digar.nlib.ee

Portals enabling access to digital cultural heritage in Estonia

Estonian cultural institutions have developed a number of e-services to make cultural heritage available. In this context, the following solutions could be brought out: the archival information system AIS[7] developed by the National Archives of Estonia, a collection of digitised family history resources SAAGA[8], a database of digitised Estonian newspapers DEA[9], an archive containing digital copies of publications issued in Estonia DIGAR[10], an archive of the Estonian Public Broadcasting TV-shows[11], a virtual exhibition portal developed at the initiative of the CC Kanut[12], and an information system for museums developed by the Ministry of Culture[13]. The Estonian National Library and the Estonian Public Broadcasting Company will also develop portals, ensuring common gateway for the use of various e-services these organisations provide.

In spring 2007, the Ministry of Culture joined the EU project MICHAEL Plus[14] in the framework of which information was gathered on digital collections of different countries and their descriptions were added to the trans-European network of portals. The keywords of this project include multilingualism and commonly shared vocabulary for describing collections.

Though such organisation-specific or topic-based portals constitute a considerable step forward in taking information to their users, it would still be even better if users could find the information they seek through one central gateway.

The Ministry of Culture intends to establish a portal of Estonian cultural heritage, which would serve as a common gateway to information maintained in information systems of different areas. Users would no longer need to waste time on wandering through different portals, but could make enquiries related to digital cultural heritage from one place. The portal would also allow to create associations between different pieces of information maintained in different information systems. Similar gateways have been developed in several European countries, for instance in Italy[15], Germany[16], France[17], and our Nordic neighbour Finland[18].

Users would be able to make enquiries related to digital cultural heritage from one place

Long-term preservation of digital cultural heritage

The preservation of digital cultural heritage requires secure long-term conservation of digital substance. In order to increase the security of long-term preservation of digital substance in CC Kanut, museums and the National Library, the Ministry of Culture concluded a co-operation agreement with the Estonian Public Broadcasting Company. The respective solution has been developed on the basis of tape library with transfer of data taking place automatically. The initial data volume allocated to memory institutions amounts to 100 TB (with the current volume of data in the tape library being 560 TB), but the tape library can be expanded up to 5,5 PB.

Co-operation agreement to increase the security of long- term preservation of digital substance

ATHENA project

At the end of 2008, a project called ATHENA[19] was initiated with an objective to transfer digital cultural heritage maintained in different museum information systems in Europe to the Europeana system. While in Estonia practically all museums use one system – the information system of museums – other countries tend to have in-house local systems. Estonia's advantage, in this context, lies in its smallness. The number of museum objects in all Estonian museums equals to that of some larger museum in some other country. The most difficult part of the ATHENA project lies in adjusting all different thesauri in order to enable multilingual search. The

7 http://ais.ra.ee/ais/
8 http://www.eha.ee/saaga/
9 http://dea.nlib.ee
10 http://digar.nlib.ee
11 http://etv.err.ee/arhiiv.php
12 http://www.virtuaalmuuseum.ee
13 http://www.muis.ee
14 http://michael-culture.org. The Estonian-language part of the portal is located at http://michael-culture.kul.ee
15 http://www.cult uraitalia.it
16 http://www.bam-portal.de
17 http://www.culture.fr
18 http://www.kulttuurisampo.fi
19 http://www.athenaeurope.org

project is closely related to EuropeanaLocal – a project targeted at local and regional memory institutions.

Internet's role in serving as a path to cultural heritage can hardly be overestimated

Though for the time being, possibilities to familiarize oneself with the cultural heritage through the Internet are still in their infancy, Internet's role in serving as a path to cultural heritage in the future can hardly be overestimated. New solutions providing easier access to information can contribute to the narrowing of digital divide both in social and geographical terms.

1.1.4 Computer Protection 2009

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In 2001, Estonia's most influential companies established a foundation called Look@World[20] with an objective to lead Estonians to the Internet. Within three years, the foundation fulfilled its ambitious goal to give basic computer and Internet training for 100,000 Estonians. In addition, 500 public Internet access points were opened and an eSchool system that has gained both domestic and international reputation was developed.

Objective to lead Estonians to the Internet

look@world

As the use of computers, the Internet and e-services increased in Estonia, it was time to start paying more attention on computer protection and what ordinary computer users can do in order to ensure the security of both themselves and their computers in the Internet. A security-conscious computer user is also a warranty for the security of e-services.

In the light of the above-mentioned, the Look@World Foundation launched a new initiative in 2006, when the biggest telecom companies and banks in Estonia (AS EMT, AS Elion, AS SEB and AS Hansapank) together with the Ministry of Economic Affairs and Communications signed a co-operation agreement called "Computer Protection 2009". The goal of the initiative is to make Estonia a country with the most secure information society in the world by 2009. To this end, the partners of the "Computer Protection 2009" agreed to direct users of their e-services from using password-based

To make Estonia a country with the most secure information society in the world

20 Vaata Maailma SA: http://www.vaatamaailma.ee (only in Estonian).

identification to more secure authentication methods (including the ID card and Mobiil-ID). The parties aim to achieve massive use of the ID card and Mobiil-ID in electronic channels with an objective to have at least 400,000 Estonians using either the ID card or the Mobiil-ID for electronic authentication and digital signing by the end of 2009.

By today, other large organisations and companies providing e-services have joined the co-operation agreement: eSchool, Tax and Customs Board, Centre of Registers and Information Systems, Estonian Informatics Centre, AS Eesti Energia, Eesti Krediidipank, Nordea Bank, Sampo Bank, AS Tele2, AS Sertifitseerimiskeskus, and the city of Tallinn.

Activities of "Computer Protection 2009"

Various activities have been carried out in the framework of the initiative, most of which have been training courses. The following is a list of activities implemented by the Look@World Foundation:

- development and constant upgrading of its basic ID training on http://www.id.ee;
- training of employees of various organisations and companies (all in all, more than 1,500 people);
- implementation of a one-year pilot on mobile training box (visited by 6,300 people of which 4,300 received thorough ID training);
- in co-operation with AS Elion, implementation of a pilot called "Technician to home" (free ID-support either at home or at an office);
- together with partnering organizations, creation of banners urging to use the ID card and the Mobiil-ID.

Blogs providing information and practical instructions on computer security

Since November 2006 the foundation maintains two blogs[21] providing information and practical instructions on computer security. In autumn 2007, the Look@World Foundation launched, in co-operation with Microsoft, a computer security environment for children[22]. Daily activities of the organisation also include the administration and development of the ID website23 and increasing,

21 http://www.arvutikaitse.ee (in Estonian) and http://www.infosecurity.ee (in Russian)

22 http://www.laste.arvutikaitse.ee

23 http://www.id.ee

Photo of the mobile training box

in co-operation with AS Sertifitseerimiskeskus, the user-friendliness of the ID card's software (installation software and renewal of certificates) and its use.

Furthermore, activities carried out by the foundation include organisation of a joint procurement for the supply of affordable ID card readers; a media campaign with a slogan "Right thing, right century" held in autumn 2007 and aimed at the promotion of the ID card and Mobiil-ID; compilation and production of different information materials for the dissemination at trainings and in service bureaus of partnering organisations; commissioning and analysing several surveys on ID card use and relevant services.

An important milestone to be mentioned in this context is the publication of a book entitled "Computer Protection A-B-C"[24]. The book explains, in layman's terms, computer security related terms, and gives practical instructions for secure behavior in the Internet.

The activities of the foundation have been targeted not only at end users, but also at developers respon-

24 http://www.vaatamaailma.ee/materjalid/arvutikaitseABC.pdf (only in Estonian)

sible for ID related issues in enterprises and organisations. In spring 2008, the foundation organised, in co-operation with AS Sertifitseerimiskeskus, a one-day seminar "Digital identity and how to add it to one's applications". The aim of the seminar was to offer advice and support to those responsible for ID development in their organisations.

Mobiil-ID service – certificates are maintained on the SIM card of a mobile phone.

In May 2007, AS EMT together with AS Sertifitseerimiskeskus launched the Mobiil-ID service, in case of which certificates are maintained on the SIM card of a mobile phone (not on the ID card as usual). Other mobile operators – Tele 2 and Elisa – plan to conclude their respective development work and launch the service for their clients in 2009.

"Computer Protection 2009" has received also wider recognition – the Association of Estonian IT and Telecommunications Companies awarded the project with the title "The Deed of the Year 2006".

Plans for 2009

The year 2009 six projects will be carried out in order to give ID training

The year 2009 will be busy for the Look@World Foundation. Namely, with the support of the EU Structural Funds, six projects will be carried out in order to give ID training to nearly 70, 000 people and advise approximately 200,000 people on the use of e-services. The projects to be carried out include:

- ID support centre (24/7 assistance for ID related issues by phone, e-mail and through a website);
- eBus (training on the use of e-services and ID matters in a bus/computer class riding through Estonia);
- mobile training box (practical and personal training on the use of e-services and ID matters at bank offices, fairs, conferences, etc);
- interactive web-based training course (practical and interactive self-training course for all);
- support centres for the use of e-services (advising, training and obtaining feedback from potential users of e-services in service bureaus of organisations and enterprises providing public e-services);
- eCitizen training network (classic classroom training for all throughout Estonia).

The preliminary applications of these projects have been approved by the Estonian Informatics Centre and these serve as a basis for the organisation of procurements. The prerequisite for the implementation of the projects is satisfaction of the final applications once the procurements have been carried out. First trainings are expected to start in spring 2009.

Number of ID card users

In May 2006, when the "Computer Protection 2009" co-operation agreement was signed, there were approximately 20,000-25,000 ID card users in Estonia. This number was planned to be doubled yearly (the target was 100,000 ID card users by the end of 2007; 200,000 by the end of 2008 and 400,000 users by the end of 2009).

By the end of 2008, the number of ID card users was nearly 180,000, accounting to more than 17% of those having a valid ID card (see Figure 1). During the last six months, the ID card has been used by more than 12% of people possessing a valid ID card. In years 2002-2008, there have been nearly 20 million electronic authentications and 10 million digital signatures have been issued.

By the end of 2008, the number of ID card users was nearly 180,000

Though there is a slight backlog in terms of the number of ID card users, a considerable increase is expected in 2009 as a result of large-scale training programmes.

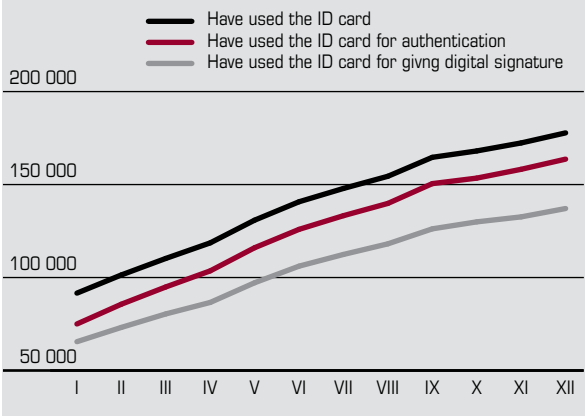

Figure 1. Growth in the number of ID card users in 2008

1.1.5 Year 2008: a big step forward for internet administration in Estonia

Photo: Stanislav Moškov

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The administration of the Internet in Estonia took a big step forward in 2008. Namely, the revision of the administration of .ee domain names started off.

Although Estonia has the reputation of being an advanced information society, the development of national domains has so far lagged behind. The previous rules date back to times when the Internet used to be a tool for the academic community only, and are among the strictest in the European Union. Meanwhile, the Internet has long broken out of the science labs and these rules are way behind time.

Revision of the administration of .ee domain names

The Estonian Internet community has been waiting for improvements in the administration of domain names for a number of years. Therefore, the Ministry of Economic Affairs and Communications established a working group to develop a concept for the renewal of domain names. The Estonian Association of Information Technology and Telecommunications (ITL), current domain name administrators, the Estonian Educational and Research Network (EENet) and the National Institute of Chemical Physics and Biophysics joined this initiative. The group also included representatives from the Ministry of Education and Research, the Tallinn University of Technology and the Association of the Estonian Patent Attorneys.

The working group had the responsibility to develop, based on the needs of the Estonian Internet community, the principles and system for the administration of domain names. In addition, they had to establish an effective extrajudicial procedure for resolving domain name disputes, given the growing commercial importance of domain names.

Eventually, the administration of domain names should be considerably improved. The rules will be liberated so that also private persons will be able to apply for domain names (several if required). Also foreign companies will be able to obtain an Estonian domain name, for instance should an e-service provider want to create a service environment in Estonian.

Estonian Internet Foundation

Furthermore, the Estonian Internet Foundation will be established by the state and ITL. The new organisation will represent the Estonian Internet community in the Internet Corporation for Assigned Names and Numbers (ICANN) and other international institutions; develop the Estonian Internet policy; administer top .ee domains, and establish rules for distribution of domain names. It will also be responsible for settling extrajudicial domain name disputes.

The registration of domain names will be based on a two-level system. The central register of domain names will be administrated by the Estonian Internet Foundation. There will be no need for direct communication with the Foundation in order to register a domain name, as this can be done via the service provider/registrar. As a rule, the server host will also serve as the registrar. Registrars will be communicating electronically with the central register in real time.

1.1.6 E-inclusion project competition

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Estonia's success in the implementation of information technology and development of e-services, including those provided by the public sector, has been significant. However, there is not yet full realisation among the system developers as well as in the society at large of the fact that the new and better life is not accessible for all, either because of lack of necessary skills and equipment or due to unsuitability of solutions.

Objectives of the competition

Groups who are in greater danger of becoming excluded from the information society

Since 2007, the Ministry of Social Affairs has organised an eInclusion project competition for non-profit organisations. The objective of the competition is to contribute to the eInclusion of groups who, for one reason or another, are in greater danger of becoming excluded from the information society. This mainly concerns the elderly and the disabled, but also children from large families, who might not have the opportunity to purchase and use ICT equipment.

The second, but not less important objective of the competition is to raise awareness of eInclusion in the non-profit sector. The Ministry of Social Affairs wishes to call upon interest groups to have their say in how to overcome the existing barriers and prevent the exclusion of risk groups from the information society. The latter might deepen their overall exclusion from the society even more.

Funding and scope

The total monetary value of eInclusion projects in 2007 amounted to 496,279 Estonian kroons (31,700 euros) and 570,115 kroons (36,400 euros) in 2008. The funding was not extensive, but hopefully there is positive side to it. The Ministry's experience shows that some twenty or thirty thousand kroons and a few vigorous people knowing how to make use of the existing resources (e.g. computer classes in comprehensive schools and gymnasiums) is quite enough to give basic ICT training for about 20 old people. In other words, efficient projects are not necessarily expensive. The project competition will be organised also in 2009, though with somewhat more limited budget.

Efficient projects are not necessarily expensive

The scope of the projects of the 2007 project competition was exceptionally diverse. In addition to training, funding applications were also submitted for the development of different information portals that would assist the disabled, but also parents of disabled children, to search specific disability-related information, to take care of one's health and to cope with daily life. Thus, an information and assistive technology portal was developed for the Estonian Union of Persons with Mobility Impairment[25]. The site contains information about different solutions enabling people with different disabilities to use the computer. In addition, a Russian-language module was added to a portal entitled Freedom of Movement (for people with limited movement ability and wheelchair users)[26], allowing thus a wider circle of users to make use of its content.

Training as an instrument for raising the interest of risk groups in ICT

In 2008, funding applications were submitted primarily for the organisation of training for the disabled and the elderly. Training is unquestionably one of the main instruments for raising the interest of risk groups in ICT. Once the number of those interested in ICT will start growing, system developers and online service providers will probably also take deeper interest in developing more specific services and solutions for the disabled.

25 http://itiabi.elil.ee/index.php/Esileht (only in Estonian)
26 http://liikumisvabadus.invainfo.ee/?go=index&lang=eng

1.2 Broadening technological access to digital information

1.2.1 First year of digital revolution

The first year of the digital revolution in Estonia witnessed a ten times increase in the number of households with digital TV. Four new domestic TV channels entered the market and the entire country was covered with a digital television network, which can be seen with ordinary antennas. At this point, all preconditions are in place for a full transition to digital television in Estonia.

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On 31 March 2008 an analogue television receiver was turned off on Ruhnu, Estonia's remotest island. Thus Ruhnu, which is also the smallest Estonian municipality in terms of population, was the first Baltic region to fully switch over to digital television. At that time, approximately a third of the Estonian households (180,000 homes) were watching analogue TV with an ordinary roof antenna. At the end of 2008, 40,000 of them had switched over to digital TV, which can be seen with ordinary antennas. At the end of 2009, as much as 100,000 households are expected to be watching digital TV.

Estonians' awareness of the transition to digital television is high

Estonians' awareness of the transition to digital television is high: according to a survey carried out by research company TNS Emor in February, 70% of the respondents were aware about the digital revolution. 70% of Estonians and over 60% of non-Estonians were supportive of the transition.

Seven digital channels for free

Significantly higher picture and sound quality

The advantages of digital TV include significantly higher picture and sound quality; electronic TV guides with a single push right on the screen; a variety of sounds and subtitles in different languages, and other additional functions. However, these are not the primary reasons for transition to digital television. The key benefit of digital broadcasting is that the new technology has facilitated the establishment of new domestic TV channels. The old analogue network had become technologically obsolete and national broadcasting of new channels was no longer possible, which inhibited the creation of new TV channels in Estonia. The first year of the digital revolution witnessed the emergence of four novel TV channels in Estonia, which doubled the number of channels seen here.

New technology has facilitated the establishment of new domestic TV channels

In summer 2008, the Estonian parliament adopted the Broadcasting Act Amendment Act, providing for a smooth transition to digital television. Consequently, the new channels Kanal 11, TV6 and Kalev Sport as well as the older universal channels ETV, Kanal 2 and TV3 were switched over to the digital platform. The transition of the latter three to free digital broadcasting can be considered the turning point for the rapid increase in the number of digital TV viewers. In August, the sales of digiboxes went up

owing to the launch of ETV2, which was oriented to broadcasting the Olympic Games.

Domestic digital TV channels for free

Last but not least, the seven domestic digital TV channels, which comprise over 80% of the total time that Estonians spend on watching TV, are free of charge. Moreover, there is no need to subscribe to any service provider to see these channels.

Estonia covered by digital broadcasting

Another important milestone in transition to digital TV broadcasting was covering the entire country with free digital distribution for one month in November 2008. To this end, 17 new digital TV transmitters were established. Estonia became the first European country to be fully covered with free TV distribution transmitted in MPEG-4.

Currently, there are altogether three national networks of transmitters in use: the first one transmits free national TV programmes, and the other two broadcast programmes with conditional access. The distribution area of the first network (MUX1) covers virtually the entire territory of Estonia; the signals of MUX2 and MUX3 reach approximately 90% of the population. The MPEG-4 standard applied in Estonia enables to transmit up to 12 channels via one network. Consequently, the transmission costs of one channel might be up to ten times lower compared to the costs of analogue distribution.

Hotline and online help for digital TV households

A free hotline 17101 and an online help site[27] were launched to provide information on digital TV broadcasting in Estonia. Various electronics stores started to distribute digital TV instructions free of charge. Furthermore, awareness campaigns and trainings have been organised for electronic equipment importers and antenna system installers. The objective was to offer competent advice and help to consumers in order to facilitate transition to digital television.

Deadline for full transition

The deadline for full transition to terrestrial digital television in Estonia was set to 1 July 2010. On that day, the three currently operating networks of analogue transmitters will be switched off and the respective frequencies will be put to a different use.

27 http://www.digilevi.ee

Development of citizen-centred, efficient transparent and public administration

2.1 Improving the efficiency of the public sector

2.1.1 The data exchange layer X-Road in 2008

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This article gives an overview of the developments of the data exchange layer X-Road in 2008. Various technical and organisational improvements were implemented, including debates, audits and trainings. All these projects contributed to the development of new e-services in the X-Road environment. At this point, over a thousand different services are available. The article concludes with the user statistics of the X-Road and a short overview of future developments.

Over a thousand different services are available

Development of the X-Road

2008 witnessed the following improvements to the X-Road:

- Development of a regulation on the data exchange layer of information systems
- Transfer of the administration of the X-Road to RIHA and development of new meta services of the X-Road for RIHA
- Development of a universal portal and addition of a new authorisation option to MISP
- Testing of SAWSDL in the X-Road environment
- Audit of the data traffic in the X-Road
- Development of a new presentation layer of X-Road queries for the State Portal eesti.ee
- Introduction of the X-Road environment at CeBIT and to visiting delegations

Regulation on the data exchange layer of information systems

The start of 2008 witnessed a new regulation on the data exchange layer of information systems. The regulation was enforced in April 2008 pursuant to clause 439 (1) 5) of the Public Information Act.[28]

The new regulation was adopted for a number of reasons. First, the former regulation on the implementation of the data exchange layer of information systems[29] had been valid for nearly four and a half years. In the meantime, the X-Road had been considerably improved: the technology had been updated, the number of services had grown several times and so had the number of X-Road users. Second, the Databases Act had been repealed and the legislation on the maintenance of databases had been integrated to the new version of the Public Information Act. The latter added the X-Road to the list of six systems that support the functioning of databases.

Transfer of the administration of the X-Road to RIHA and development of new meta services of the X-Road for RIHA

It had been decided a while ago that paper-based document management in joining databases and institutions to the X-Road will be replaced by digital web-based management. To this end, the administration system of the state information system (RIHA) was established, which has been successfully operating for some time now.

In order to develop the functionality of RIHA, several new meta services that would comply with

28 Government of the Republic of Estonia Regulation No 78 of 24 April 2008.

29 Government of the Republic of Estonia Regulation No 331 of 19 December 2003.

RIHA queries had to be added to the X-Road servers. At this point, the application is fully operational (for further information see next article).

Development of a universal portal and addition of a new authorisation option to MISP

This application started off from the relatively strict data security requirements of the eHealth project, which called for a revision and improvement of the security solution of the mini-information system portal (MISP), the user interface of the X-Road. The universal portal is an improvement of the X-Road portals, which enables to develop other special portals similar to the Business Portal. The software of the portal was developed and launched on the basis of the X-Road queries made through the portals of family physicians, specialist doctors and pharmacists.

These portals were to function together with the various components of eHealth software application. However, during the launch of the portals it appeared that the security level of the universal portal of the X-Road should be increased owing to the specifics and strict security requirements of eHealth. To this end, various developments were carried out in accordance with the ISKE[30] standard. In other words, the integrity level of MISP had to be raised by one level (from T2 to T3). This application might be useful also for other user groups, for instance the divisions of the Ministry of Internal Affairs or the Ministry of Defence, where the security requirements are higher. The application includes an improved version of maintaining the logs created in the administration of user rights. It is based on the standard technology used for maintaining the logs of the X-Road security servers and processing the security chain of these logs.

Various developments were carried out in accordance with the ISKE standard

Testing of SAWSDL in the X-Road environment

The completion and implementation of the new version of RIHA raised a question how to connect the web services and their semantic descriptions. For the description of web services the X-Road uses the WSDL (Web Services Description Language) standard recommended by W3C (World Wide Web Consortium). WSDL itself does not include semantic descriptions. Neither does SAWSDL (Semantic Annotations for WSDL) include any language tools for the presentation of semantic models (ontologies). Instead, SAWSDL proposes mechanisms for making references to the concepts of the semantic model, which are defined either inside or outside the WSDL document, from within the components of WSDL.

For instance, the reference to the element of personal ID code (isikukood) in the WSDL description looks like the following:
<element name="isikukood" sawsdl:modelReference="http://www.aktors.ee/support/x-tee/test#isikukood" type="string">. In other words, the element of personal ID code in the service description is related to the semantic description (ontology) of the personal ID code (in OWL language).

Since the X-Road project developers lacked experience in using SAWSDL, a test database and test services were developed in order to use that standard. The test results were positive, showing that SAWSDL can be applied in the X-Road environment and that all the X-Road components could process the service descriptions made in SAWSDL without errors. The above-described solution enables to gather the OWL ontologies to RIHA and link service descriptions to them.

According to the test results, SAWSDL can be applied in the X-Road environment

Audit of the data traffic in the X-Road

Over the seven years of operation, around ten audits have been performed to the X-Road. After the cyber attacks against Estonia in 2007, another audit was planned for the X-Road to minimise potential future risks.

