



Department of State Information Systems

# **Information Technology in Public Administration of Estonia**

**Yearbook 2006**

**Tallinn 2007**

## Contents

<b>Contents .....</b>	<b>2</b>
<b>About the Yearbook.....</b>	<b>3</b>
<b>Preface.....</b>	<b>4</b>
<b>1. Policy formulation in the field of information society in Estonia.....</b>	<b>5</b>
1.1. Course towards the planned development of the information society .....	5
1.2. National and international interoperability.....	12
1.3. Integration of public sector information systems.....	16
<b>2. Building the ICT infrastructure of the information society .....</b>	<b>20</b>
2.1 Electronic communications – trends and developments in 2006.....	20
2.2. Developments in the field of electronic identity and PKI.....	22
2.3. Implementation of the Estonian Broadband Strategy: Village Road 3 .....	26
2.4. X-Road – one of the cornerstones of the state information system .....	27
2.4.1. X-Road development projects in 2006 .....	27
2.4.2. Principles and history of the X-Road .....	29
2.4.3. X-Road as an element influencing the interoperability of the state information system.....	33
2.5. Launch of paperless communication between document management systems and development of the document exchange environment.....	35
2.6. Improvements to central state portals and related application services .....	39
<b>3. Activities aimed at the development of inclusive society .....</b>	<b>41</b>
3.1. Computer Protection 2009.....	41
3.2. Contribution of the non-profit and private sector to the development of information society .....	43
3.2.1. Role of the ITL in developing ICT in Estonia .....	43
3.2.2. The role of the EITF in developing ICT education and e-Learning.....	45
3.2.3. E-Governance Academy – Estonia’s e-gate for other countries .....	48
<b>4. Development of ICT applications and e-services in the public sector.....</b>	<b>51</b>
4.1 Information society projects developed with the support of the EU Structural Funds ..	51
4.1.1. eHealth projects in the Ministry of Social Affairs .....	51
4.1.2. Integration and e-services of the police information system .....	55
4.1.3. ePRIA – the farmer’s digital friend.....	61
4.2. A single procedural information system for law enforcement authorities – eFile.....	63
4.3. Development of complex e-services in Estonia.....	67
4.3.1. Inter-institutional e-services of childcare information system.....	67
4.3.2. E-services provided by the Health Insurance Fund.....	70
4.3.3. eSTAT: a new channel for the submission of statistical data .....	72
4.3.4. <i>E-services provided by the Environment Information Centre of the Ministry of the Environment</i> .....	74
4.4. Co-operation between the information systems of the Estonian public administration and those of the EU.....	78
4.4.1. Preservation of digital cultural heritage and making it available for the public ....	78
4.4.2. Developments in the field of information systems in the Citizenship and Migration Board.....	81
4.4.3. Developments in the eTax and eCustoms Board in 2006.....	83

<b>5. Developments in IT legislation, standardization and data security .....</b>	<b>87</b>
5.1. Developments in ICT legislation in 2006.....	87
5.2. New IT standards adopted in Estonia.....	90
5.3. Developments of the standard security system for information system - ISKE.....	91
5.4. First year of CERT Estonia .....	93
<b>6. Overview of the surveys on information society, eEngagement and ICT .....</b>	<b>95</b>
6.1. Surveys on information society in 2006.....	95
6.2. Surveys carried out in the field of eEngagement in 2006 .....	98
6.3. Estonian ICT sector in 2005 .....	103
6.4. Overview of the usage of ICT tools in public administration agencies in 2005.....	107
6.5. Information society related developments in local governments .....	113
<b>7. Contacts and links.....</b>	<b>121</b>
7.1 IT contacts in public administration agencies .....	121
7.2. Information society contacts in the public administration .....	124
7.3. Useful links.....	127

## About the Yearbook

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## Preface

Dear reader,

Significant events and developments are usually difficult to perceive when being in the middle of them, and it is often only in retrospect that we are capable of evaluating the importance of different phenomena better.

When looking back at information society related activities in 2006, one must admit that there was a lot indicating new significant developments.

The Internet has always played a significant role in Estonia's development. Over the years, the state has contributed to ensuring its availability in schools, local governments, public libraries and other public sector institutions. In 2006, we took a step further – the launch of the Village Road 3 programme enabled fast Internet access for thousands of people, who had so far been left uncared for by service providers.

Technology is in constant development and the state has to keep pace in order to ensure necessary conditions for its implementation. In 2006, several necessary decisions were made from the viewpoint of the development of new services, such as the digital-TV and new wireless Internet services. The impact of those new technologies on our real life remains to be seen during the coming years.

The year 2006 was a significant one in terms of policy-formulation in the field of the information society. The Government of the Republic approved the Estonian Information Society Strategy 2007-2013. In this context, the time frame of the new strategy deserves to be highlighted – it was only recently that the planning information society related developments for seven years was unheard of. The longer time horizon of the new policy document speaks for the maturity that our society has achieved in the development of the information society. Our plans no longer depend on fast-changing technological nuances, but focus on objectives vital for the whole society – citizens, who lead a full life and are involved in public life; a developing economy; and an efficiently functioning public administration.

These are no longer the tech nerds but all of us who play the key role in the development of the information society.

In order to rationalise the organisation of a field of life with the help of IT, decisions are to be made by those directly responsible for the particular area. There are several success stories in the field of eState in Estonia. I hope that information technology will be put into smart use in all fields of life, allowing us thereby to create a better future for ourselves.

**Mait Heidelberg**

Adviser on IT matters

Ministry of Economic Affairs and Communications

## 1. Policy formulation in the field of information society in Estonia

### 1.1. Course towards the planned development of the information society

The Principles of Estonian Information Policy 2004-2006, approved by the Government of Estonia in 2004, set out three main objectives: introduction of e-services in all state agencies together with respective training and awareness-raising activities for the whole society; keeping the level of ICT use in Estonia at no less than the average level of the EU, ensuring thus the efficiency of the Estonian economy and society in general; and increasing the export capacity of the Estonian ICT sector.

At the end of 2006, it could be noted that Estonia has made considerable progress in the implementation of public sector e-services, being among the EU leaders in the field. For instance, according to the Capgemini survey of 2006<sup>1</sup>, Estonia ranked second after Austria in terms of fully electronic services. In addition, success has been achieved in other dimensions related to the development of the information society. The following includes some examples of that:

- Advanced communications network and good Internet availability. In 2006, the internetization programme for sparsely populated areas of market failure – Village Road 3 (KülaTee 3) – was continued. The objective of the programme is to ensure, by the end of 2006, Internet availability in all populated areas in Estonia.
- Service-oriented approach to the development of information systems and a secure data exchange layer called the X-Road, which constitute the cornerstones of the so-called common service space. In 2006, common use of data from databases and information systems having joined the X-Road increased significantly. The extensive use of the X-Road, also by the private sector, imposes extremely high requirements on the system's availability. To ensure this, several development projects were carried out in 2006.
- The Citizen Portal at [www.eesti.ee](http://www.eesti.ee), reflecting the state as an integral whole, where authorized users have three possible roles: that of the citizen, the entrepreneur, and the official. While in 2005 main focus was placed on ensuring the accessibility of the portal, in 2006 emphasis was primarily placed on the development of services from perspective users' view. The child care service targeted at parents, local government officials, employees of child care establishments, and officials in the ministries is just one example of such services.
- High-quality IT solutions in the private sector, in particular Internet banking and mobile applications.
- Success stories in the Estonian ICT sector (i.e. the Internet communications company Skype, the provider of various GIS and mobile positioning services – Regio, the provider of different m-applications and m-solutions – Mobi Solutions etc.).
- Wide use of ICT in education as a result of the Tiger Leap programme aimed at the internetization of general education schools and improvement of IT skills among teachers.

<sup>1</sup> "Online availability of Public Services: How is Europe Progressing?" Capgemini, July 2006

- The largest functioning public key infrastructure in Europe, based on the use of electronic certificates maintained on the national ID card and allowing to considerably improve the security and functionality of IT solutions. More than 80% of the population possesses the ID card that enables both electronic authentication and digital signing. Relevant legislation is in place, giving the digital signature equal power with the handwritten one, and imposing a responsibility on public authorities to accept digitally signed documents.
- Eagerness of Estonians to use innovative solutions (wide take-up of IT solutions provided by the Tax and Customs Board, Internet banking, m-parking, eVoting etc).

On a self-critical note it has to be admitted that the provision of e-services at local level still leaves a lot to be desired. In addition, much more can be done in terms of awareness raising and training.

So far, information policy related activities in Estonia have mainly been focused on the development of ICT infrastructure and the creation of systems necessary for implementing sectoral policies. In order to increase the competitiveness of the society, more emphasis needs to be placed on the development of citizen-centred and inclusive society, knowledge-based economy, as well as transparent and efficiently functioning public administration.

The year 2006 can be considered ground-breaking. While in previous periods, we have mainly concentrated on the development of the necessary IT framework and environment, the [Estonian Information Society Strategy 2013](#), approved by the Government of the Republic on 30 November 2006, mainly focuses on how to use the “IT power” smartly, increasing thereby the living standard for all of us.

### Objectives of the Information Society Strategy 2013

The Information Society Strategy 2013 sets out objectives in three dimensions on which the functioning of the society is based – social, economic and institutional.

Under its social pillar, the strategy aims to ensure that each member of the society could lead a full life, using the opportunities of the information society and actively participating in public life (“nobody will stay or will be left behind”).

By widening access to digital information and increasing possibilities for participation Estonia wants to achieve a situation, where:

- high-quality Internet will be available throughout Estonia for a comparable price;
- all Estonians will have switched over to the digital-TV and consumers will be able to use public services irrespectively of technological solutions used for their provision;
- all public sector websites will be accessible for people with special needs;
- everybody will have at least basic computer and Internet skills;
- public awareness will have increased about the possibilities and threats, including those concerning IT security and intellectual property, related to the information society.

Under its economic pillar, the strategy seeks to increase the technology-intensiveness of the Estonian economy. This requires, on one hand, that companies will use ICT to increase their productivity and competitiveness while also adjusting their business models in accordance with new technological possibilities. On the other hand, this requires an increase in the added value generated by the Estonian ICT sector and the strengthening of the sector’s export capacity.

By ensuring conditions for the effective application of ICT by businesses and the increased competitiveness of the Estonian ICT sector, we seek to achieve a situation, where:

- the application of ICT will enable Estonian businesses to launch innovative products and services as well as to considerably increase their productivity;
- the number of Estonian computer scientists and IT professors will correspond to the needs of the economy;
- national curricula will be modernized in order to ensure technical-technological competences necessary for coping in the information society and knowledge-based economy;
- as a result of constant revision of state-commissioned education, the number and qualification of Estonian IT specialists will correspond to labour market requirements.

Under the institutional pillar, the strategy aims to ensure the citizen-centeredness, transparency and efficiency of the public sector. Transforming the public sector presumes, on one hand, that state and local government business processes will be efficient, simple and transparent. On the other hand this requires the use of the common service space for the provision of services for citizens and businesses as well as for more efficient communication between public bodies.

In increasing the efficiency of the public administration, the most important objectives are the following:

- all management of public business will be electronic;
- the state information system will be service-oriented and function in accordance with user needs, not based on institutional structure;
- the electronic personal identification mechanisms used in Estonia will correspond to the world's best practice and will be usable both in Estonia and internationally;
- possibilities will be ensured for the use of Estonian e-services by citizens of other countries, in particular those coming from EU member states.

The implementation of the Information Society Strategy requires the involvement of all parties. To this end, the public sector co-operates with organisations representing the private and third sector as well as with the academia.

The Information Society Strategy does not deal with purely technological aspects of the state information system, but seeks – proceeding from the current technological capabilities – to link together the initiatives of different ministries with an ultimate goal of improving the living environment of everybody. The development of the information society is a strategic choice that requires the desire and willingness to change our habitual ways of conduct if necessary.

## Objectives, action fields and measures of the Information Society Strategy 2013

According to the vision set out in the Information Society Strategy, Estonia will be – by 2013 – an inclusive society, raising the living standard of everybody, and a competitive economy with increased productivity and higher employment achieved through the use of rationally developed ICT solutions.

In order to realize the vision, measures have to be implemented in three dimensions on which the functioning of the society is based – social, economic and institutional. The Information Society Strategy sets out objectives in three action fields and envisages measures for their implementation. The three action fields of the strategy are the following:

- **development of citizen-centred and inclusive society;**
- **development of knowledge-based economy;**
- **development of citizen-centred, transparent and efficient public administration.**

### Action field I: Development of citizen-centred and inclusive society

In the information society, most of the information is stored in a universal digital form. The availability of information and skills to use it create preconditions for increasing the welfare and quality of life of citizens. Citizens' welfare also depends on how much their needs are taken into account when organizing public life. Participation in the information society requires, on one hand, multi-channel access to digital information and, on the other hand, skills and willingness to use the opportunities created as well as motivation to actively participate in decision-making processes.

To achieve the objective, two measures will be focused on:

- **Broadening technological access to digital information**

The planned activities include:

- development of data communications networks in areas of market failure and ensuring their commercialisation;
- ensuring favourable environment for the development of new telecommunications technologies and technological convergence, including the take-up of digital-TV;
- bringing public sector websites into compliance with WAI (*Web Accessibility Initiative*) quality criteria;
- further development of the Citizen Portal at [www.eesti.ee](http://www.eesti.ee).

- **Improving skills and widening possibilities for participation**

The planned activities include:

- continuous upgrading of knowledge and skills of all members of society in order to ensure their ability to cope in the information society;
- development and promotion of Internet-based learning environments (eLearning);
- raising public awareness about the information society;



- digitisation and digital preservation of cultural heritage, making it available via the Internet to citizens and integrating it with eLearning environments;
- widening opportunities for participation in decision-making processes (eDemocracy);
- implementation of flexible work arrangements.

The development of ICT brings along ever newer opportunities for the creation, processing and use of digital information. Everybody is free to choose technological solutions he or she finds most suitable. The choice of technological solutions usually depends on their providers' business interests that for the end-user express themselves in the price of the respective service. Business interests are directly linked to the number of potential users which, in turn, depends on the density of population in different regions. It is important to ensure that the information created in the society would be usable by any technological device and in any region of Estonia.

Ensuring high-quality Internet throughout Estonia and making services based on digital information available irrespectively of technological devices gives everybody the opportunity to participate in the information society.

In order to ensure the take-up of the developed IT solutions public awareness must be raised both about the possibilities and threats that such solutions bring along. In addition, the use modern solutions requires sufficient trust towards the technology, skills for using and analysing both the technology and the information, and motivation to use digital content.

#### Indicators:

- **By 2013, 75% of Estonian residents will be using the Internet, while household Internet penetration will amount to 70%<sup>2</sup>.**
- **By 2010, all public sector websites will comply with WAI quality criteria<sup>3</sup>.**

### **Action field II: Development of knowledge-based economy**

In its economic dimension, the strategy aims to increase ICT uptake in all economic sectors. This will contribute to the productivity growth in enterprises as well as to their capability to develop innovative products and services, improving thereby the competitiveness of the Estonian economy. On the other hand, the strategy seeks to create necessary preconditions for greater competitiveness and internationalisation of the Estonian ICT sector.

To achieve this, the following measures will be pursued:

- **Promotion of ICT uptake by enterprises**

#### The planned activities include:

- supporting the ICT uptake and use of eBusiness through business and innovation support measures;
- re-organisation of general, vocational and higher education so as to ensure conformity of labour skills to the requirements of knowledge-based economy;
- development of a common service space for the public, private and third sector;

<sup>2</sup> In spring 2006, 58% of Estonian residents used the Internet and the household Internet penetration was 39%.

<sup>3</sup> According to a survey carried out in 2002, 90.7% of public sector websites failed to comply with WAI requirements.

- widening opportunities of re-using public sector information (including geo-information) by the private and third sector;
- ensuring favourable environment for the development of eBusiness.
- **Increasing the competitiveness of the Estonian ICT sector**

The planned activities include:

- bringing IT education in accordance with the requirements of the ICT sector;
- supporting the internationalisation of the Estonian ICT sector;
- facilitating the development of high-quality and innovative information society and media services as well as settling intellectual property related issues;
- elaboration and implementation of principles concerning the outsourcing of services necessary for the functioning of the state information system;
- increasing the role of the Estonian ICT sector in the development of the country's defensive capacity.

In the information society, ICT is one of the key technologies enabling the creation of significant added value. Since in society, value is created through economy, the manner in which ICT is applied in economy is of crucial significance.

The take-up of technological solutions also necessitates reorganisation of business models and management methods as well as increased investments in the upgrading of skills. In addition, opportunities and risks related to the application of ICT are to be taken into account in the development of business environment.

The competitiveness of the ICT sector greatly depends on the number and qualification of respective specialists, which are, in turn, determined by R&D related activities in universities. Public-private partnership in the development and implementation of IT solutions also plays a significant role in this context. Furthermore, the competitiveness of the ICT sector is influenced by legal framework on the protection of intellectual property.

Indicators:

- **By 2013, the productivity per employee in Estonian enterprises will account for 75% of the EU average<sup>4</sup>.**
- **By 2013, the share of ICT enterprises in the national GDP will amount to 15%.**

### **Action field III: Development of citizen-centred, transparent and efficient public administration**

The strategy aims to achieve a situation, where the public sector functions efficiently while collecting, using and maintaining data necessary for ensuring the provision of public goods in a single and systematic manner. Public sector business processes are transparent and easy to understand; public services for citizens and entrepreneurs are accessible via electronic channels, they are widely used and take into account user needs.