The audit focused on the data traffic of the X-Road and it was carried out by Finnish companies Clarified Networks OY and Codenomicon Ltd. As the X-Road is used in almost every institution were there is public sector data traffic, the focus of the audit was actually expanded from the data traffic of the X-Road to the entire data traffic managed by the

30 ISKE is a three-level baseline protection system for information systems, which is aimed at providing sufficient security for the data processed in information systems.

Estonian Informatics Centre. The auditing process included traffic audit as well as robustness testing.

The results of the audit were positive. Around ten errors were identified in the X-Road with only a couple of them being serious; usually, hundreds of small, medium or serious errors are detected in similar cases. Half of the problems were eliminated already in the course of the audit. The audit was complete and profound as in the future, the auditors intend to specialise on auditing applications that are based on the SOAP protocol. Therefore, the SOAP-based X-Road application was of great interest for them.

Development of a new presentation layer of X-Road queries for the State Portal eesti.ee

In the initial phase of the X-Road, a special Citizen Portal was developed, providing the citizen with the opportunity to check what kind of data has been gathered about him or her into databases. Many users, however, were not fond of the portal's laconic and blue design. The design was simple because the screenshot for displaying a reply for every query was created by an automatic replier, not a human being who puts great emphasis on "the bells and whistles", or at least pleasant design. Now, the Citizen Portal has a new design solution, being integrated into the State Portal for further information see article 2.2.1).

Introduction of the X-Road environment at CeBIT and to visiting delegations

The X-Road project has gained wide international recognition. We have promoted the X-Road at the world's biggest ICT exhibition CeBIT in Hannover, Germany, for five years now. Moreover, delegations from around twenty countries have visited the Estonian Informatics Centre to learn from Estonia's experience in connecting public sector databases and developing e-services. We have had visitors from well-known IT countries as well as regions with relatively modest IT potential. Top IT specialists have included a delegation from the Japanese IT Board, the ID card working group from France and representatives from the Lausanne IT training centre, Switzerland. In 2008, the City of Tallinn was granted a prestigious award for the successful introduction of IT. The X-Road was among the various Estonian IT projects introduced to the expert of the award committee from New York by the IT specialists of the City of Tallinn and the Estonian Informatics Centre. In cooperation with the eGovernment Academy, in 2008 the X-Road was also introduced to delegations from Kosovo, Macedonia, Montenegro, Georgia, Azerbaijan and other countries.

X-Road use statistics

The use of the X-Road has been increasing rapidly year-on-year:

2003 – 0.59 million services
2004 – 7.75 million services
2005 – 13.45 million services
2006 – 29.5 million services
2007 – over 43 million services
2008 – over 70 million services

The following diagram shows the use of X-Road services by different information systems. The Estonian Informatics Centre here denotes a number of central state information systems.

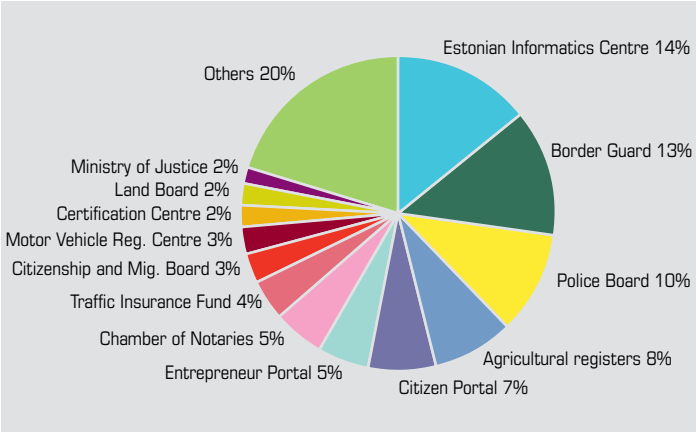

Figure 1. Breakdown of the use of X-Road services by different information systems

Plans for further development

The Estonian Informatics Centre plans to develop the 5th version of the X-Road in 2009. The new improved environment would be based only on the data transfer protocol SOAP, instead of the current two parallel protocols (XML-RPC and SOAP). XML-RPC has become outdated. In addition, the description of services in WSDL, monitoring, the availability of components and the design of the portals will be improved.

2.1.2 Launch of the administration system of the state information system

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The Estonian Informatics Centre is responsible for the co-ordinated development of the state information system. To this end, there are six support systems for the state information system: the data exchange layer X-Road, the system of security measures (ISKE), the geodetic system, the system of address details, the classifications system, and the administration system of the state information system (RIHA).

The administration system of the state information system consists of

- the administration system (RIHA) itself and
- the principles for the administration of the state information system.

The objective of the RIHA is to guarantee the transparency of the administration of the state information system, planning for information administration and supporting the interoperability of databases of the state, local governments and persons in private law performing public duties.

In relation to that, the RIHA has the following strategic objectives:

- To provide a comprehensive picture of the state information system; i.e. an overview of the meta data of all state information systems, administrators and maintainers of information systems, services, service providers and users, classifications and classification administrators/users.
- To contribute to the interoperability of public sector information systems; i.e. the reuse of technical, organisational and semantic resources.
- To provide high-quality data about the state information system, so as to enable the public sector to better perform its tasks, i.e. provide public services to the citizens;
- To provide users with high-quality services based on their needs and the necessary views in the RIHA according to their role or responsibility.
- To serve as a decision-making tool for the state IT co-ordinators, information administrators and the business sector.

Integration of public sector information systems into an interoperable whole

The administration system of the state information system helps organise the development of information systems and integrate public sector information systems into an interoperable whole. The RIHA is turning into the driving force of the state information system, being used as a vehicle for spreading new technologies.

History and present status of RIHA

The RIHA grew out of the state register of databases, which was established in 1997 and gave an overview of the existing X-Road services, the information systems and agencies providing these services, and the descriptions of services. Back then, data was entered centrally into the state register of databases (i.e. not by the agencies administrating the information systems). However, when these data became obsolete, the Estonian Informatics Centre was not informed about it. Consequently, the state register of databases did not give a true picture of the state information system.

In 2006–2008, the first stage of development of the RIHA was implemented, establishing an environment for mapping the state information system.

Currently, the RIHA enables to:

- insert and maintain data related to databases and their services, classifications and the X-Road;
- insert and maintain semantic data (dictionaries of semantic areas, ontologies) and link them to the data of databases and their services.

Data are submitted to the RIHA electronically, using the following processing processes:

- processing of the application for interfacing to the X-Road and implementation of interfacing;
- approval of the documentation of the database;
- changing of the composition of data entered in the RIHA;
- registration of the database;
- approval of a classification and changes thereto;
- establishment of a classification;
- processing of applications for the development and use of databases' services.

The composition of the data required in the course of each processing process is indicated upon entry of data in the RIHA in the environment in which the data are submitted. Data are entered in the RIHA by the owners of data (administrators of databases, semantic resources or classifications). The submitter of data is responsible for the accuracy of information and administration of access rights in the RIHA.

Thus, the first stage of development has produced a so-called environment of catalogue service, which gives a comprehensive picture of the state information system both to the database administrators and the state information system co-ordinators.

Development of RIHA is in line with the changing requirements of the state information system

The RIHA is a "live" information system that develops in line with the changing requirements of the state information system as well as the needs of the RIHA target groups. The development plans for 2009 are based on the feedback received from users during the launch of the RIHA and the changing needs of the system. The development process will also include representatives of the users and target groups of the RIHA. In addition, legislation concerning the RIHA will be revised and updated.

Co-ordination of the RIHA

The RIHA is not merely an information system but also a set of principles for administration. In order to better comply with these principles, a co-ordinating competence centre is needed to give guidance to the administrators/maintainers of databases as well as the users and developers of databases' services.

A number of working groups have been established for the co-ordination of the RIHA.

The operation of the administration system of the state information system is co-ordinated by the RIHA co-ordinators' working group, which includes representatives from the Ministry of Economic Affairs and Communications, the Estonian Informatics Centre, the National Archives, Statistics Estonia and the Data Protection Inspectorate. The working group has met regularly since the beginning of 2008. The group adopts common positions on the administration of the state information system, improvement of the RIHA and, if necessary, also amendment of legislation. Representatives from the Estonian Informatics Centre include an evaluator of RIHA databases, a field manager, a project manager, a product manager and an application administrator. If necessary, also experts are included who advise on the introduction of new technologies, consult users on creating semantic resources, etc. The positions and recommendations of co-ordinators are introduced at the RIHA information days and seminars in local governments. In addition, the RIHA guidelines are regularly updated.

The co-ordination of semantics related to the administration of the state information system lies with the semantics working group, consisting of representatives and experts from the Ministry of Economic Affairs and Communications and the Estonian Informatics Centre. The semantics working group has developed a programme for the semantic interoperability of the state information system, addressing the creation and administration of semantic resources, informing of interested parties, organisation of trainings, and development of the necessary infrastructure. In 2008, the working group also contributed to publishing a special issue on semantics in the A&A journal.

Programme for the semantic interoperability of the state information system

Launch of the RIHA

At the beginning 2008, the revised Public Information Act entered into force. Among other things, this act regulates the establishment and maintenance of databases and information systems. On 8 March 2008 the Government Regulation on the administra-

Public Information Act regulates the establishment and maintenance of databases and information systems

tion system of the state information system entered into force, setting out the rules for collection of data in the RIHA and administration of the state information system. The abovementioned act and regulation served as the basis for defining and implementing the functionality necessary for the processing processes of the RIHA, administration of contact persons and rights, guidelines, systemic notices and help texts, semantic descriptions of services and databases, etc.

The RIHA was launched in May 2008. Beforehand, data from over 170 databases (names, text descriptions, data on interfacing to the X-Road) were transferred from the state register of databases to the RIHA. This did not concern obsolete and unclassified data, such as data of contact persons. The RIHA also included some new functions, such as adding and approving data on classifications, administration of semantic resources and the processing processes of the X-Road.

By the end of 2008 (eight months after RIHA's launch) the owners of databases from more than 100 agencies had started to organise the data in their databases. All in all, data from around 300 databases had been entered in the RIHA and over 200 classifications had been established. Over 50 agencies had used the RIHA to interface to the X-Road.

Data from around 300 databases entered in RIHA by the end of 2008

The Regulation on the administration of the state information system has set 1 July 2009 as the deadline for the description of semantic resources. However, this date appears to be too optimistic. Therefore, an amendment to the regulation is under way to extend the time limit for the semantic description of databases by one year; that is, until 1 July 2010.

Awareness raising and trainings

Changing the way of thinking as well as organising trainings

During the introduction of the RIHA it has appeared that users have difficulties with the implementation of new solutions. It often entails changing the way of thinking as well as organising trainings on the functioning of the state information system, IT interoperability and new technologies applied in the RIHA (machine-readable data descriptions, development of semantic resources).

The Public Information Act significantly increased the number of registered databases and database administrators. For example, it established the requirement to register the databases of local governments and agencies under their administration in the RIHA. Consequently, the principles and new technologies of the RIHA had to be introduced to a relatively large audience, not only IT specialists.

Not only IT specialists but also decision-makers and business sector representatives

It was especially important to make top executives understand that information system administration should include not only IT specialists but also decision-makers and business sector representatives. For instance, in addition to the maintainers of information systems also content experts, lawyers and other specialists should be involved in the development of semantic resources.

In 2008, a number of trainings and information days were organised to introduce the principles of the state information system and the RIHA to different target groups.

The information days held in January and November were targeted at a more general audience and introduced the aspects of the new Public Information Act that concerned databases and protection of personal data as well as the systems supporting the state information system.

In addition, seminars were held in various counties to introduce the issues related to the state information system to the employees of county and local governments. The feedback received from local governments during the seminars will be used for further improvement of the RIHA.

The Estonian Informatics Centre has conducted special RIHA user trainings for ministries and major information system administrators to introduce the requirements to the registration of databases and services, and the processes of the RIHA, and address issues related to the implementation of new tech-

nologies. In addition, trainings on the development of ontologies and semantic description of ontology-based web services have been organised. These trainings have provided information system developers and administrators with basic knowledge of the semantic description of information systems.

The Estonian Informatics Centre plans to continue with trainings and awareness raising in 2009. The benefits are mutual: the RIHA will be developed further on the basis of feedback from the trainings to make the RIHA more user-friendly by taking into consideration the needs of different target groups. The co-ordinators of the RIHA, legislative regulators, major database maintainers/administrators, and local government representatives, on the other hand, are the target groups whose professional help contributes to reorganisation of the administration of the state information system and development of the information system supporting that. In the future, also more efforts will be made to change the attitude of decision-makers.

Further development will be based on feedback from trainings

Is the RIHA complete?

The first year of the RIHA has shown that not everything goes as planned. For example, local governments who have not been widely included in the administration of the state information system, are a specific target group with regard to the RIHA. For instance, they do not have IT or security experts, and many of them use similar software and databases with similar composition of data.
The administration of the state information system requires regular co-ordination. The development of the RIHA as an information system strives towards making the RIHA easily understandable and usable for all users.

In order to achieve the interoperability of state information systems it is important to ensure that the information created in the public sector would be unambiguous throughout the entire state information system. Currently, the development of semantic interoperability is hindered by the fact that contractors, developers and users of information systems have insufficient knowledge of semantics.

The feedback from the launch of the RIHA shows that the data collected in the RIHA can be used more efficiently, if:

- More attention is paid to the needs of different database administrators and the submission of data in the RIHA will be made easier.
- Local governments are integrated in the state information system on the basis of an integral concept, taking into consideration the needs of local governments in developing database descriptions in the RIHA.
- A solution is developed for the description of similar database data in the RIHA (document, financial and personnel management systems; waste management and pet registers, etc.).
- The processing logic and processes of the RIHA are simplified by improving the respective software (co-ordination of databases, submission of documentation to the RIHA).
- Websites are registered in the RIHA in such a manner that would ensure their interoperability in developing an environment for the administration of semantic resources and interfacing that environment to the RIHA.
- New technologies are introduced in the RIHA and information systems, and related trainings are conducted.
- The RIHA is interfaced to the so-called great RIHA: the administration processes of the three-level baseline information security system (ISKE), the monitoring and statistics system of the X-Road, the administration system of semantic resources (SEHKE), and the information technology infrastructure library (ITIL).
- The statistics module is developed for the RIHA, taking into consideration the needs of different user groups.
- Trainings are provided to different user groups of the RIHA, as well as user-friendly manuals and other instructions (interactive instructions, video clips by different areas and processes of the RIHA, a handbook of databases).

Towards making the RIHA easily understandable and usable for all users

These objectives serve as the basis for the improvement of the RIHA in the coming years.

2.1.3 The Document Exchange Centre in 2008: from testing to operation

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The concept of the Document Exchange Centre[31] (DEC) was developed under the State Portal project. By now, the DEC is already in operation as an independent support system. The aim of the DEC is to provide a secure infrastructure for transition to paperless document exchange.

Increased amount of documents exchanged

After years of planning, development and implementation the DEC was finally put to operation in 2008. Th e benefits of that are best seen in the increased amount of documents exchanged: in 2007 around 850 documents were sent via the DEC, and in 2008 as much as 6,400. Along with the increase in the amount of documents also the number of institutions that use the DEC grew, reaching 221 at the end of 2008 (102 at end-2007).

Administration interface was created in 2008

As the DEC is now in actual use, its users need to be informed about the flow of their documents in the central server of the DEC. For that purpose an administration interface was created in 2008, which can be accessed in the State Portal eesti.ee. Document exchangers can use that interface for searching errors as well as for statistical purposes. It enables to perform different kind of inquiries.

In order to launch digital document exchange between institutions, the first common document type – the letter – was taken into use. This is currently the only type of documents processed through the DEC and marks the first step towards paperless document exchange.

31 http://www.ria.ee/28567

The next important milestone is transition to eInvoicing

The cornerstones of eInvoicing are already in place. Namely, the architecture of the DEC was improved by adding gateways that enable to interface the DEC to other (incl. private sector) document exchange environments. With regard to the future this means that the institutions that have joined the DEC will be able to exchange digital invoices and also other documents with most of the private sector institutions.

The National Archive developed an universal archiving module

Besides the exchange of documents between two users the DEC includes the functionality of document exchange between a user and an information system. The National Archive developed an universal archiving module on the basis of that functionality in 2008. The module packages records of archival value, which are stored in the records management system of an institution, into suitable XML capsules and sends them via the DEC to the National Archive.

The performance of the DEC was enhanced last year because of the anticipated large volumes of documents and data processed through the centre. Thus, in the coming years there should not be any functional failures in the DEC resulting from the excessive operation of software or hardware. This is also confirmed by the stress-test carried out in the development phase of the DEC, which did not identify any problems in processing documents even as large as 2 GB. However, it is recommended to split large documents before transferring them through the DEC. In other words, the sender splits the document into several parts of a certain size, which the receiver then pastes into a single document.

The number of users has increased

As the number of users has increased, the number of errors has also inevitably grown. One source of errors is incompliance with XML schemas and transition of defective XML containers. In order to identify such errors, the central server of the DEC provides for the validation of incoming XML containers and informs the sender about possible errors.

In conclusion we may say that the “bone structure” of paperless document exchange is in place, but the “muscles” need further work-out.

2.1.4 Developments of digital archiving and related e-services in 2008

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One of the most important tasks of the National Archives is the full development and launch of the digital archive. The strategy for digital archiving, which was compiled in 2005, set 2010 as the time of completion of the strategy. In July 2008 an application for EU structural funds was filed to develop software for the digital archive, which includes the following stages:

1. development of an information system for receiving documents sent to the digital archive (2009);
2. development of an information system for long-term storage of materials in the digital archive (2010);
3. development of an information system for accessing materials in the digital archive (2011).

Thus, the digital archive may be fully functional in 2011, in case sufficient funding will be provided.

Universal archiving module (UAM) – the first component of the digital archiving software

In 2008 the universal archiving module (UAM) – the first component of the digital archiving software – was completed. UAM is a software designed for archivists for preparing, supplementing and reorganising the sets and descriptions of digital records to be submitted to the National Archives. The institutions that want to use UAM first need to interface their electronic records management systems (ERMS) with UAM to make the export data comply with UAM's XML import format. Digital records along with their descriptions are packaged into XML capsules and sent via the Document Exchange Centre to the digital archive's server in the National Archives. UAM can be used also only for transmitting the descriptions of documents; for instance when the paper documents have been registered in ERMS. This enables to make the descriptions of paper documents available without having to access the archive's information system.

Digital records are sent via the Document Exchange Centre to the digital archive

UAM was developed on the basis of the first version of requirements to archiving digital records compiled by the National Archives. The requirements provide for the separation of digital records and their metadata from ERMSs and their submission to the public archive. After the establishment and testing of UAM the requirements have been revised and improved. The design of UAM was carried out by AS Webmedia.

In parallel with the development also the testing of UAM software was conducted. The testing was carried out under a pilot project on the transmission of digital documents and was based on GoPro Case, the ERMS of the Tartu City Government. Over 660 documents (legislative documents of the City Government dating back to 1990s) were submitted to the National Archives. The National Archives treats these documents as the copies of original records stored in the Tartu City Government. The documents can be used in accordance with the established access restrictions after the originals have been submitted to the Archives.

In 2008 a public procurement was conducted to find a long-term partner that would supply software modules to the digital archive. On 15 September framework contracts were concluded with AS Webmedia, AS Helmes and AS TietoEnator Eesti. Owing to the budget cuts it was not possible to order any software solutions in 2008. Hopefully the first orders can be made in 2009 (the contracts expire in September 2011). Currently, the reception module and the records module of the digital archive are under way.

Joined efforts in the development of the digital archive

On 23 May 2008 the National Archives and the Tallinn City Archives signed a Memorandum of Understanding (MoU) to join efforts in the development of the digital archive. The MoU provides that the Tallinn City Archives will participate in the development of the digital archive of the

National Archives and will be entitled to full access to the archive. The testing will be conducted by the Tallinn City Archives in the Tallinn City Council when the universal archiving module will be interfaced to the electronic records management system Postipoiss.

International cooperation in digital archiving

In 2008 practical work was started under the PROTAGE project[32]. PROTAGE is a research project in the European Commission's Seventh Framework Programme. It is aimed at the research and implementation of agent-based software technologies used in digital preservation. The main partner of the project is the Swedish National Archives. Other partners include the National Archives of Estonia, the Luleå University of Technology (Sweden), software companies EASY Innova (Spain) and Giunti Labs (Italy), the University of Bradford (United Kingdom) and Fraunhofer-Gesellschaft (Germany). The primary task of the Estonian National Archives is to test the software.

Research project PROTAGE

In 2008 the National Archives conducted the surveys necessary for the implementation of the project; compiled the source documents; identified and described the scenarios to be carried out; started the development of the first prototypes and prepared for testing them. The Archives also held two seminars for its partners that are responsible for the evaluation, reception and collection of digital documents and for the records managers of various state agencies. The seminars analysed the needs of the National Archives as well as other institutions in relation to the automation of their daily activities and records management procedures. In addition, the seminar participants identified 11 agent-based software tasks to be completed during the project. The following three tasks are considered as priorities:

Seminars for partners responsible for managing records

- preparation for the submission of digital data to the National Archives – verification of compliance with input data package (IDP) requirements;
- preparation for the submission of digital data – creation of a view for the transmission of IDP;
- preparation for the submission of digital data – creation of IDP.

The first prototypes will be completed at the beginning of 2009 and tested by the National Archives.

Another interesting project initiated by the National Archives at the beginning of 2008 is a wiki-environment called the Archives Ingest Cooperation Wiki[33]. This wiki has been established for European national archives for gathering digital data, learning about the practices of other countries and finding partners for collaboration and standardisation. At present, 18 countries and the European Commission have created a user profile and submitted data to this wiki. Work and cooperation on the improvement and development of the environment will continue in 2009.

Archives Ingest Cooperation Wiki

Development of e-environments

In 2008 the web application software of the archive's virtual research hall was completed. The launch of the virtual research hall will reform the National Archives' web services by drawing them together into a single portal and providing them with additional options (personal databases and linkbooks, an integrated forum, an e-store for the Archive's publications, etc.). Moreover, also the administration of user feedback in the Archives will improve. The virtual research hall will be opened in April 2009.[34]

Archive's virtual research hall

The beginning of 2008 saw the introduction of the Film Archive Information System (FIS)[35], which includes audio and video recordings and film descriptions. The National Archives has also started to develop the Photo Information System, which should be introduced in the first half of 2009.[36] Other available and completed services include the Estonian Historical Archive's collection of digitised maps

32 The name PROTAGE is an acronym for PReservation Organizations using Tools in AGent Environments (http://www.protage.eu).

33 http://www.eha.ee/wiki

34 The virtual research hall will be available at http://www.ra.ee/vau.

35 http://www.filmi.arhiiv.ee/fis (in Estonian only)

36 The Photo Information System will be available at http://www.ra.ee/fotis.

(the Saaga project);[37] the database of land revision materials based on Estonian economic and settlement history in the 18th century;[38] a teaching aid of palaeography for studying old manuscripts[39] and various other smaller applications.

In 2008 the National Archives extended the meaning of Saaga, the web environment of digitised archival sources.[40] The term digital content is no longer used; Saaga now includes both the digitised genealogical sources and all other digitised materials of the National Archives. In order to make Saaga more user-friendly, several improvements were made in 2008: data were updated; the function of a magnifier was added as well as a search option for new archival documents, a search engine, an option to rotate the images and texts in English; the reference system was simplified; the Google Analytics was introduced, and the entire environment was integrated with the virtual research hall.

Saaga, the web environment of digitised archival sources

At the end of 2008, Saaga included 3.2 million images with the total size of 3.1 TB. Soon another 1.7 million digitised images from the Utah Genealogical Society and 81 000 images from the State Archives will be added. One more project under way is the provision of access to the files of digitised address sites of the Tallinn City Archives in Saaga.

At the beginning of 2008, the technical principles for digitisation were developed on the basis international practices and standards. These principles provide the parameters for the digitisation of archival and user copies for different mediums, rules for naming digitised files, and principles for processing digitised files.

37 http://www.eha.ee/kaardidreg/kaardid/kaardid.php (in Estonian only)

38 http://www.eha.ee/adramaad

39 http://www.eha.ee/arhiivikool/index.php?tree_id=90 (in Estonian only)

40 http://www.ra.ee/saaga

2.1.5 Co-ordination of information society development at local level in 2008

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Since 2007, the development of the information society at local level falls under the responsibility of the Ministry of Internal Affairs. The main objective of the ministry is to help local governments in the implementation of various interoperable information systems, facilitating thus, first and foremost, the communication of citizens at local level, which is the primary level of public service provision. Using best practice in the field of information society in local governments increases their administrative capacity and allows to serve citizens faster and with higher quality. Achieving results, however, requires systematic and consistent development and implementation of public services and participatory democracy.

Responsibility of the Ministry of Internal Affairs

So far, the development of the information society in local governments has been based at the initiative of each local government itself and been dependent only on the competence of specific officials and the priorities of local leaders. In order to ensure homogeneous development at local government level, the development of the information society must be co-ordinated so that the creation and use of information systems would be purposeful and based on common principles.

In co-operation with its good partners, the Ministry of Internal Affairs elaborated, in 2008, a development plan called "Information society strategy for local governments 2008-2011" and "Implementation plan 2008-2009 of the information society strategy for local

Information society strategy for local governments 2008-2011

governments". The document sets out objectives for the development of the information society and for improving the availability of public services in local governments.

Aims of the "Information Society Strategy for Local Governments 2008-2011"

1. **Introduction of electronic public administration in all local governments.** Upon accomplishment of the goal, local governments will make use of electronic records management systems, digital signature and digital processing of documents. Documents between agencies will be exchanged through the document exchange centre;
2. **Development of Internet-based tools for the involvement of citizens in the organisation of local life in all local governments.** Upon accomplishment of the goal, information on local governments' websites will be systematic and easy to find for all target groups. Local government websites will allow involving all citizens in local-level decision-making processes;
3. **Ensuring that all local government officials are aware of ICT possibilities.** Upon accomplishment of the goal, local government officials will be motivated and able to use possibilities enabled by the information society in active communication, service provision and obtaining information, while also being aware of potential threats related to the use of ICT;
4. **Development of preconditions for the use of e-services in all local governments.** Upon accomplishment of the goal, public services offered by local governments will be digitalised. In addition, standards will be elaborated for uniform service provision;
5. **Establishment of development organisations for the co-ordination of information society development in counties.** In order to achieve this goal, the Ministry of Internal Affairs has established the position of development manager for information society in eight counties. The development managers have to examine, in co-operation with local governments, county governments and other interest groups (non-governmental organisations, enterprises) the needs of local governments in terms of IT solutions, co-ordinate county-level information society development projects and organise respective information and training activities.

2.1.6 Re-use of public sector information: the focus of 5th information policy forum

Photo: Io Josing

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Information is an important tool, which shapes the development of information society and the use of which depends on the competitiveness of countries and regions. The information collected and stored by the public sector plays a special role in this context. Access to public sector information is necessary not only for democratic participation and control but also for economic gain. The latter aspect was also in the focus of the 5th Information Policy Forum "Public information: to whom does it belong?" held in May 2008 in the Estonian National Library.

Information collected and stored by the public sector

The Forum was organised by the Estonian National Library, the Ministry of Economic Affairs and Communications, the Ministry of Justice and the e-Governance Academy. There were approximately two hundred participants, including representatives from the public, private and third sectors. Among other things, the Forum aimed to establish the impact of the so-called PSI directive[41] on the Estonian information society. The implementation practices of this directive are currently being harmonized by the European Commission. The related activities are co-ordinated by the ePSIplus network[42], whose representative Michal Warzala participated in the Forum to make an overview of the situation in Estonia.

Forum aimed to establish the impact of the PSI directive

The opening remarks of the forum were made by

41 Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information.

42 http://www.epsiplus.net/

the Estonian Regional Minister Siim-Valmar Kiisler. The Minister stressed the importance of ensuring co-ordinated collection of information in the public sector and of the reliability of such information. Information collection should be organised in a reasonable manner; repeated requesting of the same information by different state agencies should be avoided. The Minister expressed hope that putting the re-use of public sector information in the focus contributes to these objectives.

Importance of ensuring co-ordinated collection of information in the public sector

Options for the implementation of the PSI directive

The first session on the legal regulation and implementation options of the re-use of public sector information started with a presentation by Mr Warzala. He introduced the key European standpoints with regard to the re-use of public sector information and gave an overview of the current analysis of the implementation practices of the PSI directive. It appeared that public information issues were raised in Europe already some twenty years ago. However, over ten years passed before that issue was brought to the political agenda. At first, the potential of the re-use of public sector information was realised by people directly engaged in that field, primarily in the geoinformation system (GIS), meteorology or traffic sectors. Normative regulation in the EU started in 2003, on the last day of the year, when the PSI directive entered into force.

Fair, proportionate and non-discriminatory onditions for the re-use of public information

The objective of the directive is to harmonise the conditions governing the re-use of public sector documents in order to ensure fair, proportionate and non-discriminatory conditions for the re-use of such information. All 27 EU Member States have implemented the directive by now, but this is not really the most important aspect. What is important is the outcome, which is why the main focus currently lies on establishing whether the directive has had the desired impact and what should be changed to improve the situation. To find answers to these questions, the ePSIplus thematic network has been established, who analyses these issues and presents the results of analysis to the European Commission. The analysis covers five topics:

- Law and Regulation (incl. implementation of the directive);
- Public Sector Culture (incl. compliance with the directive);
- PSI Re-use Business;
- Financial Impact of the directive: cost and taxation (incl. impact on public expenditure and budget);
- Information Management Standards and Data Quality.

The representative of the ePSIplus invited forum participants to participate in discussion and make proposals on these themes.

Legal framework and practical experience

Later on, moderator Ülle Madise gave the floor to various local experts who analysed the legal framework of and practical experience with public sector information. The procedure for the disclosure of public information was explained by Kaja Puusepp from the Data Protection Inspectorate and Monika Mikiver from the Office of the Chancellor of Justice. In Estonia, this field is regulated by the Public Information Act since 2001, which has clearly made public administration much more transparent. However, as came out in the forum, the Public Information Act has also caused considerable confusion. Namely, the use of terms in their unconventional meaning causes problems: public information is not information which is public, i.e. available to everyone; it is information which is obtained or created upon performance of public duties. Thus, part of public information is not really public, in particular personal data and state secrets.

Use of terms in their unconventional meaning causes problems

Journalist Tarmo Vahter illustrated the situation and described the difficulties in accessing archived information. The Archives Act restricts access to the personal data of the deceased without the consent of the deceased's relatives or successors for thirty years as of the death of that person. In fact, this is a matter of political judgment where to draw a reasonable line between public and private interests. The discussion revealed also another problem – the incompetence of officials regarding the

PSI has increased the efficiency of public administration

Principles of personal data protection

implementation of the Public Information Act. The principles of personal data protection have been valid without any changes for already 12 years, but people still cannot distinguish fully restricted access from the right to use personal data with the consent of that person. Usually, it is assumed that the obligation to obtain the consent of the data subject means that the data are classified. There was also a heated debate on the ethics of trading personal information as well as over the use of personal data obtained from national or local government databases for commercial purposes (e.g. for identifying target groups in advertising or for direct mailing).

Obviously, there are examples of proper use of public information too. One of them is the Digital Archives, which was presented by Kairi Felt from the National Library. The information stored in the Digital Archives is accessible also via Google. The presentation was followed by a discussion where IT expert Peeter Marvet talked about the possibilities of expanding the Digital Archive as a service, in case more Estonian authors will start publishing their works in line with the principles of creative commons[43].

No legal barriers to accomplishing the objectives of the PSI directive

All in all, it can be said that there are no legal impediments to accomplishing the objectives of the European directive on the re-use of public sector information. However, the achievement of these objectives largely depends on the amount of new information which has been developed for taxpayers' money and made available. The discussions held in the first session revealed several issues that deserve further attention from legislative as well as executive authorities. Access to personal information and conditions of use of such data for commercial purposes are among the most important issues. Trainings to public servants are also necessary to ensure that information services are oriented to citizens and comply with various regulative principles.

Public sector e-services

The second session of the forum addressed the role of public sector e-services in the re-use of public information. The session was moderated by Arvo Ott from the e-Governance Academy, who pointed out that private sector interests are an important driving force for the use of national information resources. Margus Püüa, Head of the Department of State Information Systems, Ministry of Economic Affairs and Communications, explained how to obtain access to public sector information. First, public sector information should be made digital and machine-processable, while bearing in mind the need for a transparent and solid legal framework so as to protect the safety of people. Every entry of data entails a certain administrative operation and procedure, which are fixed by the data system. The person whose data are processed must have the opportunity to identify who and why has done that. Use of data for commercial purposes enables to develop new e-services with added value for different target groups. The basic infrastructure for re-use of public sector information is already available in Estonia. Now the old technologies and thinking paradigms need to be eliminated.

Public sector information should be made digital and machine-processable

Use of data for commercial purposes enables to develop new e-services

Old technologies and thinking paradigms need to be eliminated

Commercial use of public information is largely determined by the conditions of access to information. The latter were analysed by Martti Mandel from the Public Administration Department, Ministry of Financial Affairs. Pursuant to the PSI directive, public information should be easily accessible within a reasonable time, for reasonable charges and under conditions known to all potential users. Reasonable charges should not exceed the total costs of collecting, producing, reproducing and disseminating documents, together with a reasonable return on investment, having due regard to the self-financing requirements of the public sector body concerned. The directive also encourages public sector bodies to make documents available at charges that do not exceed the marginal costs for reproducing and disseminating the documents.

Apparently, databases should be service-based and more user-oriented in the future. This objective has been laid down in the "Estonian Information Society Development Plan 2013"44, and the harmo-

43 A licensing system allowing authors to communicate which rights they reserve or waive for the benefit of recipients or other creators.

44 http://www.riso.ee/en/information-policy/policy-document/Estonian_Information_Society_Strategy_2013

Many different practices to charging use of data.

nization and integration of databases via the data exchange layer X-Road is just the right step in that direction. When it comes to charging use of data, there are many different practices. Data are disclosed for charge as well as for free of charge, whereas service-based registers are mostly charged. According to an analysis, the charges for queries of the most popular registers are in line with the PSI directive; i.e. the charges do not exceed the costs for reproducing and disseminating register data. State fees charged upon the release of documents and register entries are usually also reasonable. In conclusion, the Estonian legislation is generally in compliance with the requirements laid down in the PSI directive.

Tuulikki Sillajõe, Deputy Director-General of Statistics Estonia, made a presentation on the principles for collection and dissemination of statistical data and the responsibilities of Statistics Estonia in relation to providing data services. The principles for producing statistics include impartiality, reliability, cost-effectiveness, confidentiality and transparency. The objective of Statistics Estonia is to offer a reliable and objective information service to state agencies, business and research companies, international organisations and individuals on the current situation and development trends of the Estonian environment, population, social sphere and economy. Statistics Estonia provides services free of charge as well as for a charge (the latter include contracted surveys). Statistics is primarily used for analysing the present conjuncture and for decision-making; the use of statistics has been constantly increasing over the years. In the future, electronic collection, presentation and dissemination of data is expected to expand even further.

Principles for collection and dissemination of statistical data

Veiko Meos, Head of Krediidiinfo AS, gave an overview of developments regarding the use of public information in the private sector. Clearly, every entrepreneur needs reliable information to make economic decisions. Such information is essential, since many of the relations in the private sector are based on credit. Krediidiinfo AS has developed such a service, on the basis of data from different databases. The presenter stressed that development of new services now rather relies on access to public databases through a web interface, and not so much surfing the Internet. For an entrepreneur "relatively fast" often means that information is needed in real time. The Commercial Register is a good example in this context – it enables to interface public and private sector information systems and is very functional. In the future, the same should apply to all registers and databases. Commercial information related to individuals, however, requires clear instructions as to what kind of information may be disclosed and what not.

The second session concluded with a discussion where it was pointed out that besides providing access to information the public sector should also promote it more actively. The synergy that arises from public and private sector cooperation contributes to turning national information assets into resources for development.

Re-use of land information

The third session addressed the current situation and developments related to re-use of land information from the viewpoint of both the public and private sectors. The session was moderated by Kalle Arula, Deputy Head of the Estonian Informatics Centre. The first presentation was made by Kristian Teiter, Head of the Geoinformatics Department of the Land Board, who introduced the opportunities of re-using land information. For instance, the base maps are available free of charge. The Land Board also provides free access to 16 different map applications. Thus, it can be said that the Estonian Land Board is one of the most liberal mapping agencies in Europe.

Base maps are available free of charge

Apart from the public sector, frequent users of free map applications include major infrastructure companies, real estate and design companies, universities and other organisations interested in land information. Pursuant to the PSI directive, there is also a separate group of users in that context: those who re-use land information to create added value and bring new services to the market. Even though this user group complies with the requirements of the PSI directive, there is still room for development. First of all, conditions governing the re-use of public information need to be harmonised, as the current situation in this field is somewhat chaotic.

Conditions governing the re-use of public information need to be harmonised

Regulation of that field is scattered in different laws and there are no common principles for imposing charges on the re-use of information. Some charges on the right to use certain land information are too high for consumers and need to be adjusted. Moreover, the re-use of land information should be further simplified. Raising general awareness of the availability of land information deserves more attention too.

In conclusion, technological developments and the free international map service (Google Earth) has put an end to the "peaceful existence" of map organisations. Although Estonia has every reason to be satisfied with its situation in that field, there is always room to do better. At the same time, the development needs of information producers should be borne in mind, as the production of timely, reliable and complete land information is costly.

The next presentation was made by Ulvi Ingver, Deputy Head of the Tallinn City Planning Department, on the city's geoinformation data and re-use of it. Tallinn has several databases that contain lots of land information and that need to be integrated into a single register – the Spatial Data Register. The objective is to develop a new advanced information system, which would link different information systems and users, and provide central administration of spatial data and exchange of data, using standard data exchange protocols. As regards charging the re-use of information, there are currently two different approaches: 1) free re-use of data, and 2) establishing charges for release of data to cover data acquisition costs at the least. The speaker stressed that at this point, there are no legal impediments to local governments as regards obtaining economic or other gains for the use of data that is created as a by-product of public administration.

It is necessary to agree on the standards for storing data

The private sector views on the re-use of land information were analysed by Toomas Talts, Head of the Information Systems Department of AS Regio, who talked about the costliness of restricting the dissemination of geoinformation. His statements were rather critical, as also expressed by the topic of the presentation. The state information system is technically complex and it takes a lot of time and effort to obtain data. Instead of harmonising software, it is necessary to agree on the standards for storing data, such as OPEN-GIS. Compliance with the PSI directive might well be true, but this is elementary and much more work should be done in this field.

Importance of data accuracy

The session concluded with a discussion on how land information could create more added value. Andrus Altrov from Medibus IT OÜ emphasised the importance of data accuracy. The main problem lies with the link between location and address or, in other words, accuracy of address details. These data should be interfaced to the information systems of companies, and a reasonable charge would be appropriate. More activity is expected from the Land Board with regard to reorganising the system of address details. A heated debate followed, raising several important issues regarding public information: the state policy regarding charging the re-use of information; double data collection by different state agencies; ensuring of data correctness, etc. To sum up, the private sector expects the state to better promote the re-use of public sector information and avoid competition with the private sector in providing new e-services.

Private sector expects the state to better promote the re-use of public sector information

Rapporteur's view

The forum was concluded by Jüri Adams, former parliament member and minister of justice, who stated that it would be expedient to treat the commercial use of public sector information separately from the traditional use of information by everyone To this end, the Public Information Act should be amended by adding a chapter that would lay down general rules on the commercial use of data. The institution of person *making request for information* as set out in the current Act is not suitable for obtaining data for commercial purposes, as it is primarily aimed at ensuring transparency of public authorities. Concrete relations between the submitter and receiver of data should be regulated with agreements, which should also lay down the methods and procedure for submission of data. These practices are already in place in Estonia and need to be harmonised. The Ministry of Justice could, for

instance, develop a sample contract. Use of data for zero charge on the basis of a contract is far better than use without contract. The state could use the issue of the amount of charges as a policy tool for supporting enterprise.

The organising committee of the forum also drew its own conclusions after the forum to submit all the ideas and proposals to relevant ministers.

Conclusions of the forum

The preparations for and sessions of the forum allow to conclude that the PSI directive has not been fully acknowledged in Estonia. None of the Estonian legislation includes references to that directive and the re-use of public sector information in Estonia actually draws on the Public Information Act, which entered into force in 2001. Although this act provided broader access to public sector information, it does not directly aim at re-using public information for commercial purposes, as laid down in the PSI directive, but at general democratic values. Minimum requirements to the re-use of public information have been transposed into the Estonian legislation, but several problems have been identified that require the attention of public authorities.

Estonian PSI-related legislation targets general democratic values rather than the use of PSI for commercial purposes

The use of public information for commercial purposes often requires fast and extensive data exchange. However, the tools provided by the Public Information Act – publication of information on websites and request of information – are often insufficient for that. There has been a need for operative data exchange between public sector information systems, which requires clear principles. Different databases (e.g. the Commercial Register, the Land Cadastre) have developed different practices in relation to what should be analysed and harmonised, giving consideration to organising the re-use of public information on the basis of licence contracts as recommended by the PSI directive. Amendments to the Public Information Act could be considered to clearly outline the specifics of using information for commercial purposes.

The bases for charging release of public information are way behind time: pursuant to the Public Information Act, information must be released on paper and only after the person requesting information has paid the state fee. Moreover, it is not clear whether the charges for release of information from databases that have been established by specific laws always follow the principle of not exceeding the direct costs of releasing information, as laid down by the Public Information Act. This field is definitely subject to further analysis.

The re-use of public sector information is complicated by the fact that the system is largely oriented to end-users and participants in the process of public sector data acquisition. Information service providers, however, are interested in integrating different data to develop new e-services. To do that, data must be in a form that allows using the data by different information systems. The forum revealed that the re-use of geoinformation requires special attention and closer cooperation between the public and private sectors.

Data must be in a form that allows using the data by different information systems

There are still problems related to access to public sector information that contains personal data. Although the Personal Data Protection Act has set out clear principles for that, the act has often been misinterpreted. Among other things, this complicates the work of investigating journalists. Restricted access to the personal data of the deceased for thirty years, as laid down by the Archives Act, has turned out to be a serious obstacle to defining the past and the presence of the information society. The forum caused a heated discussion over trading personal information and the use of personal data obtained from national or local government databases for commercial purposes. Obviously, this field requires greater legal clarity and common understanding on where to draw the line at allowing the use of personal data for commercial purposes.

The forum also drew attention to the availability and quality of public information. Government agencies are obliged to document and disclose the information in their field of responsibility in the administration system of the state information system (RIHA). Neverthe-

Availability and quality of public information

less, it is still difficult to obtain necessary data. It is vital for the re-use of public information to increase the reliability and quality of data. In this context, consideration should be given to re-use on the basis of contracts and to establishing firm standards for the quality of data.

Another obstacle pointed out in the forum was the word-for-word translation of the English term re-use, which apparently creates a lot of confusion and misunderstanding, since it does not reveal the essence of the matter. Therefore, the Estonian term should be reconsidered.

To sum up, the forum proved that the use of public sector information is a field that deserves further attention, from the Estonian Informatics Council, for instance, but also from all agencies responsible for administration of public information.

2.1.7 Information society in training programmes for civil servants

Information society was included in ATAK's[45] training programme for central and local government officials already in 2003 with the introduction of electronic public administration as a training area. As a training centre for civil servants, ATAK has organised continuous training for records managers, IT specialists as well as heads of institutions.

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Mentoring programme for new civil servants

Due to the t opicality of the area, information society related issues were included also in the mentoring programme for new civil servants. Four academic hours are dedicated to the topic, of which two hours are devoted to the analysis of the information society and the state information system in general and two hours are focused on the electronic public administration and records management. Each year, nearly 200 new officials undergo the training and so far, feedback has been predominantly positive. Information society is considered a necessary topic, as all officials use ICTs in their work and need to adapt to ever-increasing information volumes and work-environment requiring new knowledge and skills. According to the feedback, training participants have received new ideas for improving

Training participants have received new ideas for improving the organisation of their work

45 ATAK – Centre for Public Service Training and Development, www.atak.ee

the organisation of their work. In addition, they have pointed out that information society is an interesting and useful topic not only in the work context, but also in terms of being a member of the modern society in the wider sense.

The following is a brief comparison of the outcomes of a survey on the use of public e-services among Estonian inhabitants conducted by Saar Poll at the end of 2008[46] and an analysis of those having participated in the mentoring programme. The results of the comparison reveal that the most popular state portals among Estonians aged 15-74 both in terms of awareness and usage are the State Portal[47] and electronic State Gazette[48]. At the same time, participants of the civil servant training had used the State Gazette (91%) most and half of them had also used the State Portal. Awareness of the participation portal[49], however, was considerably higher among training participants with 47% of civil servants being aware of it, compared to 14% of the general public in the age group 15-74.

Task of officials to inform service consumers of ervices provided by the state

In the framework of the Saar Poll survey, people having used the State Portal were asked, whether they were aware of the possibility to use the portal not only for obtaining information, but also for the use of various e-services. The results of the survey revealed that 87% of State Portal users are aware of the portal's e-services. 35% of civil servants were not aware of the possibility to use e-services in the State Portal before the training course. As it is the task of officials to inform service consumers (i.e. citizens, entrepreneurs) of services provided by the state, it is vital that civil servants themselves are well aware of relevant developments.

According to the e-track survey conducted by TNS Emor in autumn 2008, 83% of Estonian inhabitants aged 15 -74 possess the ID card. 17% of card holders have used the ID card for authentication in the electronic environment and 6% of them for giving digital signature[50]. The respective numbers for civil servants were considerably higher. 53% of officials having participated in the training had used the ID card for electronic authentication (true, a number of respondents also reported having used Internet banking codes) and 42% of them had used the card for giving digital signature.

Mentoring programme for new local government officials

In 2007, mentoring programme for new local government officials, too, included a course on the information society, the state information system and electronic public administration. In 2008, however, the programme was shortened and the topic of information society was dropped. In some ways, the relevance of information society as a training area is higher for local government officials than for their counterparts in the central government, as most public services are provided at the local level. Besides, those having participated in the training for rural municipality and city secretaries have noted that it is not only themselves, but all local government officials, who need to improve their skills related to ICT and electronic public administration.

Training for rural municipality and city secretaries

Objective is to give instructions and share experience for increased uptake of ICT

In the last two years, ATAK has organised information society training for rural municipality and city secretaries. The objective of the training is to give instructions and share experience for increased uptake of ICT in the provision of public services, digitalisation of public administration and increasing the efficiency of in-house organisation of work.

Fifty rural municipality and city secretaries attended the training in autumn 2007. In 2008, focus was set on local governments of smaller parishes, where resources are more limited both in terms of personnel and funding. In 2008, 26 rural municipality and city secretaries in smaller parishes were trained.

The volume and content of the training programmes of 2007 and 2008 were practically identical. The objective of the 52-hour programme was to advise

46 http://www.riso.ee/et/infoyhiskond/uuringud/kodanike_rahulolu_2008 (in Estonian)

47 http://www.eesti.ee

48 http://www.riigiteataja.ee (only in Estonian)

49 http://www.osale.ee

50 http://www.riso.ee/et/infoyhiskond/statistika

rural municipality and city secretaries on the implementation of information society policy, introduce the principles of the state information system and provide them with necessary know-how for negotiations with IT specialists. As rural municipality and city secretaries are responsible for developing their offices and ensuring fast and smooth records management, the training programme aimed at increasing their competence in these areas.

Lectures on different areas

The training programme includes lectures on a number of areas: characteristics and objectives of the information society; essence and components of the state information system; requirements for public sector websites; data protection; ID card and its functions; eDemocracy; electronic public administration; paperless records management; digital archiving etc. Throughout the years, lectures have been delivered by experts from the State Chancellery, Ministry of Economic Affairs and Communications, Tallinn City Government, eGovernance Academy, Tallinn Technical University, etc.

Discussions, brainstorming, debates

The training programme does not only consist of lectures, but also includes discussions and brainstorming. The debates held in the framework of training for rural municipality and city secretaries revealed the following challenges:

- There is no competence centre where one could receive IT related support.
- Co-ordination needs to be increased between parishes and towns so as to avoid waste of financial and human resources by developing IT solutions separately (e.g. requirements for websites).
- The survey carried out during the training programme of 2008 revealed that only a few parish development plans contain an IT component. Moreover, 84% of parishes lack an IT development plan.
- Training participants consider appropriate training the most relevant factor in the transition of paperless public administration.