To achieve this, two measures will be focused on:

- **Improving the efficiency of the public sector**

The planned activities include:

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<sup>4</sup> In 2004, the productivity per employee in Estonian enterprises was 50.6% of the EU average.

- transforming public sector business processes so as to make better use of advantages and possibilities enabled by the application of ICT;
  - improving the quality of policy formulation through better use of data and increased research into the impact and challenges of the information society;
  - integration of state information systems into a single interoperable whole;
  - development of electronic authentication and authorisation mechanisms, including participation in cross-border eID (electronic identity) projects;
  - ensuring the functioning and development of support systems for the maintenance of the state information system;
  - development of information systems for increasing the efficiency of central and local government agencies.
- **Provision of user-friendly public sector e-services**

The planned activities include:

- integration of services provided by the public, private and third sector into one service space to improve the quality of service provision in the public sector;
- identification, development, launch, and active implementation of high impact services (*eProcurement*, *eInvoicing* etc);
- development of public sector e-services in different fields of life for citizens, businesses and public sector agencies;
- opening up of Estonian e-services for the citizens of other countries, especially those from the EU member states.

One of the main challenges for the public administration lies in how to increase the population's satisfaction with public services in terms of limited resources. The taxpayer expects his money to be spent on issues most critical to him or at least he wants to clearly understand, what resources are spent on and why.

ICT solutions allow to increase the transparency and traceability of public administration. At the same time, ICT enables to make public sector business processes significantly faster, more convenient and efficient for citizens. Current customary mechanisms in the society, including organisation of work, are no longer the best. The challenge today is, whether we dare and want to change the rules in order to make the most of the existing technological solutions.

In order to ensure the interoperability of state information systems it is important to ensure that the information created in the public sector would have a single meaning throughout the state information system.

A well and integrally functioning state information system allows to increase citizen satisfaction with the state through improved and optimised services. Application of ICT in the provision of public services creates preconditions for the treatment of citizens not as a group, but allows maximum consideration of different individual needs.

Information society requirements have to be taken into account in public sector skills development and improvement of policy formulation processes. Following international good practice and pursuing innovative approaches will be promoted in the development of public sector information systems.

Smart use of ICT allows to decrease the need to apply for public services, turning service provision into a logical automatic process. No less important is the state's role in serving as a single gateway in the jungle of information, where citizens' trust towards the Internet is

increasingly jeopardised by difficulties in differentiating trustworthy and untrustworthy information.

Indicators:

- **By 2013, citizen satisfaction with public sector e-services will reach 80%.**
- **By 2013, satisfaction of businesses with public sector e-services will be 95%<sup>5</sup>.**

### Implementation of the strategy

The strategy is implemented on the basis of Information Society Strategy implementation plans. At the beginning of each year, agencies whose fields of activity and competence are encompassed by the strategy, submit to the Ministry of Economic Affairs and Communications (MoEAaC) information about the ICT development works they intend to carry out during the following year. The MoEAaC as well as other related ministries take this information into account when elaborating their organisational strategies, which serve as an input for the State Budget Strategy. The MoEAaC submits the draft of the Information Society Strategy implementation plan that has been amended according to the State Budget Strategy to the Government for approval.

The implementation plan is realised in the form of project-based development works in accordance with the principles set out in the Estonian IT Architecture and Interoperability Framework. Projects are financed both from the state budget and the EU Structural Funds. Expenses related to activities to be funded from the state budget are planned by respective implementing agencies, while central and cross-institutional activities are financed via the Structural Funds.

In compliance with the State Budget Strategy and according to the estimated calculations 290-320 million kroons (18.5-20.5 million euros) per year or 2.13 billion kroons (136 million euros) altogether will be spent on the development of the information society in 2007-2013.

## 1.2. National and international interoperability

One of the central themes in the development of the information society is the interoperability of organisations and information systems. Interoperability denotes the ability of information systems and of business processes they support to exchange data and share information and knowledge. "Information Technology in Public Administration of Estonia 2005" ([http://www.riso.ee/en/pub/yearbook\\_2005.pdf](http://www.riso.ee/en/pub/yearbook_2005.pdf)) gave a detailed overview of the basic principles of interoperability, general structure of the state information system, infrastructure requirements for the state IT interoperability, foundations of organisational, technical and semantic interoperability, requirements for the state IT architecture etc. Therefore, the current article mainly focuses on developments of the year 2006.

The state information system as the system of systems needs to be created, developed and maintained. Many countries have established the rules and principles for such a system in their interoperability frameworks. The European Union has launched a programme called Interoperable Delivery of European eGovernment Services to Public Administrations, Businesses and Citizens (IDABC) and elaborated the European Interoperability Framework (<http://europa.eu.int/idabc/en/document/2319/5644>). The Estonian IT Interoperability

<sup>5</sup> In 2005, satisfaction of Estonian businesses with public sector e-services was 93%.

Framework ([http://www.riso.ee/et/koosvoime/raamistik2\\_0.pdf](http://www.riso.ee/et/koosvoime/raamistik2_0.pdf) – in Estonian; to see the summary in English see Uno Vallner's article in the magazine Baltic IT&T Review No 34 – <http://www.riso.ee/et/koosvoime/BalticITUV.pdf>) sets out rules and principles to be followed in the development of public sector information systems. So far, two versions of the framework have been elaborated. The elaboration of the framework is led by the Department of State Information Systems of the Ministry of Economic Affairs and Communications and the document is drafted in co-operation with experts representing the public, private and third sectors. The framework is based on the principles of open standards and the practice of drafting the RFC (Request for Comments) documents.

The IT Interoperability Framework and the related documents are mandatory in order to ensure mutual communication between the information systems of central and local government agencies. The framework documents cannot, however, be regarded as legal acts. Their obligatory nature is expressed through the following aspects:

- The framework and the related documents have undergone a consultation period during which central and local government agencies, the private sector, third sector organizations, as well as private persons had the opportunity to submit their proposals. Thus, the document serves as an agreement between different stakeholders.
- Pursuant to the Government of the Republic Act, the Public Information Act and The Basic Principles of Estonian Information Policy, the co-ordination of the development of state information systems is assigned to the Ministry of Economic Affairs and Communications. The IT Interoperability Framework and the related documents constitute one of the tools for the development and co-ordination of the state information system.

The Estonian IT Interoperability Framework serves as:

- 1) a guide for those drafting national strategies and developing concepts for state information systems;
- 2) a guide for IT project managers in the public administration for the development of concepts for their internal information systems;
- 3) an aid for carrying out public procurements in the field of IT.

### Elaboration of the documents of the Interoperability Framework

The documents of the Interoperability Framework describe the main principles of the state IT interoperability. In the future, the framework will be complemented by several other documents concerning interoperability. Documents related to the state IT and interoperability framework have to be elaborated in a co-ordinated manner and according to common principles. To this end, the following mechanism will be used:

- The initiator of an interoperability document (any central or local government agency) draws up, with the assistance of experts, a draft of the document and launches a public consultation on it.
- The document is published for consultation on the website of the Department of State Information Systems (RISO) at: <http://www.riso.ee>. Together with RISO, the initiator informs other stakeholders about the publication of the document. Stakeholder comments are published on the web. A month later, the initiator of the document reviews all the received comments and responds to them on the web. Depending on the type of the document, organisations representing the public, private, and third sector, as well as individuals can participate in the consultation.

- Based on the received feedback, the initiator then prepares a new version of the document, which is again published on the RISO website. In case no further substantial comments are made to it, the initiator draws up a final version of the document. After the document has been approved by RISO, it is considered final.
- All interoperability documents are open for comments all year round. The initiator of the document is obliged to review it at least once a year and update it as necessary.

### Documents of the state Interoperability Framework

The documents of the state Interoperability Framework are in constant development. Completed documents are published on the web at: <http://www.riso.ee/en/>. As a novel aspect, documents under elaboration are now available also in RISO Wiki at: <http://www.riso.ee/wiki/>.

It was decided that the new version of the Estonian Interoperability Framework would take into account the new European Interoperability Framework as well as the related surveys. As the development of the new EU framework was delayed, the elaboration of the new versions of the Estonian Interoperability Framework and the Estonian IT Architecture was postponed until 2007 as well. The table below presents a list of documents to be reviewed/elaborated in 2007.

Name of the document	Status in 2006	Plans for 2007
Estonian Interoperability Framework	V 2.0	V 3.0
Estonian IT Architecture	V 2.0	V.3.0
Estonian Semantic Interoperability Strategy	V 0.5	V 1.0
Web Interoperability Framework	V 0.3	V 1.0
Information Security Interoperability Framework	V 0.8	V 1.0
Principles of Open Source Software	Does not exist yet	V 1.0
Interoperable Document Management Systems	Does not exist yet	V 1.0
Requirements for Database Descriptions	Does not exist yet	V 1.0
Requirements for Service Descriptions	Does not exist yet	V 1.0

### EU-level developments in the field of interoperability and IT architecture

The European Interoperability Framework (<http://europa.eu.int/idabc/servlets/Doc?id=19528>) is a set of documents and surveys in support of the development and implementation of pan-European services. Though the interoperability framework is the only officially completed document so far, there are a number of surveys as well as several documents on technical, semantic and organisational interoperability currently under elaboration.