By now, the Ministry of Interior has begun to tackle several of the above-mentioned problems. Outcomes of the surveys carried out during the training programmes of 2007 and 2008, too, showed that co-operation between different parties dealing with IT related matters has improved.

Lack of clear understanding and guidelines

In addition, survey results revealed that local governments consider digitisation of their administration and provision of e-services necessary. To a certain extent, the process is ongoing in most local governments. However, there is lack of clear understanding and guidelines on how to do that. The situation is further complicated by scantiness of resources and shortage of competent personnel.

Mindset and motivation of civil servants should be changed

In the „Information Society Strategy 2007-2013“ a goal has been set to ensure paperless management of public administration by 2011. In this context, the main problem brought out by the secretaries was that it will take time for civil servants to realise that transition to electronic administration also requires change in working habits (in 2008, this was considered the largest problem by 91% respondents). Thorough training through which the mindset and motivation of civil servants could be changed was brought out as a solution.

Both in 2007 and 2008, the organisers of the programme noticed a significant change of attitude in the course of the training for rural municipality and city secretaries. While in the beginning, one could sense some reserve towards the topic of information society, by the end of the training secretaries had become fully aware of the importance of their role in the implementation of ICT for increasing the efficiency of work processes.

Other ATAK's training courses

ATAK has organised also other information society related trainings courses. In 2007, the centre carried out a training programme developed by the Estonian Informatics Centre (RIA) with an aim to give practical instructions on the implementation of the three-level baseline protection system for security systems ISKE[51]. The training was targeted at IT managers, information security managers, specialists and system administrators. In two years, 77 people underwent the training.

In co-operation between RIA and ATAK, trainings on semantic assets were carried out in 2008. The

51 See ch. 4.1

Trainings on semantic assets

training, funded by EU Structural Funds, was directed at developers of information systems both from the public and private sector. The training focussed on the compilation on ontologies and semantic description of ontology-based web services. Participants were given an overview of the semantic interoperability of information systems as well as skills for the practical realisation thereof.

At the request of administrative agencies, ATAK has also organised in-house trainings on the use of the ID-card.

So far, ATAK training programmes have been based on actual needs. However, this process should be slightly more systematic and regular. Both local government leaders and IT specialists need more training in order to keep up with the topical areas and state-level developments in the field of information society. The training courses would help to increase the quality of public service, improve the administrative capacity of rural areas and, thus, increase the satisfaction of rural and city people with public services provided by local governments. Future plans include several projects for increasing the ICT competence of civil servants, including training as one of the components.

2.1.8 E-state charter

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In autumn 2007, the National Audit Office of Estonia completed an audit "Quality of Public Services in the Information Society". The audit revealed that even though large investments have been made in the development of the national ID card and related technological environment, creation of databases, and ensuring the availability of the Internet, people still have to run between different agencies in order to receive public services.

Audit "Quality of Public Services in the Information Society"

Thus, the National Audit Office decided to elaborate, in co-operation with experts and opinion leaders from universities, non-governmental organisations, media, ministries, the Office of the Chancellor of Justice, and the State Chancellery, certain principles and criteria for good administration. In other words, they decided to develop an eState Charter. The charter allows to evaluate, whether administrative agencies take into account, in their work, the interest and welfare of citizens. In addition, the document enables state agencies to assess whether their work is practical, making rational use of the possibilities of ICT. These principles and evaluation criteria or, in other words, a vision on how all this should be organised in accordance with legislation and judicial practice, were put down in a way providing citizens information about their rights and state agencies about their obligations. Need for such a document is supported by the fact that during the second half of 2008 the charter was read in the participation portal more than 13,000 times. This number has kept the charter in the top for months.

eState Charter – principles of good administration

Principles for the provision of e-services

The eState Charter[52] enlists and describes ten good

52 http://www.ega.ee/files/e-harta_english.pdf

Rules that should be taken into consideration in the provision of e-services

administration rules that should be taken into consideration in the provision of e-services. Below presented is a brief overview of the document.

In today's Estonia, everyone should be able to choose how they communicate with administrative agencies. Public services should be provided through all communication channels: service bureaus, post, phone, Internet (including e-mail). For instance, if an individual has submitted a request for information by e-mail, an administrative agency should respond to that in the same form within five working days. If the requested information exists in the electronic form, it should be sent by e-mail.

Every administrative agency must be able to receive and process digitally signed documents

When applying for public services and communicating with administrative agencies it should be possible to identify oneself with the ID card. Since having the ID card has been made mandatory by the state, citizens have the right to use it in their communication with administrative agencies. Every administrative agency must be able to receive and process digitally signed documents.

One of the basic principles of the providers of public e-services should be the publication of relevant and up-to-date information on people's rights and obligations on the websites of administrative agencies. The right to obtain information also means that people can find the information they are looking for easily on the websites of administrative agencies without having to waste their time on the web in vain.

Burdening citizens with unreasonable demands has to be avoided

Burdening citizens with unreasonable demands has to be avoided. For instance, application forms on the websites of administrative agencies should be in a format allowing users to save the completed forms on their computers and then send them electronically. This should be possible without users having to install any software. Web forms pre-filled on the basis of data held in state registers should be used as much as possible in order to allow for presentation of the data already known to the state on the application form. Everyone has the right to receive information about the progress made in processing their requests. Upon applying for a service, people should receive an accurate overview of the course and deadline of the service provision. The ID card allows to monitor the progress of processing one's application also through the Internet.

Everyone has the right to know, what personal data an administrative agency has collected about them. In addition, everyone should have the possibility to see and use such data. The State Portal53 already allows people to check data maintained in databases about them. However, it is not yet possible to see, which agency, when and why has used someone's data.

Administrative agencies must ensure that personal data are securely processed

In addition to informing individuals about personal data collected about them and the purposes these data are used, administrative agencies must ensure that personal data are securely processed and that e-documents are safely preserved. Logs are to be kept of all enquiries made to databases that contain personal data and it is consistently checked whether such inquiries are justified.

People always have the right to express their opinion on the quality of services to service providers. Administrative agencies should consistently monitor the quality of public services, and involve users of public services as a source of feedback. People's feedback on the provision of services should be an integrated part of the process irrespective of whether it is an e-service or a traditional one.

Administrative agencies should provide, at their own initiative, citizens with relevant information either to an agreed contact address or the official e-mail address @eesti.ee. Once citizens have activated their @eesti.ee address, they should be able to receive information on the initiation of construction plans, reminders on the expiration of the European health insurance cards, statements of holdings from the Pension Centre and any other information necessary for them in order to communicate with administrative agencies and execute their rights. At the same time, citizens must have the right to opt

53 http://www.eesti.ee

Inclusion of citizens in decision-making processes

out from receiving further notices. Everyone has the right to participate in decision-making processes concerning themselves and the society as a whole. Central and local government agencies should promote the inclusion of citizens in decision-making processes, ensure that they are informed in a timely manner and develop an environment for people, where they can express their opinion.

Future of the eState Charter

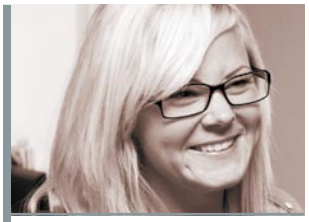
The National Audit Office wishes to use the principles and evaluation criteria set out in the eState Charter in the organisation of its future audits assessing the quality of public services. It also plans to recognise public services that proceed from the principles of the charter and their developers. To this end, a quality mark „Wow, great e-service!“ will be awarded annually. This mark published on the website of a central or local government agency will serve as a sign of good and legitimate treatment respecting the citizen. Work on the elaboration of the recognition scheme is ongoing.

Quality mark „Wow, great e-service!“

The National Audit Office hopes that administrative agencies take the charter as a basis for the development and provision of e-services as well as for the evaluation of their quality.

2.2 Provision of user-friendly public services

2.2.1 Development of state central portals and related implementation services in 2008



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As an outcome of three years of development work, the largest and most important portal aggregating public sector information and e-services – State Portal eesti.ee[54] – has been realised. The State Portal is an architectural component of the state information system, which makes public information and public e-services available through a central user environment.

Environment aggregating public sector information and e-services for end users

The development of the State Portal was launched in 2005 and the project was funded by EU Structural Funds under the measure 4.5 "Development of the Information Society". At that time state portals still lacked common visual identity and information and services available were scattered. As an outcome of the project, an environment aggregating public sector information and e-services for end users and serving as an infrastructure for the provision of e-services for service providers was completed in 2008. A side product of the State Portal project is a document exchange centre, which by today has evolved into a separate secure nationwide infrastructure for document exchange.

The portal has several components ensuring interoperability – information content can be managed through the X-Road, the portal enables to subscribe to RSS feeds or to obtain information through a special XML format designed for the exchange of content. Other information systems can use the content of the eesti.ee portal in the similar manner. In terms of presentation layer, the portal supports the WSRP (*Web Services for Remote Portlets*) standard[55].

User environment of the State Portal

In order to ensure the presentation of public sector information to end users in common information architecture, information content and services have been integrated to the State Portal's user environment from several central state portals (eGovernment portal riik.ee, X-Road portal, information portal of the eCitizen portal and citizen portal of the eCitizen portal). Citizens no longer need to find out, which administrative agency deals with a specific question, but find links to the information and services they need in one and the same place.

Information content and services have been integrated from several central state portals

The user environment is divided into different views. The front page view is directed at the general public. It gives an overview of the portal and aggregates general information and news of state agencies. The citizen view[56] contains information and services aimed at citizens. In the context of the State Portal, the term "citizen" goes beyond its traditional meaning of the citizen of the Republic of Estonia, meaning an individual in the wider sense. Thus, the term also includes non-citizens and foreigners with an interest to participate in the social life of Estonia. The entrepreneur view[57] contains links and services for companies, non-profit

User environment is divided into different views

54 http://www.eesti.ee

55 WSRP is a specification which defines a web service interface for interacting with presentation-oriented web services.

56 http://www.eesti.ee/eng/citizen

57 http://www.eesti.ee/eng/business

organisations, foundations and their employees. The civil servant view[58] comprises information and services for central and local government officials, legal persons in public law and their permanent as well as temporary employees. The view also includes administrative tools for services aimed at citizens and businesses.

Information content of the portal

Articles in Estonian, Russian and English

By the end of 2008, the portal contained 1,500 links and more than 2,000 articles in Estonian, Russian and English, where one can obtain guidelines for many life events and find references to legislation, administrative agencies and e-services.

In the context of updating the information content, one of the most important activities in 2008 was the integration of the institutional view of the eGovernment portal riik.ee with the State Portal. In addition, coherence of the State Portal was improved by increasing the number of cross-references between information and service areas. The creation of cross-references and topical associations in the portal was vital in order to ensure that citizens would be able to find necessary information by using different behavioural logic. Course has been taken to gradually move towards active involvement of responsible agencies in the generation of content. The portal enables to delegate the content management of each topic to a respective specialist. In this context, the activeness of the State Chancellery in developing civil society can be brought out as a good example. Consultations launched in the participation portal osale.ee will be available through the RSS feed also for the readers of the State Portal.

Service area of the portal

Over 100 public e-services have been aggregated to the State Portal's service area

Over 100 public e-services have been aggregated to the State Portal's service area. For instance, citizens can send their notices of residence, submit applications to the police and forward electronic forms. In addition, there are a number of support services, such as linkbook, official e-mail address etc. Of services targeted at citizens, the digital signature application was updated in 2008. Several already existing applications were given additional functionality and made multilingual, as a result of which the volume of the Russian-language part of the portal increased both in terms of information content and services.

Functionalities for making enquiries, displaying the results

At the end of 2008, the enquiry portal of the middleware X-Road was consolidated with the State Portal. The presentation layer for enquiries in the eesti.ee portal includes the possibilities of the former X-Road enquiry portal: functionalities for making enquiries, displaying the results and administrating the system. However, new functionalities, such as search for services, topic-based browsing and filtration have also been added. In addition, possibilities for the visualisation and presentation of enquiry results have been extended. It is now possible to save the results of an enquiry in the .pdf format or send an encrypted version of it, signed by the portal, to an agreed e-mail address. Furthermore, the portal now allows appointment of representatives, meaning that a user can authorise another person to perform enquiries and provide paid services.

As a significant qualitative improvement, XForms format has been adopted for the automatic generation of web interfaces. This allows to increase the flexibility of developing complex services and to manage the design and behavioural model of the user interface. Each agency can now determine the design and behavioural model of its services.

Information system for the management of Structural Funds

In the field of services for businesses and officials, an information system for the management of Structural Funds (SF) was developed in 2008. The system facilitates the applying for funding for information society development projects from the EU Structural Funds, processing of applications as well as managing respective reporting. During the current budgetary period, the circle of eligible applicants within the information society priority is considerably wider than during the last period, as central and local government agencies, non-profit organisations and foundations, too, can now apply for SF funding. The information system is expected to facilitate the application process.

58 http://www.eesti.ee/eng/official

Administration tool for the document exchange centre

For officials, an administration tool for the document exchange centre (DVK) was developed, allowing DVK administrators to easily draw up different reports and, if necessary, access documents sent to their agencies. In practice, the administration tool has been taken into active use also by document management software developers, who use it for the localisation of errors in the testing process.

Usage statistics

In 2008, the State Portal was visited by more than 600,000 people, of which half were regular users. In terms of visits, the peak was reached on 17 June 2008 – the day of publishing the results of state exams – when the portal was visited by nearly 14,000 young people.

Number of daily users accounts to approximately 4,000

Compared to autumn 2007, when the portal was launched, the number of its visitors has doubled. While earlier, the portal was visited by, on average, 1,800 people per day, the number of daily users accounts to approximately 4,000 now.

The most popular pages of the portal include the front page of the citizen view, e-services of the Population Register, e-services of the Police, e-forms, and the information system for work plans that has been developed for officials. For instance, the page for queries on name statistics[59] under the e-services of the Population Register was visited more than 145,000 times in 2008. Of e-services provided by the Police, viewing misdemeanour data was the most frequently used service. There were over 10,000 statements, forms or applications submitted through the e-forms solution. Public sector websites, too, are actively visited.

Infrastructure for e-services

By providing central and local government agencies or, in other words, service providers, with e-services infrastructure, the State Portal gives additional value for projects aimed at the development of other public e-services. Till now, the following functionalities of e-services infrastructure have been used the most:

- **Information services**, which include e-mail notifications to the @eesti.ee address and mobile notifications. Notifications can be personal, service-based, location-based or mass notifications.
- **Authentication services**, which allow user identification with the ID card, Mobiil-ID or via Internet banks. After the user has entered the State Portal, he or she will be forwarded, together with authentication information, to an external information system.
- **Authorisation services** that are mediated by information system for the common management of rights. Data are taken from the state register of central and local government agencies, which is regularly updated. The State Portal allows to develop the system further by adding positions of a specific agency and assigning rights to those. The rights of an agency are managed by a person authorised to do it. The administration of rights and the structure of an agency as well as authorisation enquiries can also be performed as X-Road enquiries.
- **Official forms**. These are electronic applications, statements and other documents that are easy to compile and take into use by agencies. Completed e-forms are sent directly or through the Document Exchange Centre to an agency's document management system. Otherwise, they can be processed in the State Portal's by an authorized person.
- **Lemmatiser** – a tool allowing to search for the original forms or lemmas of Estonian words. A word or words in any form or case serve as an input for the lemmatiser and as an output one gets a respective lemma or lemmas (in case there are several of them). The lemmatiser was taken into use in the portal's search engine in 2008. However, the X-Road enables other state agencies too to use the service for the lemmatisation of the content of their websites.

State Portal in 2009

In January 2009, the first nationwide awareness-raising campaign called "eesti.ee – a gateway to the eState" was launched. The objective was to inform both the Estonian and Russian speaking population

59 A name statistics query allows to see, by entering a forename or the forename and a surname, the number of such names in the Population Register.

Nationwide awareness-raising campaign "eesti.ee – a gateway to the eState"

of the possibilities of the State Portal and to invite everybody to have their say in its development. In the framework of the campaign, people were expected to visit the State Portal, familiarize themselves with the services it offers and give feedback on how to increase the user-friendliness of the environment.

In 2009, main emphasis will be placed on the development of the portal's entrepreneur view. The aim is to develop it, by the end of the year, into an environment giving access to business-related information and services both in Estonian and English. In addition, the entrepreneur view of the portal will serve as the single point of contact the requirement for which has been set out in the Directive 2006/123/EC of the European Parliament and of the Council on services in the internal market.

Development of the portal's entrepreneur view

The single point of contact will make all business-related information and respective public e-services available both for local people and other EU citizens. This means that websites offering business-related information and information systems providing respective e-services have to be integrated in a manner, allowing the user to easily find necessary information. The most important components in this context include the Register of Economic Activities[60], the information portal for businesses Aktiva[61], electronic Commercial Register,[62] and the classification of Estonian economic activities EMTAK[63].

Enterprises expect the single point of contact to become a compact and comprehensive environment

An analysis of user needs carried out at the end of 2008 revealed that enterprises expect the single point of contact to become a compact and comprehensive environment, allowing them to find step-by-step instructions on procedures for the communication with the state and to electronically perform business-related administrative acts (i.e. applying for activity licences, submitting reports etc).

Besides, businessmen expect personalised information, e.g. information regarding their own company – reminders of due dates, information on requirements to be met in the field of their activity, information on the amendments to legislation concerning his field of activity etc.

60 http://mtr.mkm.ee/default.aspx
61 http://www.aktiva.ee (currently only in Estonian)
62 http://www.rik.ee/33167
63 http://www.rik.ee/emtak2008

2.2.2 A breakthrough year for the eFile

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2008 was a breakthrough year for the eFile information system. After the decision of the Government of the Republic on 16 June 2008 on the allocation of EU Structural Funds for the elaboration of the system, development work got a kick-start and the Ministry of Justice began to actively work on the agreed user solution.

Expedited proceeding in matters of payment order

The intensive development work began to bear fruit already at the beginning of July 2008, when an IT solution for the expedited proceeding in matters of payment procedure in the field civil procedure was completed. The expedited proceeding in matters of payment order is a written simplified proceeding, which allows to make court decisions ordering debt payments in monetary claims faster (without court sittings) and with lower costs than in case of action proceedings.

The gradual implementation of the new solution began on 15 July 2008. By the end of 2008, Estonians all over the country could submit, through the open user interface of eFile, claims for payment and claims for support.

Course of processing a claim can be monitored throughout the procedure through the Internet

First and foremost, the implementation of eFile makes the proceeding process faster and clearer for citizens. Making court decisions regarding citizens' claims takes now considerably less time than before. The course of processing a claim can be monitored throughout the procedure through the Internet. Thus, a single mother no longer needs to wait in the dark wondering, what will be the court decision on the father, who has left his child without allowance. On the other hand, eFile allows saving administrative costs related to the expedited proceedings in matters of payment order by nearly half.

Towards digital file

In the following months, the Ministry of Justice concentrated on developing a possibility for the processing of data related to criminal and misdemeanour proceedings in the eFile. In close cooperation with the Ministry of Internal Affairs and the Police Board, information systems were upgraded and user solutions widely tested. As a result, automatic data transmission was achieved between information systems, leading thus to improved interoperability of the state information system.

Parties to criminal proceeding began to submit data to courts electronically

In 2008, the Ministry of Justice primarily dealt with the implementation and introduction of electronic criminal and misdemeanour proceedings. An important deadline was 5 January 2009, when parties to criminal proceeding began to submit data to courts electronically. This next feat of labour marked the successful completion of the second phase of the eFile project.

In the near future, the most important milestone for eFile is to digitalize also the misdemeanour proceeding. Upon its successful introduction, the project team will have come halfway in terms of achieving its objective and the dream of a digital file is about to become true.

For the full realisation of the digital file, automatic data exchange has to be realised for civil and administrative proceedings. In addition, easy yet secure access has to be ensured for citizens to information concerning them.

2.2.3 eNotary

In Estonia, notary is a holder of office in public law, who is empowered by the state to attest facts and events which have legal meaning and perform other notarial acts in order to ensure legal certainty. Pursuant to law, many civil law acts that are important for individuals require notarial certification. Transfer of an immovable, establishment of a judicial mortgage and conclusion of the marital property contract can be brought out in this context as examples. The aim of notarial certification is to ensure the stability of relations between individuals, avoid later controversies and increase people's certainty in solving legal issues.

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The more complicated the legal system becomes, the more increases the role of the notary in advising contract parties and preparing contracts. The notary must perform his or her duties with required diligence, yet without making concessions in terms of the speed of service provision and without burdening contract parties with requirements of submitting comprehensive documents and data. Therefore, the Chamber of Notaries together with the Centre of Registers and Information Systems (RIK)[64] as well as the Ministry of Justice[65] have developed an information system called eNotary. An idea that occurred in 2004 to develop an information system for the digital preservation of notarial deeds and for keeping the electronic register of notarial acts has evolved, by today, into a unique solution serving as a working environment for the notary and his employees. In addition, the information system has become a data exchange environment for the communication with other registers.

Solution serving as a working environment for the notary

eNotary facilitates the communication between citizens and the state considerably. The notary obtains information necessary for a notarial deed from databases and, after a contract has been concluded, sends the agreed information to competent authorities (this used to be the task of citizens). The system is interoperable with other registers and supports them in viewing, processing and changing of data in other electronic state registers. eNotary has increased the speed and security of obtaining data from databases, as user authentication in the system is based on the ID card and it is no longer necessary to log into different databases with various passwords.

System is interoperable with other registers

What does eNotary do and how can one benefit from it?

eNotary facilitates the preparing of notarial deeds. The information system offers contract templates and necessary data about parties to and object of a transaction come from different registers with just a few mouse clicks. By entering personal identification code (or the name of a person) into the box for the details of the party, eNotary finds the respective individual and completes, based on the data of the Population Register, the rest of the blank boxes – name, place of residence, data of the personal identification document, marital status. Upon the entry of registered immovable number, eNotary finds and displays, based on the data of the electronic Land Register, other data related to the registered immovable – address, area, owner, encumbrances and restrictions, applications under procedure; finds and allows to add to the contract the plan of the registered immovable from the Land Cadastre's website (the page also contains

Contract templates and necessary data about parties

64 http://www.rik.ee
65 http://www.just.ee

information on potential restrictions related to the heritage conservation, nature conservation or other restrictions) and the land use type of data of the intended purpose of the cadastral unit; checks prohibitions on business and rights of representation from the Commercial Register etc.

Data are forwarded electronically by the eNotary information system to other relevant registers

The information system also keeps the notary's calendar, registers notarial acts, helps to calculate notary fees and state fees, draws up invoices for the payment of notary fees and pre-filled payment orders for the payment of state fees. Once the contract has been signed, the notary makes a digitally signed copy of the contract and saves it in the digital archive. However, the digital copy of the contract is not for the preservation in the archive only. The contracts in the digital archive or certain data thereof are forwarded electronically by the eNotary information system to other relevant registers, such as the Land Register, the Commercial Register and the Register of Wills. In addition, a digital copy of the contract may be forwarded to state agencies having the right of pre-emption etc. The work of the land registry department is considerably simplified, since information no longer needs to be entered from paper – it is automatically in an appropriate location in the land register information system and the paper register has ceased to exist. An electronic response is received from the land registry department or the registration department regarding the registration of the contract, ensuring a ranking. By today, 100% of registration applications are circulated in the electronic form. The cross-usage of data has increased the efficiency of working processes also in other state registers.

Cross-usage of data has increased the efficiency of working processes

In addition to the above-mentioned functionalities, eNotary also compiles notarial statistics and assists the notary's accountant.

The implementation of eNotary has reduced the need for technical personnel in notary offices and in the registration department of the Ministry of Justice. As registration applications are now submitted digitally, fully electronic Land Register has become a reality. Since the number of copies of notarial deeds has fallen by one third, it can be stated that eNotary brings direct economic savings to its customers.

The notaries' wish to obtain data from state registers and information systems fast through single point of contact has come true. The Ministry of Justice is also satisfied, as it has managed to digitise paper applications and data exchange just as the institution wanted. Furthermore, the ministry has succeeded in increasing the efficiency of procedures of its land registry department and registry department of the Commercial Register. RIK as the administrator and developer of IT in the field of administration of the Ministry of Justice has increased the efficiency, simplicity, security and novelty of the administration of registers.