The objectives of the European Interoperability Framework are the following:

- to support the development of user-friendly pan-European e-services by facilitating the interoperability of services and information systems;

- to supplement national interoperability frameworks in areas that cannot be adequately addressed by a purely national approach;
- to help achieve interoperability both within and across different policy areas.

The basic principles of the European Interoperability Framework are the following: accessibility, multilingualism, security, privacy (personal data protection), subsidiarity, use of open standards, assessment of the benefits of open source software, and use of multilateral solutions.

The IDABC programme has set itself an objective for the coming years to update, in addition to its interoperability framework, the following documents: “Architecture Guidelines” (technical interoperability), “Content Interoperability” (semantic interoperability) and “Study on Governance” (organisational interoperability).

For the revision of the two first documents, a contract was concluded with Gartner Group. Differently from the previous version, the new document will put more emphasis on the best practice of member states. The experience of up to eight member states will be analysed. In November 2006, the representatives of the Gartner Group met with Estonian IT interoperability experts, analysed our experience and took note of our proposals.

The first version of the IDA Architecture Guidelines (IDA AG) was elaborated within the IDA programme already in 1999. By 2004, version 7.1 of the document had been completed. The European Interoperability Framework and the IDA AG were based on similar principles: subsidiarity, open standards and XML technology. Then the initial approach became outdated and an obvious gap appeared between the Interoperability Framework and the IDA AG. It was decided not to publish the version 8.1 of IDA AG and undertake a thorough revision of it instead. The new document entitled IDABC AG is expected to be published, with the help of Gartner Group, in 2007. The IDABC AG will comply with the European Interoperability Framework.

### eID working groups in Europe

In Europe, a number of working groups have been established and several projects launched in the field of eID (electronic identity). Below enlisted are only those, where the Estonian public sector participates:

- Operational Bridge/Gateway Certification Authority project. The project was launched within the IDABC programme. During the first stage of the project, there were seven member states, including Estonia, participating in it. A specification was compiled for the development of a secure trust centre and a respective pilot was carried out. At the moment, work on the project is temporarily suspended.
- Information Security Expert Group. The work of the group is led by IDABC. In 2006, the main objective of the group was to map the current situation in member states.
- The eID ad hoc expert group seeks to determine the respective activities of the EU in the coming years and to co-ordinate the work of different EU institutions. The working group primarily concentrates on digital signature with eProcurement as the main field of its use.
- Within the Guide project, real pilots involving three to four countries will be launched. So far, two pilots have been carried out. The first of them is targeted at facilitating free movement of labour (concerns the exchange of the European social insurance cards or the E101 forms) and the second deals with public procurements. Estonia participates in both pilots.

### 1.3. Integration of public sector information systems

When developing its information systems, the public sector proceeds from the principle of subsidiarity, according to which all public bodies are autonomous as to the development of their internal information systems, but they have to follow the general principles of the state's IT Interoperability Framework. In a networked society, it is impossible to integrate all information systems on the basis of bilateral agreements. Transition to multilateral agreements necessitates the development of nationwide components supporting these agreements.

There are two types of nationwide systems:

- Common single points of entry that operate in collaboration of information systems. Users of public sector information systems are not interested in state information systems as such, but rather in the data contained therein. State information systems have to co-operate and function as a whole for users.
- Support systems for the maintenance of the state information system serve as agreements between state information systems and the respective middleware. As a rule, the support systems do not have a meaning *per se*, but ensure the interoperability of information systems and the re-use of resources.

The establishment and development of nationwide information systems is co-ordinated by a government agency that has been vested with the responsibility for the co-ordination of the respective field. Responsibility for the functioning of these systems rests with an institution designated by the co-ordinating agency or an enterprise from which the agency has outsourced the respective activity.

In Estonia, no central information systems are developed for the performance of single-type functions, such as document management, accounting, data storage, etc. Though centralised development of these solutions might seem tempting and yield short-term financial benefits, this would not be the case in the long-term perspective. In addition, this would restrict natural competition and infringe the principles of free market economy. Furthermore, it would give rise to an unnecessary competition between the public and private sector. The above-mentioned does not mean, however, that public bodies should not co-operate when procuring such systems from the private sector.

#### Components ensuring web interoperability

Every public sector body has its own website. Nowadays, a website should be considered a part of an agency's information system. A website is an Internet-based view at a public body's information system. The development of the website of a public body is procured by its management. The website can be designed, developed and administered internally by the agency or it can be (entirely or partly) outsourced. Every public sector body is responsible for the content and form of its website. However, issues concerning the semantic and organisational interoperability of websites are currently being agreed upon within the Web Interoperability Framework. The principles to be established within the framework will have to be followed, first and foremost, in the development of state portals [www.riik.ee](http://www.riik.ee) and [www.eesti.ee](http://www.eesti.ee), and in order to ensure the interoperability of public sector websites. No state-level requirements will be established on the hardware and software of websites: every institution will be free to choose the platform it considers the most suitable.



### Interoperable document management systems

The interoperability of document management systems denotes their ability to exchange and manage digital documents. Document management systems exchange information without any paper-based versions and traditional postal services. In addition, the systems cover processes related to the use of network services and for the processing of network services for citizens and enterprises.

The interoperability requirements for public sector document management systems are straightforward:

- all document management systems must have an interface with the central document exchange environment;
- standardized XML-based descriptions are to be used for documents and their metadata;
- all public sector document management systems must be able to communicate with the Citizen Portal in order to receive applications from citizens and entrepreneurs and respond to them.

### Interoperable geoinformation systems (GIS)

The interoperability of geoinformation systems means that geoinformation services are easy to use and digital maps are accessible for all authorised users and other information systems. The interoperability of public sector geoinformation systems has to be based on principles of open standards:

- preconditions have to be ensured for the use of digital maps and spatial data together with data layers that are relevant either from the local or the administrative viewpoint;
- all public agencies, enterprises and citizens must have the possibility to use digital maps that have been developed by the public sector and are based on open GIS standards;
- it must be possible to exploit, without any significant additional costs, new geoinformation data sources, provide new e-services through open interfaces, and add to the existing e-services links to geoinformation services;
- authorised use of data has to be ensured.

### Administration system for the state information system (RIHA)

The objective of RIHA is to ensure the interoperability of public sector information systems and the re-use of technical, organisational and semantic resources. RIHA is a tool enabling the performance of the following activities:

- to obtain information about existing services as well as those under development, about service descriptions, and principles of service provision;
- to apply for the right to use a service;
- to propose the creation of a new service;
- to use, within one's rights, data services;
- to administer in-house access rights;
- to ensure legitimate use of data services.

## Support systems for the maintenance of state information systems

The support systems for the maintenance of state information systems ensure their horizontal interoperability. There are currently five support systems:

- the classification system;
- the system of security measures for information systems;
- the system of address details;
- the data exchange layer of information systems (X-Road);
- the geodetic system.

### Classification system

In order to understand, process and categorize data in information systems in a standardised way, data need to be classified and tagged. The use of classifications facilitates the standardisation of data, enables information exchange between information systems (data providers and data receivers), and allows the comparison and analysis of the published data.

### System of address details

The system of address details is a set of common principles, which ensures a standardised identification of address objects both in their location and in different information systems, and allows the comparison of addresses submitted at different times and based on different principles.

### Data exchange layer of information systems – X-Road

The X-Road allows information systems to use the common data exchange environment as well as the common set of standardised user interfaces and a common authentication system. Joining an information system with the X-Road allows to save resources and to considerably increase the efficiency of data exchange both between public agencies and in communication between citizens and the state.

On the international level, efforts are made to develop a service exchange environment that would function as a middleware for service environments of different countries (the so-called middleware of middlewares), facilitating thus the exchange of e-services between them. In an ideal case, the Estonian X-Road itself or a similar environment could function as such a centre.

The **geodetic system** consists of:

- the geodetic reference system;
- the system of plane rectangular co-ordinates;
- the height system;
- the gravimetric system.

### System of security measures for information systems

The objective of the system is to define an unequivocal procedure for the specification of security requirements for information systems; a procedure for determining, pursuant to security requirements, security classes; and a procedure for the selection of security measures according to security classes.