The future of eNotary

Though the basic functionalities of eNotary have been developed and taken into active use, the development of the system is far from being completed. The project development team and eNotary working group, involving representatives from the Chamber of Notaries, RIK, Ministry of Justice, as well as notaries and employees of notary offices, plan to carry out the following improvements in the coming year (a non-exhaustive list of most important objectives):

- eNotary will allow everyone to access, over the Internet, notarial deeds and deed projects that have been certified with their participation;
- participants to a transaction will be able to obtain the original copy also in the digital form;
- upon the establishment of a company at the notary's office, eNotary will perform procedures necessary for the opening of a start-up account in the bank;
- the Succession Register and eNotary will be connected to the European Network of Registers of Wills;
- digital stamp and Mobiil-ID will be taken into use;
- digital documents will be transferred to the Register of Ships and Marital Property Register;
- eNotary will be joined with the information system of courts.

The realisation of the above-mentioned ideas will be the subject of future IT yearbooks. However, the Ministry of Justice believes that the customers of notaries will soon be able to experience these improvements themselves.

2.2.4 Development of the paperless Motor Vehicle Registration Centre (ARK)

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The most significant IT-related milestone in the development of the Traffic Register in 2008 was the full launch of an e-environment "Paperless ARK", the creation of which was funded by the EU Structural Funds. "Paperless ARK" allows citizens to perform proceedings related to the Traffic Register conveniently at home or at work. Through the e-environment citizens can inform the agency about changes in their data; apply for the driving license, a digital tachograph card or a certificate of driving test examiner; pay state duties; order duplicate license plates for vehicles; and sell their vehicles.

Proceedings related to the Traffic Register conveniently at home or at work

The most popular e-services include ordering duplicate license plates for one's vehicle and registering for the national traffic theory and driving test. While in the second half of 2008 the percentage of those having registered for the national driving test through the e-environment was 20%, a considerable increase is expected for 2009.

In addition to services targeted at citizens, "Paperless ARK" enables companies to carry out their proceedings electronically. Proceedings related to the initial registration of vehicles by vehicle distributors are used most extensively, with the share of proceedings performed through the e-environment accounting for two thirds of all proceedings. In addition, "Paperless ARK" has been taken into active use in scrap yards, which can now send certificates of destruction electronically.

In 2008, the Traffic Register's information system was joined with two significant enquiry systems – E-SIS and EUCARIS2. In connection with the launch of the Schengen Information System in Estonia, ARK too joined the enquiry environment of E-SIS – a system helping to prevent unlawful operations in the Traffic Register.

Joined with significant enquiry system EUCARIS2

EUCARIS is an enquiry system connecting vehicle registers in EU member states. Estonia joined the system already in 2002. In 2008, Estonia was one of the first member states to switch to the next version of the enquiry system EUCARIS2, which contains more information than the previous one. EUCARIS2 is used not only for Traffic Register proceedings, but the system also accepts enquiries made by police and border guard authorities.

2.2.5 Modernisation of the police information system and its e-services for citizens

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The existing software of the police information system POLIS that has been in use for the last ten years is being upgraded. New integrated software that will join the functions of several work lines and positions has been designed. In December 2008, a new information system for criminal proceedings was launched. Information systems for misdemeanour proceedings and management of police patrols are to be implemented soon. In the light of these developments, e-services for citizens provided through the State Portal[66] will also be renewed.

The software of the new police information system consists of several modules. Each of them serves as a specific user interface for a particular work line or a set of work processes. The sub-system of procedures assists police officers to carry out criminal and misdemeanour procedures. The module for control centre, however, has been designed as its work place, allowing to register emergency calls and see the location and status of patrols. These two modules will replace most of the existing POLIS information system. Statistics and reporting will mainly be available through a data warehouse.

Event-related data entered at police control centres will continually be available in the information system of proceedings for their further use in criminal or misdemeanour procedures. Thus, the existing functionality and comprehensiveness of the POLIS information system will not degrade. The general approach, however, is new and more up-to-date. This means that the system will be web-based and the design of windows will be changed. The most important change lies in the fact that all sub-systems of the new information system will be joined with the X-Road, enabling users to obtain data also from other databases through their own user interface. The upgraded software architecture will make it easier to add new components any time a specific work environment has to be developed for some work line.

Upgraded software architecture will make it easier to add new components any time

The above-mentioned changes were necessitated by the fact that during the last ten years, technical possibilities for the interoperability of information systems have evolved notably, many standards have become established and the middleware X-Road has been implemented. In addition, some changes are needed due to reforms in police work – joining the Schengen Information System, co-operation between state agencies etc. In addition, a person's access to his or her own data is now regulated in greater detail than ten years ago and through the State Portal, extensive possibilities have been created for that. In order to realise all these improvements efficiently in the police information system, the system needs to be upgraded.

The new information system will allow citizens to submit offence reports and hints, requests for information, requests for explanation or memoranda to the police through the State Portal. In addition, citizens will be able to submit objections in misdemeanour procedure, administrative procedure applications, manage documents they have sent to the police, and, in accordance with legislation, check data as well as misdemeanour decisions concerning oneself.

Citizens will be able to submit documents to the police through the State Portal

Preparations for the development of the components of the new information system began in 2005. The development of the system has been funded both from the state budget and by EU Structural Funds.

Transition to the new system was planned to take place simultaneously with the introduction of eFile – a new version of the register for criminal procedure. eFile, developed by the Ministry of Justice, connects proceedings of different agencies in the

66 http://www.eesti.ee

eFile – a new version of the register for criminal procedure

field of legal protection (the Police, other bodies involved in pre-trial proceedings, Office of Public Prosecutor, courts) and lays foundation for digital proceeding.

Course towards role-based solutions

The development of police information systems began with the re-establishment of the police institution in 1991. The first information system of proceedings was ESTPOL adaptations of which were made for the use in all police prefectures. The Tallinn Police Prefecture opted for software called Signal that was developed in Riga. In 1993-1994, cross-administration registers were taken into use: software for stolen vehicles, software for fugitives and software for stolen items.

The common information system for the police – POLIS – was developed in 1998 and implemented in all prefectures in 2002, replacing the existing information system. The objective of POLIS was to provide common work environment and ensure integral treatment of data beginning from emergency calls to the control centre up to the sending of proceeding materials to the prosecutor.

However, POLIS did not replace all work places: some existing work places were kept in use and some specific ones for narrower areas were developed. In order to increase the usability of information systems, role-based approach was adopted. This means that each work line gets a work environment corresponding to its needs. The idea to make POLIS role-based was generated already in 2001, but the realisation of it has been a long-standing process. With the development of the sub-system of proceedings and a module for control centre a long step has been taken towards role-based development of work places in the police information system, maintaining, at the same time, integration of data.

Each work line gets a work environment corresponding to its needs

New information systems require new approach

The complexity of the police information system has increased annually and the system has many interconnections. Several decades ago, when personal computers had only begun to appear, IT was something mystic just like gene technology is today and the possibilities concealed in the area were known only by the "IT people". Therefore, people representing other areas rarely participated in the development of information systems. Today, IT is as widespread as the hoover and the TV and the end user usually knows, what to expect from it. The main information systems of the police still exist and necessary data are available at all work places.
New requirements for information systems include better support for work processes in their uniqueness and subtlety. This, in turn, will increase the dependency of the development of information systems on the actual organisation of work.

Better support for work processes in their uniqueness and subtlety

The new situation also requires modifications in IT-related roles. Now that IT no longer constitutes a mere data processing system, but is closely integrated into work processes, it becomes increasingly important, how and when information systems should be used in one's work. This, however, can only be determined by departments actually leading the work of the police. In order to achieve better and faster outcomes, the general co-ordination of information systems development must be closely linked to the planning of the organisation's own work. Thus, as departments responsible for the core activities of the police (e.g. department of traffic supervision and the law enforcement department, the criminal investigation department, the analysis and planning department) are the owners of IT assets and customers of development works, their role in the development of information systems will increase. The task of the IT personnel is to ensure that the outcomes would be as good as possible and that the work of information systems would be supported by appropriate infrastructure. Such division of roles creates better and more sustainable conditions so as to ensure that information systems and IT solutions would correspond to the needs of the police work and that they would be harnessed to the maximum.

2.2.6 So complicated? Or surprisingly easy instead? Population Register developments in 2008

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2008 was the first year when it was possible to perform different operations by using the e-services of the Population Register. The services were developed in cooperation between three parties: the Estonian Informatics Centre, AS Andmevara and the Ministry of Internal Affairs. The services were first introduced at the end of 2007, when people could start using six new services and two new queries in the State Portal[67]. These new services were: notice of residence; registering the birth of a child; ordering a repeat vitals statistics certificate; ordering the entering of a document; name query for registering a birth, and application of the owner of the rooms for changing the residential addresses. The already existing query for own data, which enables a person to view actual data stated about him/her in the Population Registry, was supplemented by the query for relative relations and the query for forename and surname statistics.

People can view actual data stated about them in the Population Registry

When speaking about the initial expectations, hopes and also fears of the Ministry of Social Affairs, they were mostly related to two main issues. Firstly, the popularity and possibility of using the State Portal and e-services in the context where there was not much money for informing the public and the use of services required the use of ID card not only for authentication but also for signing. Secondly, the very large amount of officials involved in the process (presumably over 500 officials across Estonia) who needed to be trained, informed and also their daily way of thinking needed to be changed. So far, the officials had received the data to be entered in the Population Register on paper, but now they had to get used to the fact that some of the applications can be found in the Population Register's information system, where they are being received via the data exchange layer X-Road, not by post or by people in person.

Fortunately, the popularity of the services exceeded our expectations, despite the fact that there were some cases where people were unable to use the services because their ID card was not ready for use or due to technical errors that became evident only when the service was already in use and that regarded mainly the technical nuances of compatibility between the digital signature software and web browsers. Although there were also officials who needed to be reminded of the existence of the services, there were no considerable content-related or information technological problems.

Popularity of the services exceeded expectations

E-applications were submitted to 161 rural municipality and city governments across Estonia; most of them, as expected, to the Tallinn City Government and the local governments of the Harju County. The number of local governments shows that none of the officials is actually "protected" from e-applications and none of them can rely on the hope that "no-one here in this peripheral part of the country will want to communicate with us via computer and e-services".

Not surprisingly, the "star" service of the Population Register proved to be the notice of residence (see Figure 1). The number of users of other services has been rather modest (see Figure 2). To point out some of the reasons why other services are not so popular, then the wider use of the service of registering the birth of a child, for example, is prevented by restrictive circumstances. The application for registering the birth of a child can be submitted electronically only if the parents are married and the child was born in one of the three maternity hospitals in Tallinn. Yet the birth of a child has been registered 60 times, which

"Star" service of the Population Register – notice of residence

67 http://www.eesti.ee

means that 120 parents have successfully met all the requirements, plus all of them have succeeded with the digital signing procedure. The reason behind the low popularity of other services is probably the main drawback of e-services: people are not aware of the availability of e-services or there is little need for the services.

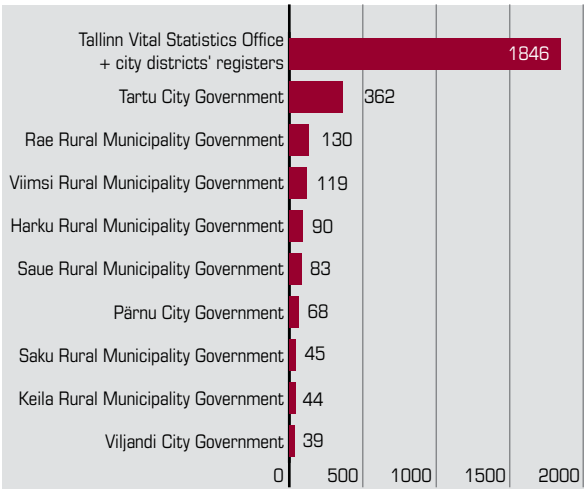

Figure 1. The number of processed notices of residence by agencies in 2008

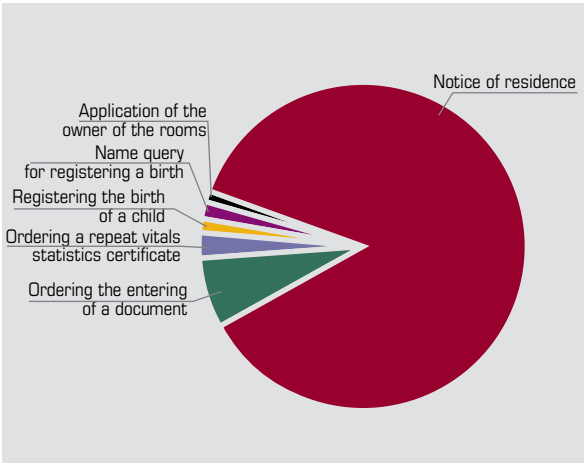

Figure 2. Processed applications by services in 2008

The statistics on e-services indicates that there are no gender equality problems in the use of e-services. Of all the processed applications, 55.3% were initiated by men and 44.7% by women. Moreover, all age groups were represented too, the youngest person being 18 and the oldest 88 years old (see Figure 3).

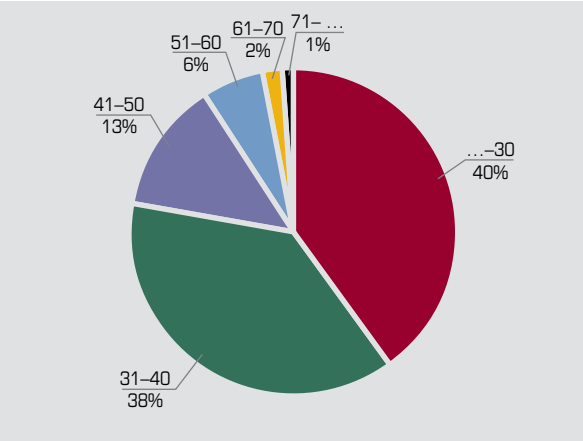

Figure 3. Number of processed e-applications by age groups in 2008

The queries, which have turned out to be quite popular even without awareness campaigns, deserve special mention. In 2008, there were 273,835 queries in total, which makes 334 queries per day.

Since queries do not require the signing of an application but simply logging into the State Portal, those who do not have an ID card or do not know how to use it can also make queries. The fact that the number of queries stabilised in the second quarter of 2008 probably means that a vast majority of the curious viewed their data right in the beginning and since these data do not change every day, there was no reason to view for example one's relative relations again every month. Yet there were cases where parents, whose child was born abroad and who had forgotten to send the birth certificate to the Population Register, managed to correct their data namely owing to the fact that when viewing their data electronically, they discovered that there is no relation in the register between them and their child.

In conclusion it can be said that for the Population Register and the people entering data to the register, 2008 was a successful e-year, which will definitely contribute to the increase in the quality of the data in the register. After all, the submission of correct data is now incredibly easy and can be done even without leaving home. By 2010, the services of submitting an application for registering marriage and death will also be available. Then we can say that e-services are available from cradle to grave and cover all the important events in one's life.

2.3 Overview of surveys on the information society

2.3.1 Internet and computer usage among estonian inhabitants and enterprises

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There are many different indicators in the world for evaluating the development of the information society. Estonia, too, continually monitors a number of them. The Department of State Information Systems of the Ministry of Economic Affairs and Communications commissioned two significant surveys in 2008: an e-track survey on the computer and Internet usage of Estonians and a survey entitled "Use of ICT in Estonian Enterprises".

Computer and Internet usage

The e-track survey – an overview of computer and Internet usage among the inhabitants of Estonia – has been conducted by TNS Emor since 2000. The areas covered within the survey are the following: frequency, place and areas of computer and Internet usage, interest in having or purchasing a computer, types of Internet connections, and interest in eCommerce.

Growth in the number of Internet users as well as in the number of computers and Internet connections at households has become stable with annual growth of approximately 2-3%. While in the first half of 2008, the share of computer users in the Estonian population aged 15 to 74 was 66%, the corresponding figure for the second half of the year was 67%. The number of computers and Internet connections at households has grown slightly more. At the beginning of 2008, 56% of households had a computer and 52% had an Internet connection. By the end of the year, these numbers had grown to 59% and 54% respectively.

Growth in the number of Internet users has become stable

It is noteworthy that the Estonian Internet user uses the web frequently. Slightly more than half (51-52%) of Estonian citizens aged 15 to 74 are the so-called heavy users, using the Internet on at least five days per week. Last year, the share of heavy users accounted for 47%. Thus, within a year, the number of heavy users has increased by nearly 100,000 people. 43% of people use the Internet daily. A "heavy user" is generally up to 34-years old, a pupil or a student, and a resident of Tallinn.

43% of people use the Internet daily

The most popular activities in the Internet include reading e-mail, using Internet banking and searching information. Compared to the previous year, use of the following areas has increased: watching and saving photos and other audio/video files, playing online games, using search engines, downloading software and watching TV programmes. Though there has been growth in the intensity of practically all usage areas, the only field that has showed some signs of waning is making phone calls over the Internet.

Compared to the previous year, the number of those having experienced problems due to computer viruses increased in 2008. While in 2007, 24% of citizens with Internet connection at home reported to have had experienced computer viruses, the corresponding figure for 2008 was 32%.

ICT use in Estonian enterprises

The use of ICT in Estonian enterprises has been monitored regularly. In the framework of the annual survey conducted by TNS Emor people with respon-

sibility for IT matters from nearly 500 enterprises of varying sizes are questioned. The survey covers the following areas: possession of software and hardware, existence of IT specialists, ICT budget, Internet connections, existence of a website, and use of the ID card and public e-services.

82% of companies have Internet connection with speed and quality corresponding to their needs

Compared to 2007, the share of companies having a computer has increased – 84% of enterprises now have at least one computer (8% growth year-on-year). All companies having planned to purchase computers in 2008 realised this intention. 82% of companies (98% of those possessing a computer) have Internet connection with speed and quality corresponding to their needs. 79% of companies can choose between several Internet service providers. Companies are satisfied with their IT partners, having ranked their competence, problem-solving capacity, meeting of deadlines, and service quality as „excellent".

Special software is primarily used in larger enterprises. Business software, for instance, is popular among wholesale and retail businesses. By today, most enterprises use computer protection software with 97% of them having anti-virus software and 75% possessing firewall and anti-spam software. 88% of companies claimed not to have experienced any security related problems.

The number of companies having used public e-services has increased considerably. While in 2007, public e-services had been used by 71% of enterprises, the respective number for 2008 was 82%. The most widely used is the possibility to submit company-related documents digitally (the respective figures being 63% in 2007 and 78% in 2008). In addition, searching information from public sector websites is popular with 70% of companies making use of that (7% growth year-on-year).

Number of companies having used public e-services has increased considerably

Business satisfaction with public sector e-services is continuously high with 90% of companies having marked either „very satisfied" or „ satisfied". The website of the Tax and Customs Board[68] is still the most widely used public sector website. 83% of companies use it and 11% of enterprises are aware of it, but do not use it. The websites of the electronic State Gazette[69] and eCommercial Register[70] (58% and 59% of companies respectively) are used slightly less.

Usage of the ID card in Estonian enterprises has increased since 2005

The usage of the ID card in Estonian enterprises has increased since 2005. While in 2005, the percentages for electronic authentication and digital signing in companies were 1% and 2% respectively, current figures stand at nearly 30%. At the beginning of 2009, ID card was used for electronic authentication in 27% of enterprises and for digital signing in 29% of companies having the Internet connection.

68 http://www.emta.ee
69 https://www.riigiteataja.ee
70 https://ariregister.rik.ee

2.3.2 Information stratification: internet non-users, small-scale users and recent adopters

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Year 2008 witnessed the completion of a research project commissioned by the Ministry of Economic Affairs and Communications, which was aimed at ensuring a better understanding of the Internet use practices among small-scale and non-users of the Internet and the (inhibiting as well as motivational) determinants of Internet use. The survey was based on seven focus group interviews, quantitative analysis of survey data and qualitative case studies conducted with the help of students. The present article first gives a short overview of the theoretical basis of the survey to help better understand the reasons for adopting the Internet.

Better understanding of the Internet use practices

Then the types of Internet users, the adoption of the Internet and the key barriers to Internet use are introduced. In addition, the barriers are compared to the results of a similar survey conducted in 2002 to identify the developments in that field since then. Finally, the authors of the survey give a few recommendations with regard to reducing digital stratification.

From digital divide to information stratification

The theoretical framework of the survey is based on the concept of digital stratification. This draws on the approach that distinguishes individuals based on their skills and motivation to use different information and communication technologies (ICT) and improve their life quality with the help of ICT. The 2002 survey was based on the concept of digital divide;[71] the current survey addresses the main problems related to the use of ICT. The discourse of digital divide usually outlines the following aspects:

Concept of digital stratification

1. **The importance of access to online computers,**
2. which use results in **increased levels of information, knowledge, communication or other types of socially valued benefits** that
3. are in turn so vital that the absence of access and the resulting "digibetism" (or computer illiteracy) will eventually create or maintain a dichotomous society of **haves and have-nots.**[72]

The term *digital divide* denotes the difference between the "havers" and "non-havers" of information. The divide arises from the uneven distribution of phones, PCs, Internet access and skills. The underlying reasons may be either socioeconomic or related to the status, education, age, gender, urbanisation, language, race, residence or ethnic background, and definitely to different lifestyles and motivation.

Such an approach is based on the normative presumption that the use of ICT is equally beneficial for all users and that the non-use of ICT hinders daily life in the modern society. The problem with that presumption is that people are not similar in terms of the use or non-use of ICT. Thus, also the benefits cannot be the same for them. Furthermore, it is clear that a simple classification into users and non-users does not contribute to understanding people in their diversity.

Simple classification into users and non-users does not contribute to understanding people in their diversity

Digital stratification contains a number of stages, which need not always follow in a linear sequence, but rather indicate the different interests, lifestyles, skills and opportunities of the individuals. For instance, when considering different practices of use,

71 See Mari Kalkun and Tarmo Kalvet (editors), *Digital Divide in Estonia and How to Bridge It*, e-book, Tallinn: PRAXIS, 2002.

72 Nico Carpentier (2003) Access and participation in the discourse of the digital divide: The European perspective at/on the WSIS, J. Servaes (edit.) *The European Information Society: a reality check* Bristol, Portland: Intellect.

it is difficult to find a scale that would serve as the basis for determining the advantage of one practice over another. At the same time, it is clear that the users oriented to communication and information differ from each other, and so do the benefits they gain from the Internet use.

Important to understand how individuals integrate different information

In the case of digital stratification, it is also important to understand how individuals integrate different information and communication technologies into their lives and what steps are necessary for that.[73]

The adoption of the Internet and ICT is illustrated by Leah Lievrouw's circle of adoption of the Internet or its applications (see Figure 1).[74] The adoption of ICT and relevant applications involves six basic stages and their relations.

The circle divides information environment into two parts: institutional and personal. These two affect the adoption of ICT and its applications at different stages. The institutional or social part comprises different levels of state authorities, private companies, the third sector, the general cultural environment, values and norms.

The personal level consists of social networks that are important for a concrete individual or a group of individuals in the centre of the circle: friends, relatives, colleagues and people with shared interests and hobbies, whose opinions and attitudes affect that individual or group of individuals.

The individual or group of individuals in the centre of the circle is constrained by his/her own skills, knowledge, lifestyle, values and motivation. These constraints are shaped by the values and beliefs of the society, on one hand, and by the ideas spread in the personal networks, on the other hand. Moreover, it is important to note that an individual is not only a set of social impacts but is significantly affected also by his/her personal identity and lifestyle, which has either been chosen deliberately or arises from different circumstances. The combined impact of the public and private spheres also influences the retrieval of information and the adoption of new technologies/applications.

Combined impact of the public and private spheres influences adoption of new applications

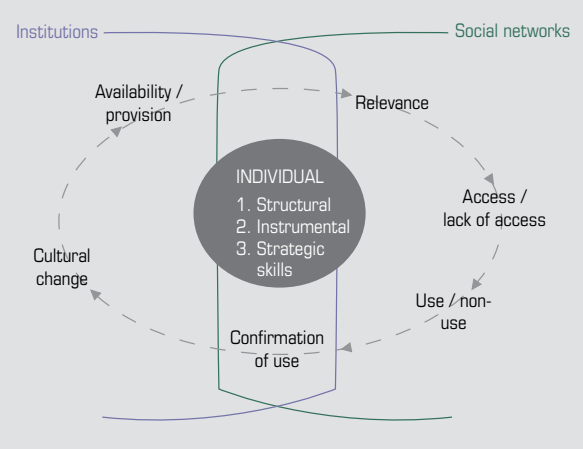

Figure 1. The circle of adoption of the Internet or its applications (Lievrouw 2001)

Adoption of ICT and relevant applications has six important stages

The adoption of ICT and relevant applications has six important stages. These are present in a linear way in this paper, but in real life, the process may be less straightforward. The cycle can easily be interrupted, and the different stages are not always clearly distinguishable. They are successive circles and it is important to understand that each new application requires passing through the stages at least once. In the case of simpler and more straightforward applications, the adoption process may consist of one-time use, so that the person does not have to acknowledge the process at all. In the case of more complex applications and technologies, the process can be complex and long-lasting.