## Public Key Infrastructure (PKI)

The public sector develops and administers, in co-operation with the private sector, the public administration's infrastructure. Below presented are the main points concerning the Estonian PKI and the ID card that have to be kept in mind when developing e-services:

- the ID card is a tool issued by the state and the state itself has to make maximum use of it;
- official communication between citizens and the state via the e-mail address in the form of [Forename.Surname@eesti.ee](mailto:Forename.Surname@eesti.ee) is to be promoted;
- ID card based authentication must be enabled in all information systems requiring authentication;
- digital signature must be accepted and the public sector itself should use it as widely as possible;
- in order to convey the organisational dimension of an institution and to secure automatic statements of an information system, digital stamps can be used.

On the international arena, Estonia supports the creation of a Trust Centre that would enable the co-operation between PKI infrastructures of different countries.

## 2. Building the ICT infrastructure of the information society

### 2.1 Electronic communications – trends and developments in 2006

Electronic communications is one of the fastest developing fields in the world as new technologies are introduced every day. The present article cannot possibly cover all developments and therefore outlines only the most important ones for Estonia that might provide interesting reading.

In 2006, the most significant events in the field of electronic communications included the following:

- **A competition held for finding a provider for a broadband network service operating in the 450 MHz band.** The Communications Board will issue a frequency licence to the winner with the obligation to build a broadband data communications network in near time that would cover the whole Estonia.

After closing down the analogue mobile phone network NMT 450 in many European countries at the end of 1990s, the 453.000–457.475/463–467.475 MHz radio frequency band became available. To date, this radio frequency band has been utilized in many countries for broadband systems through which telephone and data communication services are provided.

Considering the propagation properties of a radio signal in the 450 MHz band, these are much better than those of the WiMAX (Worldwide Interoperability for Microwave Access) technology. At the same time, the speed of up and downloading in the 450 MHz band is lower than in the case of WiMAX data communication networks operating in higher frequency bands. In the 450 MHz band the speed of downloading is usually limited to 1 Mbps and the speed of uploading to 512 Mbps. Therefore, this data communication network is suitable primarily for low density areas.

As people living in rural areas do not have that many options to choose a suitable communication operator providing a fast data transmission service, such data communication network operating in the 450 MHz band is highly welcome.

**Wireless broadband technology WiMAX** is one of the most well-known technologies often featured also in the media. By October 2006, the Communications Board had issued three national frequency licences for operating a wireless data communication network in the 3.5 GHz band. Licences were given to **Baltic Broadband AS**, **Estonian Wireless Network AS** and **Tele2 Eesti AS**. In addition, two licences have been issued to **Elion AS** (covering only the Harju County) and **Levira AS** (covering the whole country except for the Harju County).

In October 2006, WiMAX was available in eight Estonian counties.

- In 2006, the Communications Board held another competition in order to issue the **fourth national licence for the 3G mobile phone network.**

The first three licences were issued in 2003 to three mobile phone operators – **Radiolinja Eesti AS** (now **Elisa Mobiilsideteenused AS**), **EMT AS** and **Tele2 Eesti AS**.

In October 2006, the range of the 3G mobile phone network was limited to only three bigger cities Tallinn, Tartu and Pärnu, but mobile operators are busy expanding the network and building new base stations.

- As regards developments with the **Digital Video Broadcasting Terrestrial (DVB-T)** in Estonia, the regional radio communication conference held by the International Telecommunication Union should be mentioned. The goal of the conference was to draft an agreement for planning digital broadcasting within the ranges of 174–230 MHz and 470–862 MHz. Thus, within the framework of the conference a digital broadcasting agreement was established to use the above-mentioned frequency bands in European, African, Middle East and CIS countries.

The conference was a success for Estonia as it obtained seven national and one regional DVB-T coverage areas within the 470–862 MHz band as well as one national and one regional (which covers a large part of Estonia) coverage area within the 174–230 MHz band.

Owing to the digital transmission of the signal, DVB-T has several advantages compared to the present analogue television, such as:

- higher quality of the signal which means that there is less noise and higher quality picture with no reflections;
- viewers can choose between many more quality channels;
- more effective use of radio frequency spectrum (i.e. more programmes within the same band);
- emergence of new services (also services not related to broadcasting);
- interactivity (in case feedback channels are available);
- the option of mobile receipt of a TV picture;
- inexpensive opportunity to transmit large volumes of data for a very large audience, etc.

In Estonia, the newest standard MPEG-4 has been opted for the transmission of the DVB-T signal. The main advantage of MPEG-4 is that it enables to transmit a greater number of programmes in one radio frequency, which provides for more effective use of the radio frequency spectrum.

The first DVB-T transmitters started operating already at the end of 2006. The analogue television and DVB-T will be operating simultaneously until 1 February 2012. The European Union has also set 2012 as the benchmark for shutting down analogue television and switching over to digital television only.

- Another important thing in 2006 was laying the foundation for establishing an **inter-agency operational radio-communications network**. To this end, on 28 September 2006 the Ministry of Internal Affairs concluded a procurement contract with **EADS Secure Networks OY** to develop an operational radio-communications network during 2007. Such network is essential as it ensures necessary operative co-operation between the police, the Border Guard, the Security Police, the Rescue Service and the Tax and Customs Board. In addition, other agencies and companies related to crisis management could be connected to that network. Presently, these agencies lack a common radio-communications network. The new network would also provide for the required security, alarm integrity and reliability and independence from other public communication systems. The existing public GSM mobile network, for instance, does not comply with all these requirements. The operational radio-communications network will be based on the TETRA (Terrestrial Trunked Radio) technology.

The more prominent topics of discussion at the European level are eCall, cell broadcast and Digital Video Broadcast Handheld (DVB-H).

- **eCall** (Pan-European automatic emergency call system) is an electronic communication service introduced in the car industry. The eCall system means that in case of a car

accident the vehicle involved automatically transmits data on its location to the rescue service which considerably reduces the time of getting to the scene of an accident. According to surveys, this will accelerate reaching the scene of an accident by 50% in rural areas and by 40% in the cities.

At present, the main bottleneck in implementing the system appears to lie in the fact that rescue services are not ready yet to receive such calls, which is why the equipment in the call centres of rescue services should be updated. Car industries, however, are in principle ready to install respective equipment in cars.

By March 2007, the European Telecommunication Standards Institute plans to elaborate common standards for the eCall equipment. According to expectations, the eCall might be introduced in 2010 also in Estonia.

- **Cell broadcast** is a service that in terms of technology might be provided already at this moment in the radio networks based on GSM technology and also in 3G radio networks. However, so far this service has had very little use.

The main function of the cell broadcast is that it enables to provide prompt operational information about an act of terrorism that has occurred or about a coming natural disaster. The advantage of cell broadcast compared to, for instance, alarm signals lies in the opportunity to give people instructions on what to do. For instance, in some cases evacuation would be necessary, whereas in other cases, such as extensive fires causing the release of toxic gases, people should stay indoors and close all doors and windows.

- In addition to the ongoing transition to Digital Video Broadcasting Terrestrial, the reception of the **Digital Video Broadcasting Handheld (DVB-H)** has been actively tested in Europe. In terms of technology, DVB-H and DVB-T differ from each other for the feature that instead of transmitting the signal all the time, a larger data set is transmitted to the receiving equipment (e.g. a note-pad computer or a 3G mobile phone) over shorter time periods. This means that the receiving device need not receive the signal constantly, which in turn prolongs the life of batteries. Such a reception system is estimated to be up to 90% more economical than the signal transmission of DVB-T.

Tests with DVB-H have been carried out in Finland, Italy, France, Germany and Spain. In Finland and Italy, DVB-H has already been taken into use in some regions.

In case of 3G mobile networks the focus is on data transmission and not the call as is the case with GSM networks. Therefore, DVB-H is expected to gain success only after the wider take-up of 3G networks.

## *2.2. Developments in the field of electronic identity and PKI*

### **ID card in Estonia**

Preparatory works for the development of electronic identity (eID) in Estonia were started in the second half of the 1990ies, evolving into a national programme aimed at the implementation of the Estonian ID card and the respective public key infrastructure (PKI). As an outcome of the project, issuing of the ID cards began on 28 January 2002.

The ID card is a mandatory identity document for all Estonian citizens over 15 years of age and for aliens residing in Estonia on the basis of a residence permit irrespective of their age. The cards are issued by the Citizenship and Migration Board.

By 10 October 2006, 1,001,731 ID cards had been issued in Estonia, of which 231,985 to permanent resident aliens. The number of valid ID cards by this date accounted for 892,957. Thus, 87% of Estonian residents in the 15-74 age group or 66% of the entire population possess the ID card, making Estonia unique in this respect not only in Europe, but in the entire world.

The ID card is not just a plastic identity document for the visual verification of its owner, but it also contains a chip with a personal data file and two certificates – one for the secure electronic authentication of persons and the second for giving digital signature.

The personal data file includes, in addition to the personal data that can be seen visually on the card, also the card owner's personal identification code. When the card holder inserts the card in the chip card reader, the personal identification code is used for proceeding with further operations.

Until 2006, the validity period of ID cards was ten years, while the duration of certificates accounted for three years. As such, card owners had to renew the certificates of the card several times during its validity period. However, as a result of a change in legislation introduced in 2006, ID cards are issued since 1 January 2007 with a validity period of five years with the duration of certificates covering the same period. Thus, card owners will no longer have to deal with the issue of renewing the certificates.

Pursuant to the Digital Signatures Act, digital signature is equivalent to handwritten one not only in transactions between the citizen and the state, but also on a wider scale in all activities between private companies as well as in proceedings taking place between citizens. Anyone with a valid ID card can give digital signature. Nevertheless, only three million digital signatures have been given since the implementation of the ID card in Estonia.

### Strategic plan for the development of eID

Though by today, nearly 90% of Estonian residents possess the ID card and can, thus, manage both public and private business securely in information systems and the Internet, majority of the population still uses the ID card as a plastic identity document without acknowledging the possibilities of its electronic use.

In order to considerably extend the card's electronic use, a strategic co-operation was launched in May 2006 by signing a co-operation agreement *Computer Protection 2009* between the four main partners of the Look@World Foundation and the Ministry of Economic Affairs and Communications (for more information see Chapter 3.1) as the representative of the state.

The aim of the project is to make Estonia a country with the most secure information society in the world by 2009.

One of the goals of the project is to significantly widen the use of the ID card so that at least 400,000 people would use it for electronic authentication and digital signing by 2009 (in 2006, the respective number was 40,000).

Activities to be carried out by the Look@World foundation partners within the *Computer Protection 2009* initiative include the following:

- promotion and priority development of the ID card in comparison with other forms of electronic authentication;
- investing in infrastructure and the related services, in particular in the development of the infrastructure and services of AS Sertifitseerimiskeskus (the Estonian Certification Authority) so as to ensure high-quality service provision for ID card users and maximum security of the service;

- facilitating the availability of ID card readers for the population by increasing their affordability;
- developing and implementing new ID card based services; consulting enterprises and institutions on the development of ID card based services;
- raising public awareness about IT security as well as improving skills concerning the electronic use of the ID card through trainings, consultancy and awareness raising campaigns.

In March 2006, an inter-institutional working group was established with an aim to ensure co-ordinated development of applications related to ID card based electronic identity and digital signing as well as of solutions connected to the PKI. The working group has been assigned the task of solving respective technical, legal and organisational issues as well as making relevant proposals.

### First results

In order to increase the security of Internet banking transactions, the Estonian Banking Association has decided to impose, since 2<sup>nd</sup> May 2007, a daily limit on bank transactions to be made with regular code cards. Thus, transfers up to 10,000 kroons (ca 639 euros) can be made with the code card, while customers wishing to exceed this transfer limit need to use some other identification tools, preferably the ID card.

Within the *Computer Protection 2009* initiative, the design of the ID card installation software (ID-installer) has been made more user-friendly and is now freely available in Estonian, Russian and English at: <https://installer.id.ee/>. In addition to the development of the user interface, the security and reliability of the software were improved; the number of card reader types supporting the use of the Estonian ID card increased; and the whole installation process became simpler.

In the course of the initiative, a network has emerged for the distribution of affordable ID card readers. Thus, card readers can be acquired for less than 100 kroons (6.40 euros) from the representations of major telecom operators as well as from larger banks. Besides, all computers meant for public use in bank offices are equipped with ID card readers.

Basic knowledge of and recommendations on the use of the ID card are available (in Estonian and Russian) on a website at: <http://koolitus.id.ee>. Besides, a set of training materials has been compiled for employers for the organisation of in-house training.

### WPKI or mobile-ID

Mobile-ID is a development of the traditional ID card based authentication and digital signing. In case of the mobile-ID, the SIM card of your mobile phone will become an identity document just like the ID card. Similarly to the ID card, the mobile-ID will enable authentication and digital signing of documents. In case of the mobile-ID, your certificates will be maintained on the telecom operator's SIM card. In order to use them, you will have to enter a PIN code (again, just like in case of the ID card).

In spring 2007, the mobile operator EMT will launch, in co-operation with banks and AS Sertifitseerimiskeskus, a novel mobile-ID service (wireless PKI), which will allow to access Internet bank without entering e-banking codes. In order to authenticate yourself securely with the mobile-ID, you click on a respective button in the web environment after which your mobile phone asks you to enter your authentication PIN. Once you have done this, you will have been authenticated. The same process will apply to the signing of documents. Digital signing with the mobile-ID will have the same legal power as the one with the ID card.



When using the mobile-ID, no separate ID card and card reader are needed, as the phone itself already performs both functions. The main advantages of the mobile-ID include user-friendliness and convenience: the computer no longer needs to be equipped with a card reader or have special additional software installed in it.

One of the objectives of the *Computer Protection 2009* is to get at least 200,000 people using the mobile-ID for authentication and digital signing by 2009.

### International co-operation in the field of electronic identity

Electronic identity is a field the interoperability of which is sought for throughout the world. At the initiative of the European Commission, a number of working groups have been established and several projects launched in the field of eID. Estonia, too, has continuously participated in many of them (see the section “eID working groups in Europe” in Chapter 1.2).

From the viewpoint of practical co-operation, an agreement concluded in September 2006 between AS Sertifitseerimiskeskus and the Lithuanian mobile operator Omnitel (which is, at the same time, the largest telecommunications company in the Baltics) deserves to be mentioned here, based on which Sertifitseerimiskeskus will start providing digital certificates for Omnitel’s customers. Omnitel’s mobile identification services will allow the company’s customers to perform practically the same operations that can currently be done with the Estonian ID card: to log into environments offering public e-services (i.e. Internet banks, e-service environments of providers of communications, energy and other services), to access internal information systems of organisations, and to give digital signature.

From the Estonian side, the agreement was signed by the CEO of AS Sertifitseerimiskeskus, Ain Järv, by using his ID card, while from the Lithuanian side, the chairman of the board of Omnitel, Antanas Zabulis, gave his digital signature via his mobile phone. This was the first international agreement to be signed in such a way.

This is the first agreement in support of the development of mobile PKI infrastructure. Similar agreements will be signed with Lithuanian and Latvian electronic certification companies. Mobile operators Omnitel and Bite (another Lithuanian operator) have already signed a memorandum on technological interoperability and hope to build a PKI infrastructure that would be compatible and working in all the Baltic countries. Omnitel and the Ukio Bank have developed the first Internet bank supporting mobile identification in Lithuania.

In this context, it should be mentioned that Sertifitseerimiskeskus is a nationally accredited provider of certification and time stamp services in Estonia. Its spheres of activity include development of software related to the provision of certification and time stamp services as well as the development and administration of ticketing and transaction systems. Since 2005, Sertifitseerimiskeskus has been providing, in the framework of a pan-European digital tachograph project, certification services (including issuing certificates for tachograph cards) to the Republic of Lithuania.

### 2.3. Implementation of the Estonian Broadband Strategy: Village Road 3

*The Government of Estonia has, already for years, taken measures to improve Internet availability in rural areas. After the launch of the data communications backbone between government institutions – PeaTee (EEBone) – in October 1998, development of data communications network in local governments was started. In 1999, a national programme called KõulaTee (Village Road) was launched with an aim to develop permanent Internet connections in rural areas, particularly in local governments (for additional information see “Information Technology in Public Administration of Estonia 1999,” (<http://www.riso.ee/en/pub/1999it/main.htm>). In 2000, the scope of the Village Road programme was extended so as to include the internetization of public libraries and the creation of public Internet access points. This stage of the programme, lasting from 2000 to 2002, was called Village Road 2. By the time of the completion of Village Road 2, Internet connections had been established in practically all local government agencies, schools and libraries. However, sparsely populated areas, where the development of Internet connections had not proved feasible for the private sector, still remained without the Internet. Besides, the transmission capacity of some of the existing networks no longer corresponded to the needs of the information society.*

The general objective of the Estonian Broadband Strategy is to ensure, for all citizens, the availability of e-services provided by the public and private sector, and contribute thereby to the growth of competitiveness, creation of new jobs and reduction of communications and transport costs in Estonia.

The Estonian Broadband Strategy proceeds from the principle that the development of technical infrastructure and provision of communication services are the tasks of private companies competing with each other in the market. The state can contribute to the development of broadband Internet primarily by increasing the demand side, e.g. by developing user-friendly and time-saving e-services and ensuring basic computer and Internet skills for all. The public interest of ensuring the availability of broadband Internet is also related to the need to reduce digital divide and increase the efficiency of the functioning of the society. Therefore, a follow-up to the previous Village Road programmes was launched in 2005. The new programme – Village Road 3 (2005-2007) – is based on active co-operation between county governments, local governments, Internet service providers (ISPs) and the Estonian Informatics Centre. The role of the latter is to co-ordinate the process from the state side and organise public procurements. The objective of the programme is to ensure that the availability of broadband Internet in sparsely populated areas would correspond to that in densely populated regions (i.e. towns, small towns, other bigger centres). The service is outsourced from an ISP having made the best tender at public procurement.