The following describes these six basic stages of Internet adoption.

The first two – availability and cultural change – are carried out at the institutional level, as availability is generally provided by public institutions. For the purposes of this paper, availability can be related to technologies (Internet-connected computers) or online content or services. Cultural change emerges when sufficient numbers of people (or relatively in-

73 The following is based on the Doctoral thesis of Pille Pruulmann-Vengerfeldt (2006) „Information technology users and uses within the different layers of the information environment in Estonia". Tartu: Tartu University Press.

74 Leah Lievrouw (2001). New media and the 'pluralization of life-worlds': a role for information in social differentiation, *New Media and Society*, 3(1), pp 7–28.

fluential people) enforce cultural change. This change supports public understanding and perception of availability. For instance, the concept of the Internet being a public benefit derives from cultural change.

The third stage is relevance – whether people see the Internet or relevant services as being sufficiently relevant in their lives to seek access to it. Relevance does not have to be rational or conscious; it can be the result of outside pressure from social networks of relatives or colleagues. Overcoming the motivational barrier occurs thanks to strategic skills. The level of such skills, therefore, dictates the ability to take decisions about the relevance of each individual application in the individual's personal context.

In Estonia everyone has access to the Internet thanks to Public Internet Access Points

The fourth stage is seeking access. For example, in Estonia everyone has access to the Internet thanks to Public Internet Access Points. Still, availability depends on many factors, such as (a) is the public centre open at a time when the user can go there; (b) does the user know where it is; (c) does he/she have access? Seeking access can also mean seeking access to services on the Internet. People often have limited skills in finding the necessary information, and this can be overcome by providing public information about this matter.

Once access is found, the fifth stage lies in using the service or information. Individual skills and the usability of the service play an important role here, and so do the perceived alternative costs. For instance, whether the time spent on learning is worth it or what are the alternative channels for acquiring the necessary information or service.

The last stage is confirmation of the use. Even if the first experience has been successful, that does not necessarily mean that the individual will become a long-time user. Not everything may be learned through the first use, and not everything will be remembered. Many respondents in the study said that the Look@World project[75] provided them with initial usage experience and that they had accessed specific information or an application at that time, but they did not keep using the Internet, because the confirmation stage was not possible. A negative user experience can also cause non-use.

As mentioned above, cultural change may come from a positive user experience, but also from the opinions or attitudes of influential persons. The positive or negative experience of an institution's director, for instance, can influence the attitudes which employees take toward new technologies.

Each new application will require a new adoption process

It is important to understand that each new application will require a new adoption process. Surveys show that although most Internet services are theoretically equally accessible to everyone, there can be great differences in terms of the needs, skills, lifestyles, opportunities and user experiences as well as confirmation of use. This leads to differentiation in terms of types of Internet users.

Internet users and non-users

According to a survey on public e-services,[76] 70% of Estonian inhabitants aged 15 to 74 use the Internet, and 61% of them have done so in the last seven days. 30% (316,000 individuals according to the statistics of TNS Emor) are non-users.

Six basic types of Internet users

The survey outlined the types of Internet users based on the 2005 survey; the current paper can take a step forward in describing the different types by using more recent data from the 2007 survey. In general, there are six basic types of Internet users, and there has been relative consistency in this regard over the course of the years.[77] The six types and the type of non-users can be seen in Figure 2.[78]

75 Ehandi, A. "The Look@World Project: An Initiative from Estonia's Private Sector to Boost Internet Use", Baltic IT&T Review, No 2 (21), 2001. Available online at: http://www.ebaltics.com/00705261.

76 Ministry of Economic Affairs and Communications, "Avalike e-teenuste uuring", October 2007.

77 Runnel, Pruulmann-Vengerfeldt, Reinsalu, forthcoming; Pruulmann-Vengerfeldt, Reinsalu, 2009.

78 The classification of types is based on a representative survey called "Valimised ja Meedia" [Elections and Media] carried out among Estonian speakers aged 18 to 74 and involving 803 respondents. The survey was commissioned by the Institute of Journalism and Communication of the University of Tartu and conducted by research company Klaster.

Versatile Internet users take active part in the Internet-related activities listed in the survey. These are mostly people aged 18 to 44, and often with high level of income.

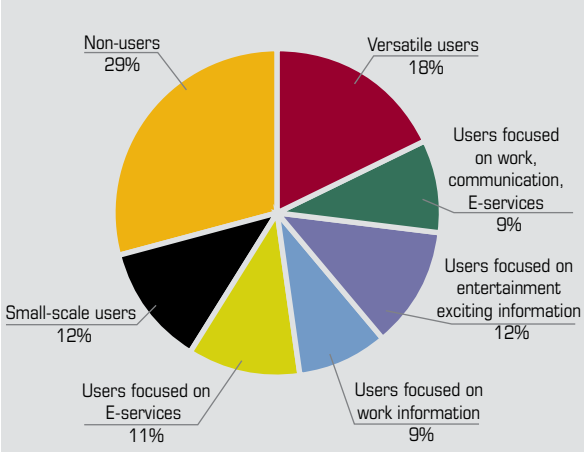

Figure 2. Internet users and non-users in 2007 (N = 803)

Source: University of Tartu, Institute of Journalism and Communication

The users focused on work, communication and e-services are relatively active Internet users. Their using habits mostly involve communication with friends and family, search for work-related information, use of e-services, and search for help and advice. Online participation and search for exciting information is less characteristic of that group. This is a pragmatic group with 72% of the users being female and a third of them aged 25 to 34.

The users focused on entertainment and exciting information are the least likely to be looking for state-related information or public e-services. The majority of them are aged 18 to 34; i.e. that user group mostly consists of younger people.

The users focused on work and information search for practical information related to the state and work and are interested in reading online media. However, they are less likely to seek entertainment or take part in forums. These are Internet users who are mostly between 35 and 64 years of age, have higher education and above average incomes.

E-service users are primarily characterised by the use of e-services, such as Internet banking, eTax Board and other applications that involve filling out online forms. These are fairly passive Internet users who could be described as single-application users. In Estonia, the most popular application appears to be Internet banking. Another common field of use is search for state-related information and work. This group of users is far less likely to take part in forums, seek entertainment or help and advice. A third of them are aged 45 to 54 and nearly half of them have higher education.

Small-scale users are not characterised by any of the aforementioned activities, and they are the most passive group. For them the Internet mostly associates with Internet banking, the eTax Board and filling out of forms, but they engage in these activities far less often than the previous user group. This is the eldest group of users with 25% of the respondents being over 55 years of age.

The seventh type is the Internet non-users. The average Internet non-user is old rather than young, female, Russian speaking, non-working or unskilled worker, and a rural resident with basic education whose monthly income per family member is 3,001–4,000 Estonian kroons. This corresponds to earlier findings about Internet non-users in 2002, which also clearly revealed the groups of blue-collar workers and the retired among the non-users.

The key reasons for non-use include the high cost of computers and lack of Internet use skills. The cost of Internet connection and lack of motivation or interest are less important in this regard. In focus group interviews, we investigated all of these factors in greater depth, and found that in many cases the straightforward explanations were interrelated in a more complex way. For instance, many of our respondents were not aware of the actual cost of computers and assumed the prices to be higher than they actually are. The following is largely based on the analysis of focus group interviews.

The key reasons for non-use include the high cost of computers and lack of Internet use skills

It is difficult these days to find anyone in Estonia who has never had any contact with a computer or the Internet. Even most of the non-users have experienced some of the Internet's benefits,

Difficult to find anyone in Estonia who has never had any contact with a computer or the Internet

Most respondents have positive associations with the Internet

with the help of their friends or family members who use the Internet for them. Internet non-users, small-scale users and recent adopters are fairly well informed about computers and the Internet. They relate the Internet mostly to communication, information, news and banking services. Online computers are seen as a way of saving time by finding information quickly. Most respondents have positive associations with the Internet, whereas they also point out that much of the information is only available via the Internet. For many, especially the older generation, the Internet is far from being the one and only medium. Neither is it perceived as a medium that could replace other channels of information.

Internet non-users were quite well aware that the Internet is often used for communication purposes; some of them had tried out communication applications such as MSN and Skype with the help of friends or family members. The same applies to Internet banking. Online public transport timetables are another popular and time-saving service. Many parents also praised the e-school application.

People are best informed of access to Internet banks

Those who had only recently begun to use the Internet talked not only about communication and information, but also about services related to hobbies, health, learning, holidays and the public sector. When it comes to general knowledge and use of available services and applications, non-users are not much different from small-scale users. In other words, they are public information users who seek for information and services that help them save time (e.g. public transport timetables; background information on goods and services). As regards the awareness of ID card related services, people are best informed of access to Internet banks.

Other services of interest mentioned by the respondents included a variety of services that are already available, such as information on health, hobbies (e.g. photography, hiking, beauty spots in Estonia) and topics related to friends and family members. However, people often lack skills to find and use the necessary information.

People often lack skills to find and use the necessary information

Key barriers to Internet use

The use of the Internet is primarily hindered by economic and emotional barriers as well as insufficient skills. The latter can be divided into three categories:

1. strategic skills (the ability to understand the relevance of the technology);
2. instrumental skills (the ability to use the relevant technology);
3. structural skills (the ability to understand online content).

Currently, the biggest obstacle lies in insufficient skills of information search and computer and Internet use. Compared to earlier studies, the authors of this paper have noted that, on the basis of focus group interviews, the lack of access is no longer considered to be the main barrier (the survey results still outline it as the biggest barrier). The barrier of strategic skills has also decreased considerably – most people clearly feel the need to use the Internet. Table 1 compares the key barriers to using the Internet in 2002 and 2007.

Table 1. Key barriers to Internet use in 2002 and 2007

Motivational barrier	
Description of the barrier in 2002	**Comment based on the 2007 survey**
The Internet "is not for me" – people cannot relate the Internet to their personal needs. Existing media and communication channels satisfy all primary needs: communication, information search, bureaucratic procedures.	In 2002, it appeared that Internet non-users (especially those aged 50 to 64) do not associate anything with the Internet. In 2007, this has changed considerably. The former attitude that the Internet is something remote and impersonal has been replaced by an understanding that the Internet has become a necessity of life.
Existing media and communication channels satisfy all primary needs: communication, information search, bureaucratic procedures.	Internet non-users seemed to be generally aware of the functions of the Internet both in 2002 and 2007; however, significant progress could be denoted in 2007 in that respect. Besides information search and Internet banking people are well informed of online news, magazines and means of communication (e-mail, Skype).
Non-users have not thought about why they do not use the Internet or feel a need for that.	In 2007, people could identify several reasons for Internet non-use. They had clearly thought about where and how they could use the Internet, but had encountered other barriers, particularly insufficient skills.
The computer is only important for children for schoolwork or for adults at work.	The understanding in 2002 was that computers are necessary for children in their school assignments and for adults at work. The 2007 survey also included such understandings but they were exceptional, and most Internet non-users regarded the Internet as a tool for improving their lives. The prevailing attitude was that computers and the Internet are for everyone who wants them, is interested in them and can use them. Moreover, people have become more critical as regards Internet over-use by children.
Skills barrier	
Description of the barrier in 2002	**Comment based on the 2007 survey**
The lack of skills is seen as the third most important barrier after the lack of access and lack of need. This may indicate Estonians' logic of thinking: first I need a computer with Internet access, then I have to need the services, and only then I will start learning.	Insufficient skills were the main barrier for non-users in 2007. For the same reason users do not expand their scope of use. The general attitude was very positive, and people expected more training opportunities both at the professional and individual levels.
Internet use is complicated by difficult user interfaces. Language issues are a problem, as is the ability of older people to learn new skills. There is a lack of opportunities to practice, and users are afraid of damaging expensive equipment or making other mistakes (e.g. transferring money to a wrong account). Although people have acquired some computer skills, they hesitate to use it. Without long-term opportunities to practice, their relationship with computers is very uncertain.	The same aspects were outlined also in the 2007 survey. Although the Look@World Foundation has organised extensive computer and Internet trainings, there were some participants in the focus group interviews who had still not started to use the Internet. Short trainings without the possibility to confirm new knowledge do not eliminate the skills barrier. Children often bring their parents and grandparents to computers, but sometimes children are also the reason for non-use. The superior attitude of the young towards the learning abilities of the elderly often lead the young to do the information search or transactions for the elderly, instead of teaching them to do those things themselves.
Strong social fears about studying in groups or using the Internet in public – people are afraid of being left behind or appearing unskilled.	The same fears appeared to the same extent in 2007 too. Good instructors are those who have the time to work on an individual basis and who let the trainees repeat and practice the things learned.
Non-users do not appreciate the concept of lifelong learning. They see life in the existing framework of strong hierarchies and order. Entrepreneurship and creativity are somewhat less important. If a barrier is encountered, people give up trying instead of seeking alternative solutions.	The concept of lifelong learning is less acknowledged among the elderly.

Access barrier	
Description of the barrier in 2002	**Comment based on the 2007 survey**
Present Internet non-users would like to use the Internet at home.	This is a continuous expectation of non-users and small-scale users.
The majority of non-users cannot or do not want to go to Public Internet Access Points.	This attitude was strongly expressed also in the 2007 survey.
Economic barriers are the most difficult ones to overcome, as people cannot afford a PC at home.	The economic barrier remains important, particularly among those with lower levels of income, as well as the retired. At the same time, people are often misinformed about the actual cost of computers and Internet connection. There is a growing trend of giving old computers to those less off, or giving computers for Christmas not only to children but also to grandparents. Many non-users and small-scale users do not dare to visit a computer store, as they are afraid of appearing ignorant there.

Overcoming barriers

The survey conducted in 2007 indicated that two thirds of Internet non-users do not intend to start using it. Such a high degree of unwillingness shows that compared to the 2002 survey, most of those who were then planning to adopt the Internet have already done that. The share of users has grown approximately 30% (in absolute terms this indicator is even higher than the share of those who were intending to adopt the Internet in 2002). In part, this has stemmed from general economic development, an increase in people's purchasing power and a decrease in ICT costs. Various initiatives have also contributed to that: e.g. the Internet and Internet banking trainings of the Look@World Foundation (overcoming the fear of ICT use); trainings held by the Labour Market Board; the X-Road imitative that connected public databases and information systems; the establishment of Public Internet Access Points, and various other public and private sector e-services. However, this has still not been sufficient to bring the 316,000 non-users to the Internet or improve the skills of present users.

Most of those who were then planning to adopt the Internet have already done that

It is a basic right for people to be assisted in overcoming the barriers that hinder Internet adoption, because everyone has the right to equal treatment. We promote equal opportunities for all by reducing the level of social stratification caused by unequal opportunities to use ICT. The following policy recommendations are based on the authors' analysis of focus group interviews and discussions with experts (see also Figure 3).

Everyone has the right to equal treatment

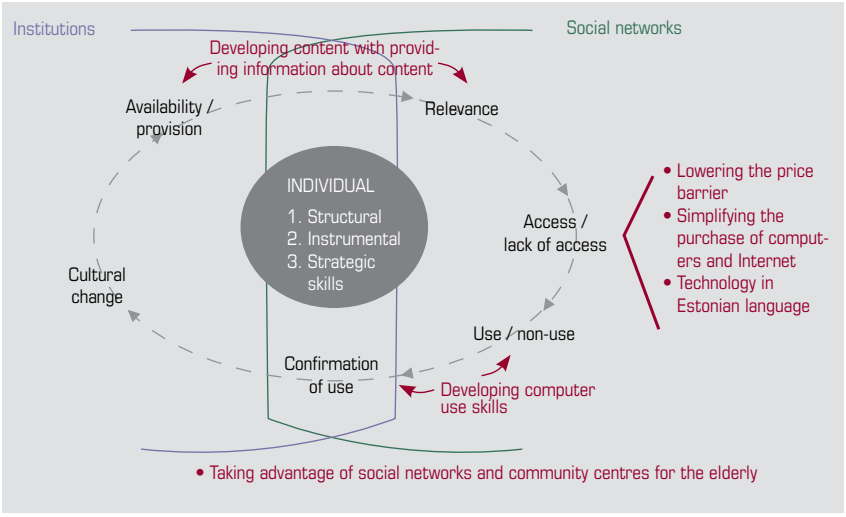

Figure 3. Recommendations for reducing digital stratification

It is necessary to organise more trainings

Lack of computer and Internet skills is a barrier both for the users and non-users of the Internet; thus, it is necessary to organise more trainings. However, the format of trainings should be adjusted to the needs of different target groups. The content of trainings should be improved further; for example, more attention should be paid to teaching information search. The network of Public Internet Access Points should be utilised as points of training and guidance. Public sector e-services should be introduced in places where people most often encounter civil servants. The existing social networks could be more included in training.

Home as the most likely place where Internet non-users come into contact with the Internet

The authors consider home as the most likely place where Internet non-users come into contact with the Internet and existing users improve their skills. The cost of Internet connection is a significant barrier to use. Therefore it is necessary to consider different opportunities to reduce or partly compensate for the cost of Internet connection for end users. People also need to be better informed about the cost and services of the Internet, including less costly service packages.

One of the barriers to purchasing a computer or choosing an Internet connection is related to emotional investment, as people perceive a need for specialist knowledge in this regard. Thus, there is demand for computers adjusted to target group needs and for related information.

Even though operation systems and user interfaces are available also in Estonian, users had mostly used systems and applications in English, which they considered to be very inconvenient as it created uncertainty. Consequently, the current target groups expect the computers to communicate in Estonian. Computer salesmen could inform the customers of such possibilities and provide them with operating systems and software in Estonian. There is also a need for training materials for software in Estonian.

Current target groups expect the computers to communicate in Estonian

Many e-services are already available for non-users, small-scale users and recent adopters; however, it is important to continue developing new online content, as the expectations related to content increase along with the level of Internet use. Training programmes could well enhance information searching skills, but in general there is a great need for a special portal of services for the elderly, as well as for more user-oriented services. More content should also be created in Russian in order to decrease digital stratification among Russian speakers. The development of content should go hand in hand with raising awareness.

ICT provides opportunities to improve the life quality of the disabled

Furthermore, ICT provides opportunities to improve the life quality of the disabled. In this regard it should be borne in mind that the barriers to use differ greatly among the disabled and deserve more attention.

The inclusion of social networks of the elderly could help overcome the barriers experienced in this user group. For instance, the opportunities of ICT could be introduced in the community centres for the elderly.

All the above recommendations call for cooperation between different sectors, with a special focus on third-sector initiatives which could contribute a lot to changing the Internet use practices of the current user groups.

2.3.3 Trends in the use of public e-services

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At the end of 2008, market research company Saar Poll carried out a survey, which focused on the following issues: awareness and usage of state portals and public e-services and user satisfaction with these. All in all, 1,015 face-to-face interviews were conducted with Estonians aged 15-74. The survey was commissioned by the Ministry of Economic Affairs and Communications and funded by EU Structural Funds.

Three out of four respondents are Internet users

According to the results of the survey, three out of four respondents or 75% are Internet users (see Figure 1). As expected, the most frequent Internet users are young; in terms of main activity they are either pupils or students. The profile of the higher-than-average Internet user also includes office workers: CEOs, specialists and other white-collar employees and people with above average income and education. By nationality, frequent Internet users comprise ethnic Estonians rather than non-ethnic ones; and, by gender, females prevail.

Lack of necessary skills and lack of a computer as the main reasons for not using the net

Internet non-users brought out lack of necessary skills (59%) and lack of a computer (58%) as the main reasons for not using the net. A third of non-users (34%) believe that they obtain all the necessary information through other channels and every fifth of them (20%) pointed out lack of Internet connection as the main reason for not using the web. Thus, for some people Internet usage is too complicated, too expensive or just not necessary.

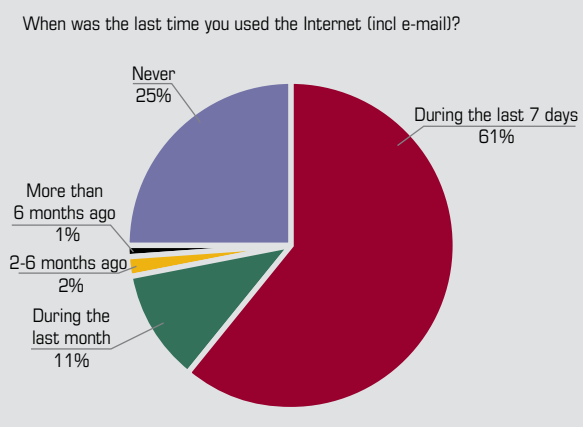

Figure 1. Frequency of Internet use

Non-users attitude towards the Internet has become slightly more positive

More than half of Internet non-users (54%) do not intend to start using it. In a year, non-users attitude towards the Internet has become slightly more positive: in November 2007, the share of those not planning to start using the Internet was 65% (of respondents. It can be assumed that in the future the number of Internet users will grow primarily on the account of younger generations for whom the Internet forms a pack and parcel of their daily lives. According to the survey, the maximum share of Internet users in Estonia could amount to 88% of the population (75% of those using it today and 13% of current non-users, who might start using the Internet in the future). The group of those never planning to start using the Internet is dominated by inhabitants of Tallinn, the retired and non-ethnic Estonians.

The results of the survey show that central and local government websites are primarily visited in order to obtain information (63% of users of websites). Public sector e-services, too, are rather widely known and used among Estonians aged 15-74 (see Figure 2). At the same time, many people cannot differentiate between public and private sector e-services. Thus, websites of banks, mobile operators, news portals, Internet forums, social networks etc. were brought out as public sector e-services.

Submitting income declarations over the Internet is clearly the best-known and most used public e-service with high user satisfaction rate (69% of web users had used the service and 71% of those having submitted the online declaration were satisfied with

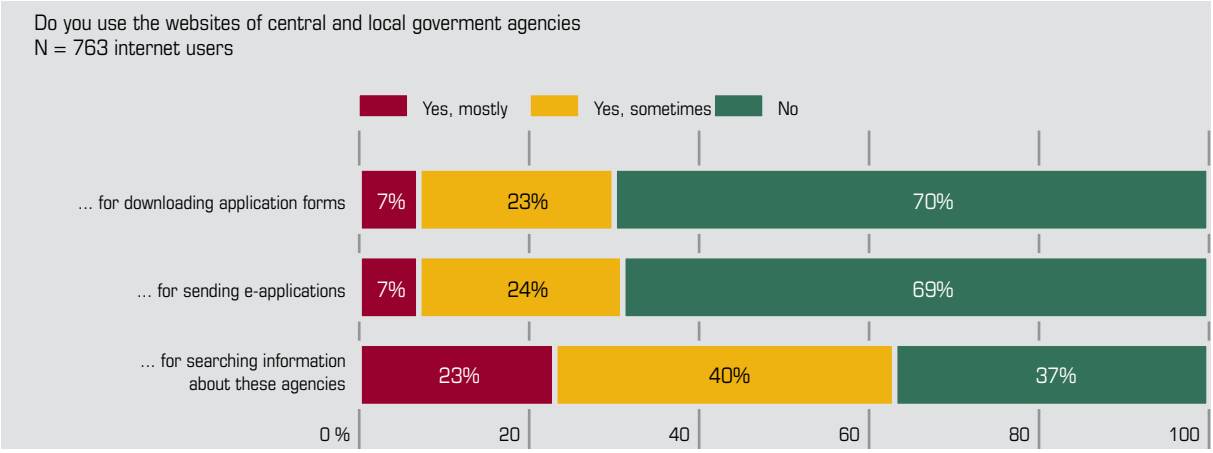

Figure 2. Use of public sector websites by purposes

it). Other popular public e-services include online communication with schools (used by 41% of web users with user satisfaction rate of 38%) and paying for public services (used by 57% of web users and claimed satisfactory by 46% of those having used the service), though in case of the latter, respondents might have thought of internet banking in general. Areas, where people expect e-services most are employment and health (41% and 35% of Internet users respectively). At the same time, the existing eHealth services received the largest number of rankings expressing dissatisfaction from users. Areas with which dissatisfaction was expressed most include: seeking medical information (7%), making an appointment with a doctor (9%), and web-based communication with doctors (9%).