The year 2006 was extremely busy from the viewpoint of the Village Road 3 programme. While in 2005, source data was collected and the first public procurements were organised, the majority of procurements as well as the actual development of Internet connections were carried out in 2006. Internet service providers were selected in 13 out of Estonia's 15 counties and the first 1500 households living in distant areas could start using high-quality broadband Internet.

The public procurement requirements impose an obligation on ISPs to provide the service for at least three years. The procurement documents also set out technical requirements for the quality of Internet connections and price ceilings that are based on average market prices.

The great interest from the inhabitants of remote areas to get an Internet connection proves that the Village Road 3 really contributes to overcoming the bottlenecks of the development of the information society throughout Estonia. In the course of the project, data was also collected about those households and regions for which the standardised solution did not suit for various reasons (areas with high and thick forest and deep valleys, houses to which no masts could be fastened etc.).

So far, procurements in the total amount of seven million kroons (1.09 MEUR) have been carried out within the Village Road 3 programme. According to the programme requirements, 80% of the expenses are covered from the state budget and 20% from the budgets of local governments. All in all, the Government of Estonia has planned to spend on the programme approximately 20 million kroons (1.28 MEUR), complemented by 5 million kroons (320,000 euros) from local budgets.

The Village Road 3 programme continues in 2007.

## **2.4. X-Road – one of the cornerstones of the state information system**

No IT development project in Estonia can be realised without any connection to the technological solution of the X-Road. The X-Road enables secure access to nearly all Estonian national databases; ensures the necessary availability, integrity and confidentiality of electronic document exchange; serves as an environment through which Estonian information systems can be potentially joined with similar systems to be built in the EU, etc. All the above-mentioned characteristics have already successfully been put into practice. Hundreds of services provided by information systems of different institutions work over the X-Road on the 24/7 basis and all Estonian residents with the national ID card or a contract for the use of Internet banking codes can make use of its enquiry services targeted at citizens.

Below given is an overview of major works and developments related to the X-Road in 2006. A summary of the principles and developments of the data exchange layer X-Road is presented below in summaries 2.4.2 and 2.4.3 as well as in previous yearbooks “IT in Public Administration of Estonia” (see <http://www.riso.ee/en/publications/natpublications>).

### **2.4.1. X-Road development projects in 2006**

- **Estonian Health Insurance Fund (EHIF).** These were the services of the Estonian Health Insurance Fund that increased the number of X-Road users most in 2006. Nearly 20,000 Estonian companies and organisations began to use the e-services of the EHIF at the same time (for more information see Chapter 4.3.2) and communicate now with the agency through the Entrepreneur Portal of the X-Road (see below).

Investments made in X-Road’s infrastructure over the previous years allow the system to maintain a required level of availability also in case of sudden or significant increase in network traffic. The main challenge for enterprises willing to start using the EHIF e-services lied in their readiness to identify themselves electronically, as many of them did not yet have the Estonian ID card or a contract for Internet banking enabling authentication and authorisation.

- **Estonian Police.** A number of new X-Road services have already been developed within the Estonian ePolice project. At CeBIT 2006, the most eye-catching element of the Estonian stand was an Estonian police car showcasing the services of our ePolice. By today, thousands

of Estonian drivers have experienced that presenting the national ID card is sufficient in order to identify themselves and check the data of their cars. ePolice services can be used both in the capital city Tallinn and in the middle of forests and fields at any place with Internet connection in Estonia (for more information about the ePolice see Chapter 4.1.2).

- **Standardising the design of portals.** The design of service-offering environments or portals is renewed every now and then. The same applies to the service provision over the X-Road. While so far, the Citizen Portal at: [www.eesti.ee](http://www.eesti.ee) and the X-Road enquiry portal had different designs, a project was launched at the end of 2006 to standardise them. The new design will not, however, alter the functionality of the portals (see also Chapter 2.4.6).

- **X-Road's monitoring system.** It is common practice to monitor large dispersed information systems on several levels. Here, distinction must be made between system monitoring and service monitoring. X-Road administrators use a special monitoring station with respective software. In the first half of 2006, surveys were carried out and a relevant specification was elaborated for the development of new monitoring software. In the new solution, the tools of system monitoring will operate independently of those of service monitoring. As a next step, tools of the administration system for the state information system (RIHA) are planned to be used for service monitoring. In addition, a data warehouse should be taken into use.

- **X-Road rules.** When the X-Road was developed in 2001, a set of rules was compiled for joining and using the system, regulating its internal procedures etc. Due to the constant development of technology and the ever-increasing number of its users, the X-Road rules had become outdated and, thus, a new set of rules was elaborated. The new document sets out new and more up-to-date software requirements; new security requirements conforming to the standard security system for information systems – ISKE (see Chapter 5.3); more detailed specifications for many technological (making back-up copies) and organisational (serving of users) operations, etc. The X-Road rules serve several purposes. On one hand, the document serves as a handbook for the working group administrating the X-Road, containing information on who is responsible for what as well as how and when problems should be solved. On the other hand, the rules contain descriptions and instructions for those planning to join their information system with the X-Road. For this, the document includes a general description of the X-Road, rules and documents for joining the environment and an overview of the management of business over the X-Road.

- **Co-operation with the I2 environment.** The extremely fast development of software systems has brought along constant debates over which new tools/instruments should be used in the X-Road environment.

I2 is a graphic user interface for the users of databases, allowing to describe, through certain graphic and consumer-friendly icons, queries that link data from several databases. The tool is already widely used in research institutions and will be taken up by specialists dealing with economic questions. A database user employing the I2 interface will be able to access plenty of data in different databases. So who will have the right to use all this data? Access rights will be given to specialists, who need to make complicated queries in order to perform their duties, or to people with the right to know, what kind of data has been stored about them in state information systems.

**Developments of the Entrepreneur Portal.** The development of state central portals (portals for citizens, entrepreneurs and officials that have a standardised design, similar functionality, and common administration) is not yet entirely completed. At the same time, services have been developed in several individual information systems for representatives of both public bodies and companies. A number of these services use the X-Road for making queries into different databases. In order to ensure the availability of services provided by individual information systems for all those acting in the name of their organisations and enterprises, the

Estonian Informatics Centre has launched the Entrepreneur Portal. The authentication in the portal is similar to that in the Citizen Portal (both with the ID card and codes of Internet banks) so that users would get accustomed to a situation, whereby public services are offered as if through one and the same portal.

While the rights of entrepreneurs can be checked rather easily from the Commercial Register, there is not yet similar state register for officials that would allow to decide upon their rights. A project targeted at solving this problem is expected to be completed in 2007. Until then, the allocation of rights for officials will still be based on paper warrants or, in some cases, public bodies will continue to use central services through their own information system or the free Mini-Information-System-Portal (MISP) provided by the Estonian Informatics Centre.

- **Centrally arranged development works for the joining of databases and information systems via X-Road services.** These development works were carried proceeding from the principle that if data traffic needs to be ensured between various ministries and institutions, it is often feasible to fund these works centrally by the Estonian Informatics Centre. An example of such a model is the enquiry system between the EHIS (Estonian Education Information System) and POLIS (police information system) information systems, which allows several structural units of the police access, through the enquiry system, the Estonian Educational Information System. The same system could also be used by subdivisions of other ministries.

- **Co-operation with the EU.** In 2006, the X-Road was involved in a number of EU pilot projects aimed at the facilitation of data exchange between different countries. Within these projects discussions have been held on the development of a gateway between the IDABC eLINK and the X-Road as well as on launching pilot projects within the Guide project (exchange of the European social insurance card E101, organisation of pan-European eProcurements). In addition, information was exchanged with experts responsible for the compilation of data exchange specifications of EU projects on EESSI (Electronic Exchange of Social Security Information).

The main problem concerning the integration of different information systems via gateways lies in the diversity of security requirements in various data exchange systems of European countries. X-Road based data exchange only takes place between authenticated users. In Estonia, nationwide PKI-based solutions have been used already for years. Besides, in case of X-Road data exchange, the transmitter of the message and the whereabouts of the authentication centre, whose services are used, are always known; users have a strict contractual relationship with authentication service providers (the Certification Centre, an Internet bank) etc. Thus, Estonia will not be able to develop official data exchange gateways to other European countries before the emergence of fully functional pan-European certification centres, development of a system of agreements between certification centres of different countries and a change in a mindset, whereby users are not authenticated at all.

- **X-Road statistics.** The data traffic on the X-Road has increased annually. The number of X-Road services (enquiries) per month has reached nearly 2.5 million, with 3,068 enquiries made solely in June 2006. In 2006, nearly 163,736 people or more than 12% of the Estonian population used X-Road services. The number of different enterprises and public bodies among X-Road users during the same time was 25,752. There were 65 databases offering their services over the X-Road.