Services have helped to save time

E-services are mainly used for the sake of saving time and resources. 82% of those having used e-services are of opinion that the services have helped them to save time (see Figure 3). Every second person (57%) having

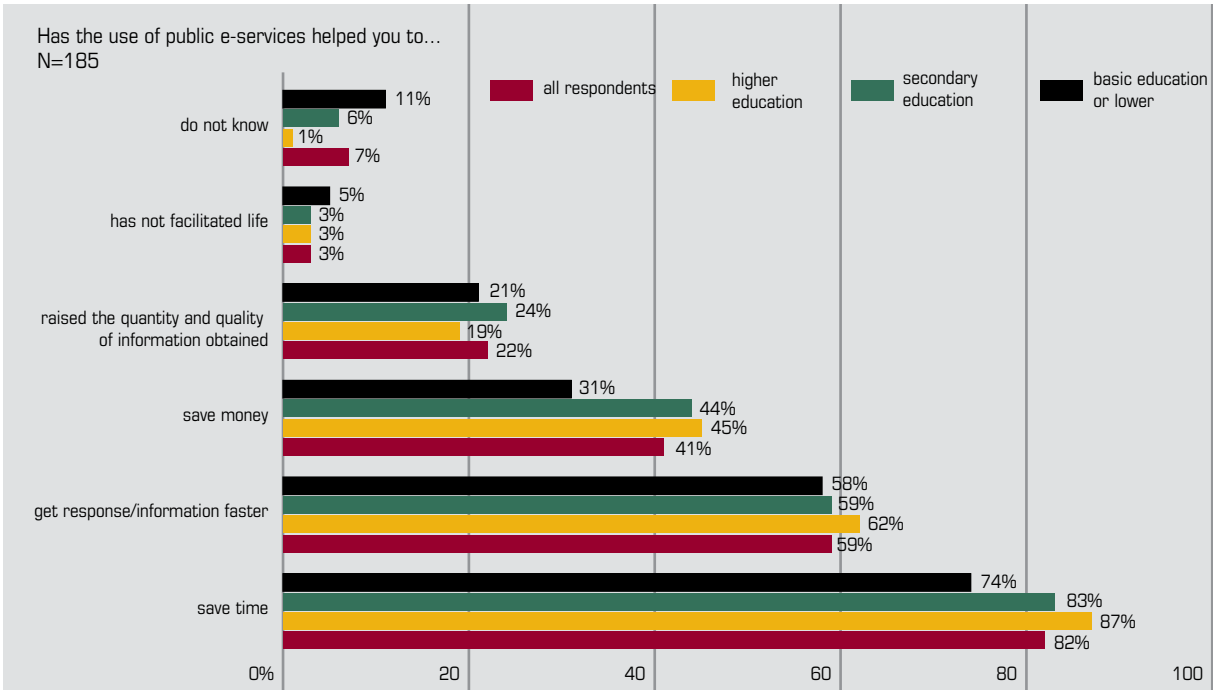

Figure 3. User satisfaction with public e-services

used public sector e-services finds that this has reduced bureaucracy and saved time in the communication with administrative agencies.

For those, who are not satisfied with e-services or have not used them, the main problems are complexity of the use of services and lack of user guides. This applies, first and foremost, to non-Estonians. Russian-speaking citizens use public e-services and public sector websites less than Estonians (39% of non-Estonians have not used any e-services, while the corresponding figure for Estonians is 29%). For many Russians, the main hindrance may well lie in limited proficiency of the Estonian language, but scarcity of information in Russian or difficulties in finding it undeniably constitute a part of the reason (51% of non-Estonians and 33% of Estonians having used public sector e-services emphasized the insufficiency of user support services and instructions). Shortage of information was brought out also by other groups. People with lower education and income frequently lack information about electronic possibilities and cannot, therefore, make use of these (44% of people with basic or lower education and 55% of service users with higher education expressed satisfaction with the findability of e-services).

People in retirement age are less represented among the users of public e-services

People in retirement age, too, are clearly less represented among the users of public e-services and public sector websites (80% of people aged 60-74 have not used any public e-services). Most of the respondents aged 60-74 (70%) do not intend to start using the Internet. In addition to the elderly, youth too are currently under-represented among the users of e-services (they have mainly used e-services in the field of education). The young are the most frequent Internet users and would most likely not have the problem of insufficiency of skills. However, with the exception of school related services, they probably do not need many public sector e-services.

Awareness of e-services needs to be increased

The take-up and awareness of public e-services has been on constant increase. In order to improve the situation further, more attention should be paid on raising the awareness of non-ethnic Estonians, the young, and people with lower education and income. The more there is information about the existence of e-services, the higher the probability that these will be used.

Development of knowledge-based economy

3.1 Promotion of ICT uptake by enterprises

3.1.1 E-invoicing – path to faster document circulation

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Changeover to uniform interoperable cross-border eInvoicing is one of the priorities of the European Union. The Services of the European Commission are working on the framework of the European eInvoicing.[79] There is an open workshop established within the European Committee for Standardization (CEN).[80] Agreements on issues regarding transport, signing and archival processing of electronic invoices are being formulated; currently, the main consideration is the economic content of e-invoices.

eInvoicing is a part of the procurement process supply chain

In more general terms, eInvoicing is a part of the procurement process supply chain: order, confirmation of the order, invoice, and payment. eInvoicing cannot be regarded merely as an electronic message – collection of the VAT, for instance, is extremely important for a state. In addition, eInvoicing helps to save remarkably on labour, paper and postage costs.

Several states have reported their progress in the introduction of eInvoicing. The public sector in Denmark accepts only electronic invoices already since 1 February 2005[81]. Sweden and Italy are prepared to follow Denmark's lead. It is presumed that starting from 2010, the public institutions in all EU Member States, including Estonia, will accept only electronic invoices. The Estonian Government is planning to change over to paper-free, i.e. electronic invoicing in the public sector by 2010. This means that all institutions will submit only electronic invoices and are prepared to receive them.

Starting from 2010, the public institutions in Estonia, will accept only electronic invoices

eInvoicing expert working group

The Minister of Economic Affairs and Communications has established an expert working group for settling the technical, legal and organisational issues related to eInvoicing and co-ordinating the changeover to eInvoicing. The working group develops proposals for the creation and development of Internet-based technological environment for eInvoicing. For this purpose, the group prepares a detailed action plan for the changeover to eInvoicing, determines the scope of the project, and assesses the need for additional analyses and resources.

Detailed action plan for the changeover to eInvoicing

In order to develop the Estonian eInvoicing system, the working group analyses public sector payments and accounting processes and evaluates the opportunities and feasibility of the implementation of eInvoicing. Consideration is also given to the international standards and experiences of other states, especially Scandinavian countries. The working group prepares a target task and action plan together with economic reasoning and submits it to the Government.

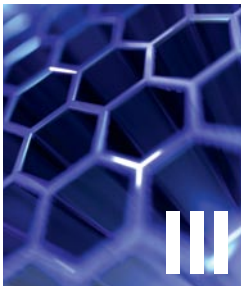
The development of eInvoicing in Estonia covers the following topics and project groups:

- standardisation of eInvoicing;

79 See further information at the website of EU Directorate-General for Enterprise and Industry at http://ec.europa.eu/enterprise/ict/policy/einvoicing/einvoicing_en.htm.

80 http://www.cen.eu/cenorm/businessdomains/businessdomains/isss/activity/einvoicing_2.asp

81 http://www.egov-iop.ifib.de/downloads/Interoperability_in_eInvoicing_in_Denmark.pdf



- cooperation between operators and service providers of electronic invoices;
- addressing electronic invoices;
- preparing a financial analysis;
- division of tasks between the private and public sector;
- life cycle of invoices;
- security and protection of data;
- infrastructure and technological environment of eInvoicing;
- amendments to legislation;
- specific requirements for public accounting.

Development should draw on open standards and applications

All national and local government authorities should be included in the development of eInvoicing. The development should draw on open standards and applications with unrestricted access. It is also important to convince the users and win their approval, which means that all interest groups need to be included right from the start. The state has to choose a platform for eInvoicing and decide whether to implement the platform by an agreement between the interest groups or by law.

Estonia's public key infrastructure, ID-card, digital signature and digital stamp have established a good basis for winning the trust of the users of eInvoicing. The introduction of digital stamp of legal entities or institutions ensures the authenticity and integrity of electronic invoices also in the case of unsigned invoices allowed by the Estonian Accounting Act.

Digitisation of invoice processing

The circulation and processing of one paper invoice within an institution takes approximately 26 minutes. To cut labour costs, the processing of invoices should be digitised, as the processing of electronic invoices takes only approximately 5 minutes. eInvoicing is not merely a matter of format, but above all a matter of the renewed work processes, i.e. digital processing. There are special invoice processing software applications available for this purpose and the more complex financial software applications include also modules for the digital processing of invoices. Each institution would use the processing software that corresponds to its basic needs. It is also necessary that all incoming invoices would be available for the software both in the form of an image and data.

Not merely a matter of format, but above all a matter of the renewed work processes

Estonia's eInvoice standard

Under the auspices of the Estonian Banking Association, an XML-based Estonian eInvoice standard has been prepared. Currently it includes primarily the transmission information, but a supplemented version of the standard is under way. In the new version, the volume of information on the separate lines of the invoice could be bigger, depending on the area-specific needs. Commercial and addressing details should also be included. Yet it must be borne in mind that the volume of added details should stay minimal, and thus we should stick to the common basic invoices.

Economy in real-time

Co-operation, agreements and IT interoperability

The implementation of eInvoicing in the improvement of invoice processing procedures and work flows can be considered as a step towards the establishment of eCommerce environment. This contributes to the development of electronic contracts, public procurement, auctions and other environments and business models. On the one hand, this is related to commercial interests and efficiently functioning public sector. On the other hand, it is the co-operation, agreements and IT interoperability that are important. Real-time co-operation between accounting systems is ensured by the creation of inter-channel interfaces. In addition to technical aspects, the economic content is also converted. This results in automated business processes. Developing an Internet-based environment focused on services also helps create new business models and introduce innovative ICT solutions.

3.1.2 Estonian company registration portal accepts digital signatures given in other countries

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The development of e-services in Estonia has been fast in recent years. Most management of business with the state can be executed either by e-mail or through different portals. Simpler proceedings can be performed by way of summary procedures, but more complex transactions requiring legal certainty must be confirmed either with personal or notary's digital signature. The development of e-services in Estonia has been facilitated by the wide spread of the Estonian ID card and broad availability of the Internet. The ID card allows us to securely communicate with the state. Can the same be said about communication with other EU member states? Estonia has set itself a target to accept digital signatures that have been issued with ID card certificates of other EU countries. Portugal has a similar aim and other countries are also moving in the same direction.

Target to accept digital signatures that have been issued with ID card certificates of other EU countries

Most Estonians know that they can communicate with the state without leaving home and confirm transactions by digital signature, if necessary. Though the number of people using this possibility is still limited, the usage is expected to gradually increase.

e-äriregister
RIK Centre of Registers and Information Systems

Establishment of a company over the Internet

Enterprises operating in Estonia must communicate with the state frequently. Paying taxes and submitting annual reports constitute a yearly activity for businessmen. Foreigners willing to do business in Estonia usually establish a company here. Owners of the Estonian ID card can establish a new company easily and conveniently over the Internet, but up to 2008, this was not possible for foreigners. Since November 2008, the Company Registration Portal[82] is open also for ID card owners in Portugal, Finland, Belgium and Lithuania, allowing them to set up a company in Estonia through the Internet.

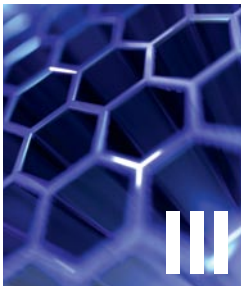
This cross-border digital signature project, led by the Ministry of Justice[83] and the Centre of Registers and Information Systems (RIK)[84], is probably the first, where a register of one country officially accepts the national ID cards (certificates) and digital signatures issued with them of other countries. The project was launched in 2007 in co-operation with the Portuguese business portal *Portal da Empresa*[85], managed by the Ministry of Justice of Portugal, which now accepts also the Estonian ID card and digital signature.

Establishment of a company, submitting annual reports and amending registry details of a company

Similarly to the Estonian Company Registration Portal, the Portuguese business portal allows, in addition to the establishment of a company, submitting annual reports and amending registry details of a company. There are electronic proceeding portals or plans to develop these in most EU member states, but the Estonian Company Registration Portal and its Portuguese counterpart are, to our knowledge, the only portals in Europe enabling electronic authentication and digital signatures by ID card owners of other countries. Electronic proceed-

2008, 40% of companies were established through the Estonian Company Registration Portal

82 https://ettevotjaportaal.rik.ee/index.py?chlang=eng
83 http://www.just.ee
84 http://www.rik.ee
85 http://www.portaldaempresa.pt



ing considerably reduces administrative burden and facilitates the life of businessmen. For instance in 2008, 40% of companies were established and 20% of annual reports were submitted through the Estonian Company Registration Portal. The percentages have doubled every year and, hopefully, the Company Registration Portal will become as popular among foreign businessmen as it is among domestic ones.

Why is the recognition of foreign digital signature certificates necessary?

Article 8 point 1 of the Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market sets out:

Digital signing can be used in communication with administrative agencies

„Member states shall ensure that all procedures and formalities relating to access to a service activity and to the exercise thereof may be easily completed, at a distance and by electronic means, through the relevant point of single contact and with relevant competent authorities."

In Estonia, it is currently possible to establish a company electronically through the Estonian Company Registration Portal by providing certain data and confirming them by digital signature. Pursuant to section 4 of § 14 of the Administrative Procedure Act, digital signing can be used in other communication with administrative agencies. In accordance with the provisions set out in Chapter 38 of the Code of Civil Procedure, a participant to a procedure may submit also digitally signed documents to the court. The Digital Signatures Act establishes that certificates issued by foreign certification providers are recognised as equivalent to certificates issued by certification service providers in Estonia if at least one of the following conditions is met:

1. According to the decision of the chief processor of the register, the foreign certification service provider complies with the requirements provided in the Digital Signatures Act and legislation established based on the basis thereof.
2. The certificates of the foreign certification provider are guaranteed by a certification service provider acting on the basis of the Digital Signatures Act, who assumes responsibility for the accuracy of the data contained in the certificates.
3. The certificates issued by the foreign certification provider are recognised by an international agreement entered into by the Republic of Estonia.

Currently no fully functional system for the evaluation of foreign digital signature certificates

At the same time, there is currently no fully functional system for the evaluation of foreign digital signature certificates and for the check-up of their validity. Therefore, it is not yet possible to accept digital signatures on a wider scale (the conditions of issuing digital signature certificates by certification service providers in different countries vary considerably). For the time being, the Ministry of Economic Affairs and Communications has given positive assessment to the ID certificates issued in Portugal, Belgium and Finland as well as to their accordance to our Digital Signatures Act.

In order to allow foreigners to manage their affairs in Estonia without having to come here, a system should be developed for the evaluation and check-up of digital signature certificates issued in other countries.

Documents that have been digitally signed by recognized certificates could be used in different fields. First and foremost, they could be used in legal proceedings, registry matters and administrative proceedings, but also in relations under civil law. Bank transaction can be brought out as an example of the use of digital signatures in private law. In legal proceedings, a system for the evaluation of certificates issued abroad would allow citizens of other member states submit applications to Estonian courts electronically and enable, thus, to extend the application area of order of payment order set out in the Regulation (EC) No 1896/2006 of the European Parliament and of the Council.

3.2 Increasing the competitiveness of the Estonian ICT sector

3.2.1 Initiatives targeted at increasing the competitiveness of other economic sectors with ICT

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The Estonian Association of Information Technology and Telecommunications (ITL) is a non-profit organisation assembling ICT companies and education institutions. There are currently 42 companies and organisations with over 3,700 employees in the association. The turnover of companies belonging to ITL amounted to over 15 billion kroons (ca 937,500,000 euros) in 2007. Throughout its long history (the predecessor of the ITL – Association of Computer Companies – was established in 1993) the organisation has tried to contribute to the development of both its own and other economic sectors. In 2007, the share of GDP produced by companies belonging to ITL was approximately 10%. For the coming years, the organisation has formulated the following vision: to support the development of the ICT sector by directing its activities more outwards (abroad, including the EU) and seeking synergy between ICT companies and fields related to the ICT sector.

Estonian Association of Information Technology and Telecommunications (ITL)

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Elaboration of a development plan for the ICT sector

In order to make the development of the ICT sector more systematic, ITL has elaborated a document called "Development Plan for the Estonian ICT Sector". The objective of the document is to give directions (primarily) to the sector itself and to its support structures for the next five years. The development defines focus areas for investment and competences to be developed. The strategy is a consensus-based document setting out directions and activities for the Estonian ICT sector. The document was completed in February 2009.

Conclusions of the ICT foresight report EST_IT@2018[86] carried out by the Estonian Development Fund considerably contributed to the elaboration of the development plan. In addition, outputs of the strategy will be used as an input for new projects in the framework of a recently launched cluster development programme[87].

ICT foresight report EST_IT@2018

Co-operation with other branches of economy

Since ICT permeates all important branches of economy, ITL has initiated several co-operation projects with other economic sectors. Some years ago, the association started a SWOT-analysis on cluster development and has carried out several surveys about the ICT landscape in Estonia. Since 2006, regular discussions have been held with representatives of associations and companies of other economic branches. As an outcome of these, several new opportunities have emerged for the application of ICT

ICT permeates all important branches of economy

86 http://www.arengufond.ee/eng/foresight/estit2018/

87 The programme was launched and is operated by the Estonian business support organisation Enterprise Estonia.

in the development of production processes and products of the so-called traditional industry.

The following is a short overview of three co-operation projects: development of wood logistics in an e-environment, development of an Innovation Centre, and establishment of an ICT Demo Centre.

Development of wood logistics in an e-environment

Co-operation between companies and business associations can lead to innovative projects and solutions

This project serves as an excellent example of how co-operation between companies and business associations can lead to innovative projects and solutions. In addition, the project proves that the realisation of a good idea takes time and needs incitement also from central or local government.

The project was launched in 2007, when the management boards of the Estonian Logistics Association (ELÜ) and ITL came together with an aim to discuss co-operation potential. In December 2007, first joint seminar on general issues was held for the members of the two associations. In April 2008, another seminar followed in order to analyse specific co-operation possibilities. In the course of the seminar, a list of potential co-operation projects was drawn up. Members of the associations then picked out three projects and evaluated their development potential during a joint seminar in June 2008. These three projects were:

1. Electronic conveyance document in wood transport (a working title for the wood logistics project).
2. A „common pot“ of e-services for logistics companies and their clients (an information environment providing information about logistics service providers for their customers).
3. Common coding systems or forest data systems allowing to save up to 3.8% of total costs.

Participants of the seminar decided that the project on electronic conveyance document had the strongest potential. The project is necessitated by the following facts: pursuant to the Forest Act, all transporters of wood must carry a conveyance document. There are approximately six million cubic metres of timber wood chopped annually in Estonia, requiring at least 350,000 shipments. Thus, there are 350,000 conveyance documents to be completed (so far, this has been done manually!) in three copies. Data maintained on paper needs to be manually entered in different information systems at three different places (at the sender of the timber, its transporter and its consignee). Since for the time being, there is no common system for the transmission of standardised information throughout the whole supply chain, much of the work is constantly doubled. Not only is the meaningfulness of manual and multiple completing of conveyance documents questionable in the e-era, it also means that data moves slowly and errors in data entering occur. This makes the whole data exchange clumsy and inefficient.

Project on electronic conveyance document

As a next step, the Estonian Forest Industries Association (EMTL) submitted, in the framework of the call for applications organised within the Structural Funds mechanism by the Estonian Informatics Centre in August 2008, an application in order to receive funding for a project entitled “Development of wood logistics in an e-environment”. The objective of the project is to digitise timber trade related information, standardise data structures, and improve and accelerate information exchange between different parties. This would considerably increase the efficiency of handling conveyance documents.

Objective of the project is to digitise timber trade related information

The pre-application was satisfied in October 2008, after which EMTL established a lead group and a working group for the project. In addition to the timber industry, the groups bring together representatives from the Ministry of Environment and transport companies, proving thus wide support to the implementation of the project.

By the end of January 2009, the initial task of the project was elaborated and procurement for the purchasing of software, hardware and testing of the solution was carried out. The final application will be submitted to the Estonian Informatics Centre in April 2009 and, upon its approval, the project will be implemented. The estimated time of implementation is 12 months, meaning that the solution will be available for use by autumn 2010.

It will no longer be necessary to enter data manually at three places

The outcome of the project – an electronic conveyance document – will be the joining link between the information systems of the seller, the transporter and the customer. It will no longer be necessary to enter data manually at three places. The information system will affect all business processes of companies related to timber trade and will increase the efficiency of their work. All enterprises and organisations that form a part of the supply chain of the forest and timber industry, but also several state institutions vested with the responsibility of monitoring deals related to the purchase and sale of timber, will benefit directly from the system.

Considering the second part of 2007 as the time, when the project idea was generated, and the second half of 2010 as the time, when the project will be completed, it can be said that the duration of a wide-scale project aimed at increasing the efficiency of a specific branch of economy is approximately three years. This should be taken account in the elaboration of state-level funding schemes.

Optimisation of timber transport

EMTL actively explores also other ways for increasing the efficiency of its sector. In September 2008, an application was submitted to the „Fund for Wise Decisions“88 for carrying out a survey on macroeconomic aspects of timber transport. The general aim of the project is to increase international competitiveness of the forest and timber industry. The immediate goal of the project is to carry out a survey identifying the best possibilities for the optimisation of timber transport through improved use of transport and road networks. The survey explores ways to reduce timber-related transport and increase road safety.

The pre-application for this project, too, was satisfied and the State Chancellery advised EMTL to involve the Ministry of Economic Affairs and Communications as a partner. The final application was submitted by 26 January 2009.

Establishment of an Innovation Centre

The Federation of Estonian Engineering Industry and ITL plan to establish an Innovation Centre. For the time being, a joint protocol on development activities has been signed by the Ministry of Economic Affairs and Communications, Tallinn Technopol and the Association of Mechatronics. Interest in such an undertaking by businesses has been analysed and deemed considerable, since enterprises regard the Innovation Centre as a necessary and promising output. Negotiations on the organisation of practical co-operation network are ongoing. The following is an overview of the idea behind the Innovation Centre.

Transition to knowledge-based economy

Ensuring long-term competitiveness of Estonian entrepreneurship presumes transition to knowledge-based economy. Cost advantage that, besides our stable macroeconomic framework, has been one of the major strengths of the Estonian economic environment, is clearly no longer sustainable. Thus, enterprises that so far have relied primarily on cheap production input, need to start creating higher added value, if they want to survive and be competitive in the future. In addition, the state as a whole needs to contribute to the implementation of technologies and promotion of Estonia as a technologically advanced country.

Competitiveness of businesses and the growth of productivity

Supporting such developments requires, however, strategies that would support the development and competitiveness of businesses and the growth of productivity. These will be the cornerstones for achieving international competitiveness of Estonian entrepreneurship. Keywords in this context include entering new markets of high-technology products, promotion of internationalisation and ensuring critical mass for the successful creation of knowledge-based society.

With competent employees and top-level equipment, the Innovation Centre will provide businesses with first class support, allowing thus to considerably improve the image of the Estonian manufacturing industry, increase the competitiveness of enterprises, and raise the level of innovation in the society as a whole.

Practical, theoretical and strategic support for production

In essence, the Innovation Centre will serve as a practical, theoretical and strategic support for production. It will be located close to production and will form a kernel of a cluster to be developed. Innovations and novel profitable processes

88 The fund is operated by the State Chancellery.

occurring as an outcome of the synergy between the different parts of the cluster will give boost to high-technology product development.

The Innovation Centre will increase integration between companies of different fields (ICT, electronics and engineering, etc), research and education institutions and state support structures. The goals of the centre will be the following:

- to enter high-technology fields, such as space technology, aeronautics, military production;
- to lay ground for the production of mechatronics products in Estonia (robotics, equipment and mechanisms for process automatisation, sensor technology, IT solutions);
- to increase the technological capability of enterprises and the competitiveness of their production resources through the execution of orders in co-operation with the Innovation Centre;
- to reinforce processes related to product development, production planning and management, and strengthen production automatisation in enterprises;
- to ensure the capability of high-precision production in Estonia by guaranteeing respective certification service on the basis of an accredited measuring laboratory in the Innovation Centre.

The main components of the cluster development are presented in the diagram below.

Development of an ICT Demo Centre

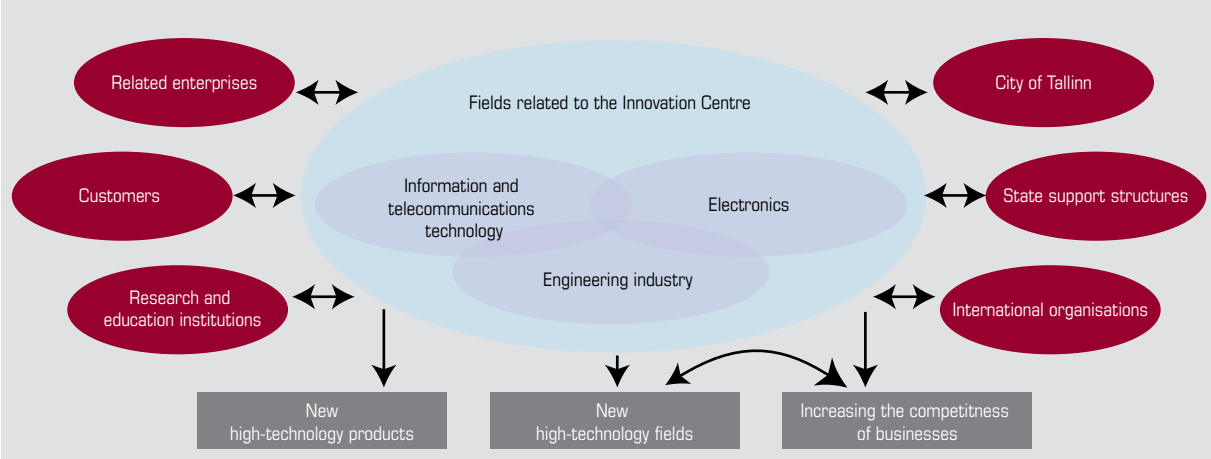
The need to promote co-operation between Estonian ICT companies has been discussed at various forums and workshops for years, but so far without any real actions. During the last couple of years, however, a circle of more active ICT entrepreneurs have come together and, thus, a number of significant projects have been initiated. The ICT Demo Centre is the first specific co-operation project between Estonian ICT companies that aims at joint marketing and product development of ICT solutions that have been developed and implemented in Estonia.

Joint marketing and product development of ICT solutions

So far, Estonia has lacked a place, where it could demonstrate software and hardware developed by different ICT companies functioning not as single solutions but as an integrated e-environment. Product or service presentations are frequently limited to serving as theoretic demonstrations either on paper or on the computer screen. They do not often offer customers the possibility to try out the solution themselves and see whether what has been promised really functions in reality; to learn, whether the solution is compatible with others; and to find out, what user skills are needed for its implementation.

The objectives of the Demo Centre are the following:

1. by showcasing functioning integrated ICT solutions, to introduce IT usage possibilities for companies;
2. to introduce the already existing eState solutions and possibilities of integrating them for state agencies;
3. to introduce Estonian eState solutions both for Estonian and foreign companies;
4. to develop co-operation between ICT enterprises in the field of product development and joint



marketing, increasing thereby the export capacity of the Estonian ICT sector as a whole;
5. to establish necessary infrastructure and technological platform for the creation of the Estonian ICT test and development centre, where different ICT solutions could be elaborated, productised and tested.

Demo Centre was built as a mini model of the society

The Demo Centre was built as a mini model of the society, where one can familiarize himself with ICT solutions used in different environments. There are solutions for businesses, home users, education institutions, the state, as well as for places without Internet connection and Wi-Fi area.

All companies, whose products or services can make our daily lives simpler, more convenient and inspiring, are invited to join the centre. However, all these companies have to accept the following principles:

Integration – all participants are willing to integrate their solutions and systems with other solutions represented in the Demo Centre.

Unity – no-one except the developer of a particular solution is entitled to take solutions and products installed in the centre out of it. The Demo Centre is not a library, where one can borrow books in order to take them home!

Common use – all members of the Demo Centre can use its facilities for the organisation of presentations and demonstrations of their products and solutions for their customers.

Joint contribution – all members participate in covering the expenses related to presenting and interfacing their solutions and services with other solutions in the Demo Centre.

Openness – the Demo Centre is open for all companies developing ICT solutions, acknowledging its functioning principles.

Positive atmosphere – the Demo Centre is not a place to dispraise the solutions of competitors, but an environment, where smooth co-operation and integration possibilities of different IT solutions are demonstrated.

Co-operation with the public sector and research and education institutions

In order to ensure sustainability of the Demo Centre, it is vital to pursue co-operation with the public sector and research and education institutions. Private sector efforts are not sufficient for the successful productization, marketing and export of eState solutions. First and foremost, enterprises expect the state to solve intellectual property issues of some eState solutions, promote Estonia as a successful eState through its international communication channels and to support the growth of the sector's export capacity through investment in R&D, technology education and the implementation of ICT solutions in other branches of economy.

For the marketing of the Demo Centre as well as for the exchange of ideas and co-ordination of activities, an appropriate e-environment will be created. Furthermore, use will be made of Ülemiste City advertising channels, targeted campaigns and joint marketing of enterprises. For the marketing of eState solutions, communication channels and contacts of the state and the city of Tallinn will be used.

The Demo Centre is expected to evolve into an innovation environment attracting high-level politicians and delegations, investors and foreign businesses in search for co-operation partners, but also international developers of new technologies needing to carry out proof-of-concept tests and to receive feedback from test customers.

As a conclusion, companies, business associations, the Ministry of Economic Affairs and Communications, Enterprise Estonia, as well as the Estonian Informatics Centre deserve recognition for having contributed to this joint activity. The year 2009 promises to become an interesting innovation and co-operation year the outcomes of which will be available to us already in 2010 and which will help up to survive complicated times more easily.

3.2.2 Improving the competitiveness of ICT undertakings via the cip programme

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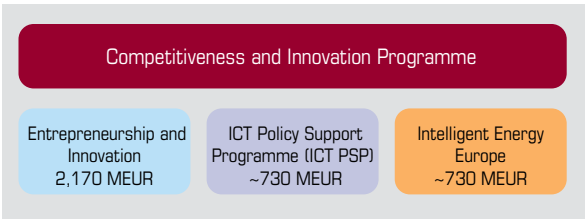
The European Union's Competitiveness and Innovation Framework Programme (CIP) was launched in 2006 to support projects in 2007–2013. CIP comprises three sub-programmes (entrepreneurship and innovation, ICT policy support and intelligent energy), which in turn divide into various support measures (see also Figure 1).

European Union's Competitiveness and Innovation Framework Programme

Figure 1. EU Competitiveness and Innovation Framework Programme



The ICT Policy Support Programme (ICT PSP) aims to encourage and accelerate the development of a sustainable, competitive, innovative and inclusive information society. The introduction of innovative ICT solutions in business is determined by the private sector and the role of the public sector is only to create the environment and provide information on the opportunities of ICT solutions. The adoption of ICT in areas of public interest such as health, inclusion, cultural values, learning, public administration or energy efficiency requires more forward-looking action plans and intervention. The main obstacles here are the low level of compatibility of ICT-based services between countries and the fragmentation of the market. The ICT PSP helps to implement the aims of i2020 strategy by creating a market for innovative ICT solutions in areas of public interest. This in turn contributes to the development of new small enterprise in Europe.

Development of a sustainable, competitive, innovative and inclusive information society

The ICT Policy Support Programme facilitates the use of area-specific research and development results and is orientated towards the implementation of already existing solutions across Europe. This is how the implementation of Europe's action plans as well as the most effective use of EU grants is guaranteed. The ICT PSP helps to bring the results of supported research and development projects to a specific product, market and implementation. However, its scope does not extend to development. To be more specific, this programme has three objectives:

Implementation of already existing solutions across Europe

- To launch pan-European public ICT-based services in the public interest by supporting above all the small and medium-sized enterprises (SMEs) and their business environment.
- To reduce the fragmentation in the EU's ICT-based services market in order to create more room for SMEs.
- To finance the participation of SMEs in the implementation of innovative ICT projects in the framework of pilot projects and networks in cooperation with the end-user.

Scope and results of ICT PSP

The budget of the ICT Policy Support Programme grows year by year. In 2007, the budget was 57 MEUR, while under the Call for Proposals for 2013, projects are funded in the total amount of 149 MEUR. The relatively modest interest of applicants in the ICT PSP in the initial years of the programme can probably be explained by the novelty of the project and the relatively small amounts of support. Call 1 resulted in 86 proposals, 22 (25%) of which were approved. Call 2 resulted in 66 proposals, 19 (29%) of which were approved.

Representation of Estonia in previous calls

There were altogether over 1,000 partner organisations across Europe participating in the projects

of Call 1. 400 partner organisations of successful projects met the requirements. Eight of them that were of Estonian origin took part altogether in nine proposals, though not as a co-ordinator in any of them.

Four of the projects with Estonian partners were successful: STORK, Dreaming, CALLIOPE and NESIS. The projects of Call 1 have all been evaluated and agreements have been concluded with the successful applicants. The successful partners were AS Sertifitseerimiskeskus (Certification Centre) participating in project (Pilot Type A) STORK, which introduces an EU-wide system for the recognition and authentication of electronic identity; AS Ida-Tallinna Keskhaigla (East Tallinn Central Hospital) participating in project (Pilot Type B) Dreaming, which introduces new services to support independent living of the elderly; and Eesti E-tervise Sihtasutus (Estonian eHealth Foundation) and TietoEnator Eesti AS participating in Thematic Networks CALLIOPE and NESIS.

Establishment of a specific pan-European system and development of one's own services accordingly

According to Tarvi Martens, Certification Manager at Sertifitseerimiskeskus, the development of electronic identity (eID) in Estonia is well advanced and Estonia has a lot of experience in this field. Participation in the CIP project STORK is therefore a natural course of events. The project creates opportunities for using eIDs of different countries in the European Union irrespective of the country of residence. Participation in this project enables to have a say in the establishment of a specific pan-European system and to develop also one's own services accordingly.

A lot of new contacts

For Eesti E-tervise Sihtasutus, participation in the projects is above all an opportunity to introduce Estonia's achievements in the field of eHealth and to learn from other organisations in the same field. According to Katre Savi, Project Manager at Eesti E-tervise Sihtasutus, participation in a Thematic Network project was the right decision for the Foundation in 2007. A lot of new contacts have been established and by now the cooperation between partners has extended far beyond CALLIOPE.

Eesti E-tervise Sihtasutus is an acknowledged partner in Europe. Estonia and Turkey are the first two countries in the world to introduce a national health information system. 2007 was the first year of the ICT PSP, as well as the first year of international cooperation for Eesti E-tervise Sihtasutus. Therefore it was especially important that the eHealth Foundation had an opportunity to use the contacts of Invent Baltics OÜ – the National Contact Point – for finding projects and organisations that might be interested in the partnership. The next step for Eesti E-tervise Sihtasutus is to participate as a partner in Pilot Type A projects, which are aimed at the introduction of specific pan-European solutions. For this purpose, the Foundation has started negotiations with the management committee of "European epSOS eHealth Project", which received a grant under the Pilot Type A of the ICT PSP and was launched in 2008, to join the Consortium of the project as a new partner.

Given that the themes in all CIP ICT PSP calls are quite similar, there were a little less partners participating in Call 2 compared to Call 1. Although Eesti E-tervise Sihtasutus was the only one from Estonia to participate in Call 2, the project turned out to be a success: namely the Thematic Network project HER-Q-TN, which is co-ordinated by the European Institute of Health Records (EuroRec).

Estonian partners have been very successful in the calls

So far, the Estonian partners have been very successful in the calls and will hopefully take part also in Call 3 and not only as partners but also as co-ordinators. In 2009, funding will be allocated to 8 themes; comprising 23 sub-measures1. The indicative budget for 2009 is 107 MEUR. This is nearly two times more than in the two previous years and it will be divided between approximately 30 projects.

Supporting the participation of Estonian partners

The interests of Estonia in the CIP ICT PSP are represented by the Ministry of Economic Affairs and Communication, and the National Contact Point has been Invent Baltics OÜ2. Interested parties can contact Invent Baltics OÜ consultants to get advice on the preparation of proposals. .

Cyber security

4.1 Iske: the information security standard for egovernment

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The development of eGovernment has increased the importance of IT regarding the provision of services. Consequently, the state has become more dependent on information systems. A failure in some important information system might have a considerable impact on service provision. Information systems have also become more vulnerable, as new attack methods emerge all the time and attackers advance their skills. It is recommended to use information security standards for the protection of databases and e-services by establishing better conditions for the security of data in information systems. To this end, Estonia adopted the information security standard ISKE in 2004.

Three-level baseline protection system for information systems

ISKE is a three-level baseline protection system for information systems.[89] It has been developed based on the information security standard IT Baseline Protection Manual (IT Grundschutz-Katalog) of the German Federal Office for Information Security (BSI).

The purpose of building such a system is to provide sufficient security for the data processed in information systems and related information assets. Pursuant to Government Regulation on establishing a system of security measures for information systems, ISKE is compulsory for the bodies that maintain state and local government databases. Also business companies can and do use it for ensuring the security of their IT assets.

ISKE is compulsory for the bodies that maintain state and local government databases

Version 1 of the implementation guide of ISKE was completed in October 2003. In 2008, Version 4 was published. The system includes three levels of security: low (L), medium (M) and high (H). The necessary level of security is determined on the basis of security classes or security sub-classes (see Figure 1).

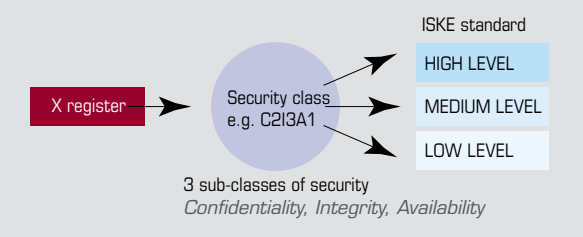

Figure 1. Classes and levels of security of a database

The regulation provides for establishing the class and level of security of all national and local government databases. The security classes are determined on the basis of confidentiality, integrity and time criticality of data.

The time criticality of data lies in the timely and easy availability of data to authorised users (persons or technical devices) within the agreed time frame. Time criticality is the primary requirement to all data and other information assets of an information system, as their later availability would make the whole information system useless.

The **integrity of data** refers to ensuring the accuracy, completeness and timeliness of data, the authenticity of data sources and protection against unauthorised alteration.

The **confidentiality of data** means that data are available for authorised users only.

When determining the security sub-classes the following types of requirements must be taken into account:

- laws and requirements arising from contracts;
- requirements arising from the processes related to principal (or business) activities;
- requirements arising from the seriousness of consequences.

The level of security is established according to the security class. The inventory data of IT assets and the level of security serve as the basis for compiling the list of necessary security measures.

Level of security is established according to the security class

89 See also http://www.ria.ee/iske.

Every new version of the implementation guide of ISKE includes updated catalogues and security specifications in compliance with the amendments and improvements made in the latest German version of the BSI manual. The latest version of the implementation guide is Version 4.01, which includes descriptions of all modules in the Estonian language. In addition, the translation of descriptions of security measures is under way. Only the descriptions of security measures of the modules used in Estonia are translated.

IT audits must be conducted to state and local government databases

In 2008, the regulation on ISKE was improved by adding the conditions for auditing. This was necessary to launch and ensure supervision related to the implementation of ISKE. Pursuant to the regulation, IT audits must be conducted to state and local government databases that are part of the state information system. In the maintenance of databases, IT audits are commissioned by chief processors of databases. Audits of local government databases are commissioned by the Ministry of Economic Affairs and Communications in accordance with the terms and conditions laid down in the regulation. Audits can be commissioned prior to integration of the database to the state information system; after a major security incident; for prevention of security incidents in the case of certain risks; occasionally over a period of time, or in other justified cases. IT audits must be conducted in accordance with the security level of databases and after a certain period of time: databases with high security level in every two years, databases with medium security level in every three years, and those with low security level in every four years.

Information days and trainings

In addition to the amendment of the implementation guide of ISKE various other support activities were on the 2008 agenda, such as organisation of information days and trainings, responding to questions concerning the implementation guide, etc. All the above-mentioned activities will be carried on also in the coming years in order to ensure appropriate implementation of security measures in agencies and institutions. This serves to provide sufficient security for state and local government databases and related IT assets.

4.2 Cyber security: a part of internal, External and economic security

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» The problem with modern-day security threats is that it is often difficult to identify the exact sphere of authority and the state agency responsible for taking the necessary countermeasures. Ensuring cyber security is like fight against terrorism in the sense that there is no single agency in charge – it involves national intelligence services, diplomatic representations, legislators, private sectors and the military. Every country has shaped the administration and defence of its strategic information systems and critical infrastructure to its best knowledge.

Unlike terrorism, which created international consensus and close cooperation on fight against terrorism after the 9/11 events, cyber security has not provoked such active international engagement. The attack against Estonia in 2007 was the first cyber attack targeting an entire country. Actually, massive attacks against other governments and private sector targets have occurred also before and after 2007, and analysts predict a cyber attack like the 9/11 to strike some time in the near future.

After the cyber attack against Estonia various countries have asked what kind of measures Estonia took to combat the 2007 attack and any future attacks. In our response we have emphasised the importance of cooperation between public and private sector IT security managers, the rapid reaction of Estonia's CERT specialists, and Estonia's international contacts. Regarding the future, we have developed the Estonian Cyber Security Strategy[90]. We have reached a national consensus that cyber attacks are to be

90 http://www.mod.gov.ee/static/sisu/files/Estonian_Cyber_Security_Strategy.pdf

treated with seriousness through close cooperation between all agencies. We have also established several working groups at different levels and amended the legislation, and are currently mapping Estonia's critical infrastructure. In addition, a platform for dialogue with critical private sector companies has been created to build a national defence system for the critical information infrastructure.

National defence system for the critical information infrastructure

Finding national countermeasures to the cyber security threats is a difficult task because of the absolute asymmetry of these threats. First, cyber attacks can be launched from great distances without any visible consequences in the physical world. Therefore, it is difficult for the general public to make a difference whether the failure of Internet banking services, for instance, has resulted from a cyber attack, a technical breakdown or pre-planned maintenance. Besides, it is not possible to understand the motive of the attackers at the time of the attack – similar attacks are carried out for criminal, political or terrorist purposes. In order to identify the motive, it is necessary to analyse the context and methods of the attack as well as the background of the attackers. Concrete organisers are often very difficult to pinpoint, as it is easy to forge IP addresses and attacks can be made through phantom servers on different continents. Owing to these asymmetric parameters it is not possible to establish the exact nature and duration of an attack at the time it occurs. Any action to protect public order and identify the attackers must be taken very quickly, within approximately 24 hours. Otherwise the attackers will be able to change their location or country and the traces will be lost.

Any action to protect public order must be taken very quickly

When planning countermeasures, it is expedient to proceed from the extent of potential damage and strengthen the protective measures. Thus, the first thing to do in the case of a cyber attack is to identify the target objects that might pose a threat to human health, bring considerable economic losses or damage the state's functioning in some other way. Then all other actions related to the protection of critical information systems can be planned, such as training of specialists; raising general awareness of IT security, including among ordinary users; international cooperation, and amendment of legislation. The most extensive part of ensuring national cyber security is the protection of the national civil infrastructure. According to the logic of construction of a democratic country, in times of peace this is treated under internal and economic security. It becomes a field of national defence rather in the context of preparing for war. Therefore, the Ministry of Internal Affairs and the Ministry of Economic Affairs and Communications play an important role here, as their fields of responsibility are directly related to the implementation of cyber security. Many critical economic sectors are governed by different stage agencies. For instance, banking supervision is under the Financial Supervision Authority; currency circulation is the responsibility of the central bank; water economy is organised by local governments, etc. Consequently, the first step is to define the areas and services that are vital for the functioning of the state.

Both the providers of vital public and private sector services depend on the business continuity of information systems. Ensuring the smooth operation of critical information systems under normal circumstances and minimum business continuity in a crisis situation is actually what cyber security is about. In addition, action and recovery plans are needed to restore the functioning of information systems as soon as possible after a cyber attack. As mentioned above, the asymmetric nature of cyberspace does not enable to detect at the initial phase of the attack whether it is an ordinary cyber crime, cyber terrorism or even a cyber war. Thus, the implementation of any kind of protective measures should start from the very beginning; that is, from the prevention of cyber crime and introduction of security measures. This, in turn, requires improving the competencies of agencies that safeguard internal security and public order, enhancing the surveillance of network traffic, and tightening interagency cooperation and exchange of information with the private sector.

Prevention of cyber crime and introduction of security measures

Safeguarding cyber security and establishing a protection system for the national critical information infrastructure takes time and effort – advanced countries have spent years on that. Estonia is a small country, which enables to achieve results faster. Nevertheless, further efforts and co-ordination of work between different state agencies are necessary.

International co-operation in the field of the information society

5.1 e-Governnance Academy in 2008

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The e-Governance Academy (eGA)[91] is a non-governmental, non-profit organisation that promotes the strategic development of e-governance, conducts research and provides expert services in that field. E-governance denotes e-government and different aspects of e-democracy. The latter has attracted a lot of attention in relation to the Estonian e-elections as well as several interesting international projects.

Organisation promoting the strategic development of e-governance

The e-Governance Academy is mainly oriented to the former Soviet Republics (Georgia, Moldova, Armenia, Azerbaijan, Tajikistan, etc.) and the Balkans. eGA provides them with training and advice in using information and communication technology (ICT) to increase government efficiency and to improve democratic processes with the aim of building open information societies. Besides the above-mentioned countries, also Japan, China, Sri Lanka and various African countries have expressed interest in cooperation with eGA.

In the field of ICT, Estonia has gained international attention for its innovative solutions, in particular the rapid development of e-government. We are also glad to share the experience with other countries.

In 2008 the Academy had meetings with the top policy-makers and journalists of Turkey, Bulgaria, France, Sweden, Germany and Greece. Longer introductory and training programmes were organised in Macedonia, Kosovo, Georgia, Denmark, Finland, Bulgaria, Bosnia-Herzegovina, Azerbaijan, Tajikistan, Armenia, the Netherlands, Croatia and Sri Lanka. Several presentations and lectures were also held to visiting delegations in Estonia. In addition, eGA organised seminars in Mongolia, Albania and Qatar, and made presentations in Ghana, the United States and Turkey.

Conference "E-Governance – New Horizons?"

In January 2008, eGA and the Ministry of Economic Affairs and Communications held an information society conference in Estonia. The conference was entitled "E-Governance – New Horizons?" with a focus on the future. The 2007 conference "Information Society for Everybody" targeted everyone interested in information society developments. The 2008 conference, on the other hand, was oriented to top executives, board members, policy-shapers and other decision-makers. Owing to the huge interest in participation, the number of participants was increased by a third compared to the initial registration list. Top foreign lecturers included Hamadoun Touré from the International Telecommunications Union, whose presentation "Connected World in 2018" envisaged the development of ICT in ten years time primarily in the form of mobile solutions. He was seconded by local experts and their visions of ICT developments in ten years. The conference concluded with the panel discussion of entrepreneurs and politicians on the possibilities to increase Estonian IT exports.

In addition to traditional training programmes (e-government at central and local government level; e-education) a few new topics were introduced in 2008, including m-government, geoinformation systems and state registers, aspects of e-democracy, and e-government in the social field.

At the beginning of 2008, a handbook on e-governance at local government level was compiled in Serbian. At the end of the year, a similar handbook was written for the Albanian central government to be published in spring 2009.

The main cooperation partners of the e-Governance Academy in 2008 were the Ministry of Foreign Affairs (use of ICT in schools – projects in Georgia and Moldova, and trainings and meetings with respective delegations); the Ministry of Economic Affairs and Communications (reuse of public information; e-democracy; conference in 2008); the State Chancellery, and the Ministry of Internal Affairs. The primary global partners were the United Nations Development Programme (UNDP), the Open Information Society (OSI) and the World Bank.

91 http://www.ega.ee/

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