#### 2.4.2. Principles and history of the X-Road

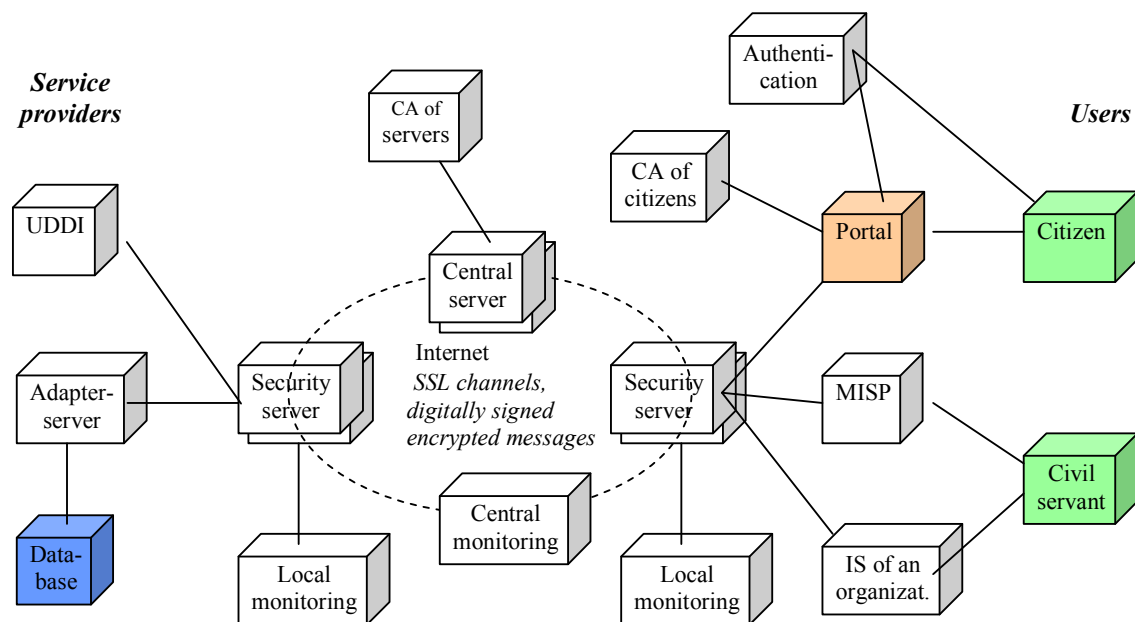
The aim and the technical solution of the X-Road project do not lie in the transition of databases to a huge data management system, but in the development of standardised

interfaces for the already existing databases and the creation of a data exchange layer called the X-Road. The X-Road allows officials as well as legal and natural persons to search data from national databases over the Internet within the limits of their authority. The system ensures sufficient security for the handling of enquiries made to databases and responses received.

The development activities on the system integration of government information systems in Estonia started at the beginning of 2001. In fact, first steps were made already in 2000. A special pilot project was launched by the Ministry of Transport and Communications, which tested the Internet-based connection between the database of the Citizenship and Migration Board and the Motor Vehicle Centre. At the same time, private companies had developed similar projects. *Andmevara AS*, which manages the Population Register, had tested the usability of CORBA standard for developing distributed systems. *Assert AS* had developed the Visa Register software based on distributed data processing in the Population Register, Commercial Register etc.

In the beginning, the X-Road was developed as an environment that would facilitate making queries to different databases. By now, a number of standard tools have been developed for the creation of e-services capable of simultaneously using the data in different databases. These services enable to read and write data, develop business logic based on data, etc.

In order to give the reader an overview of the system, let us recall the functional scheme of the X-Road described in the "IT in Public Administration of Estonia 2001".



**Figure 2.4.1. Functional scheme of the X-road**

## Structure of the X-Road

The system can be used in different ways (see the scheme above). In order to authenticate oneself in the system, the ID card or the Internet bank authentication service must be used.

Every **citizen** can use the system via the so-called Citizen Portal.

**Officials** can access the X-Road system for performing their duties through the information system of their agency.

As an additional option for organisations, whose information systems do not correspond to the sufficient security level for data processing, a free standard Mini-Information-System-Portal (MISP) has been developed. MISP functions as a secure system that can also be outsourced by ASPs.

Databases remain functioning in a standard way; they are connected to the X-Road system by a special user interface. Due to the standardised user interface, queries to all databases are made in the similar way.

The system has been designed and developed in a secure manner. The security servers of databases and information systems connected to the X-Road communicate with each other through encrypted channels. All users must pass the authentication and authorisation procedure.

**The citizen** can obtain and submit information within his/her rights;

- **the official** can use national databases in the decision-making process within his/her limits of authority;
- **the entrepreneur** can use the information maintained in national databases for carrying out business within his/her limits of authority.

It is excluded that one citizen could read the data of another citizen or that an official could read data not related to his/her duties.

The number of components (see the functional scheme) that can be connected to the X-Road is not limited.

## History of the results

**In 2001**, the architecture and main functions of the whole system were designed. Following a public procurement tender, all necessary software components for the X-Road environment were elaborated and tested. The technical and user records of the project were drawn and a number of information services available for users in the Internet were elaborated.

In December 2001, the **X-Road administration centre** was established within the Estonian Informatics Centre.

**In 2002**, the development of the X-Road continued on several levels. First, the existing technical solution was improved and several new functions were added. Second, extensive work was carried out to join new databases and information systems of agencies with the X-Road and to develop new services. Third, various amendment proposals, inevitable from the perspective of the development and implementation of technology, were made to improve the legislative framework and work organisation related to data processing and databases.

Since 2002, the development of the programme and the extended use of the X-Road can be treated as two different lines of work.

By the end of 2002, 17 databases had joined the X-Road with nearly twenty agencies registered as X-Road users. The Citizen Portal allowed residents to see data that had been

stored about them in the Commercial Register, the Population Register, databases of the Traffic Register, and the Register of Small Crafts.

**In 2003**, the development of the X-Road continued. First, in the course of X-Road implementation new necessities had emerged for several additional data usage functions that could not be foreseen in the design stage of the programme (e.g. use of the X-Road for transferring huge amounts of data from regional judicial institutions to the central database of court information system). It is clear that every database is somewhat unique, each information system has some special data processing requirements and, thus, new functions were added to the X-Road system.

Second, during the first years, the development of the X-Road was targeted at databases and information systems that were most important for the state in terms of data processing, needed plenty of information from various registers or where the use of the X-Road was vital in order to decrease the share of manual work.

Third, the X-Road administration system needed to be improved. As a first step, reorganisation of the National Databases Register (ARR) was started in order to integrate it with the X-Road environment. At the same time, the legislative framework was further reviewed with an objective to remove legal restrictions hindering the functioning of X-Road and other web-based information systems. On 19 December 2003, the Government of the Republic of Estonia approved the Regulation on the Implementation of Data Exchange Layer of Information Systems (X-Road).

By the end of 2003, the majority of the state main registers and databases had already joined or were joining the X-Road. The number of state agencies using X-Road services was nearly 150. In January 2003, approximately 27,000 enquiries were made to databases via the X-Road. Throughout the year 590,000 database queries were made, raising the monthly average close to 50,000.

**In 2004**, the technological solutions of the X-Road were further improved and updated. Thus, system interoperability protocols developed over the recent years have been implemented in the X-Road. As a result, XML-RPS was replaced by SOAP protocol for data transmission and launching programmes in telework; WSDL is now used for the description of web services, and UDDI standard utilised for the description of services.

At the end of 2004, software for the maintenance and development of the state register of databases was implemented in the framework of the X-Road administration system developments.

In order to develop e-services, agencies that have joined the X-Road can make use of functional possibilities enabling to develop complex e-services that simultaneously use data of different databases. Services such as the parental benefit service and the service informing high school graduates about the results of their state final examinations are just a few complex services implemented in 2004.

The parental benefit service deserves particular attention as it was awarded the grand prize at the national competition "The best co-operation project between state agencies 2004".

**In 2005**, the largest developments were related to log processing. Since the introduction of the new basic version, the new generation security servers store and maintain logs mainly in an encrypted form. For example, the logs of the Citizen Portal have a special solution. Anyone can see these logs by using the respective key of the ID card. However, if the key has been changed, it is no longer possible for anyone, including the key holder, to see them.

The year 2005 was full of negotiations with various international projects and organisations. Discussions were held on using the X-Road for the Schengen information system and eLink solutions of the IDA programme, as well as on launching pilot projects for data exchange with



Swedish and Finnish population registers. The X-Road is already now capable of authenticating all EU-25 citizens, as the code of the country whose citizen participates in the data exchange process was added to field of personal identification code in the data exchange protocol.

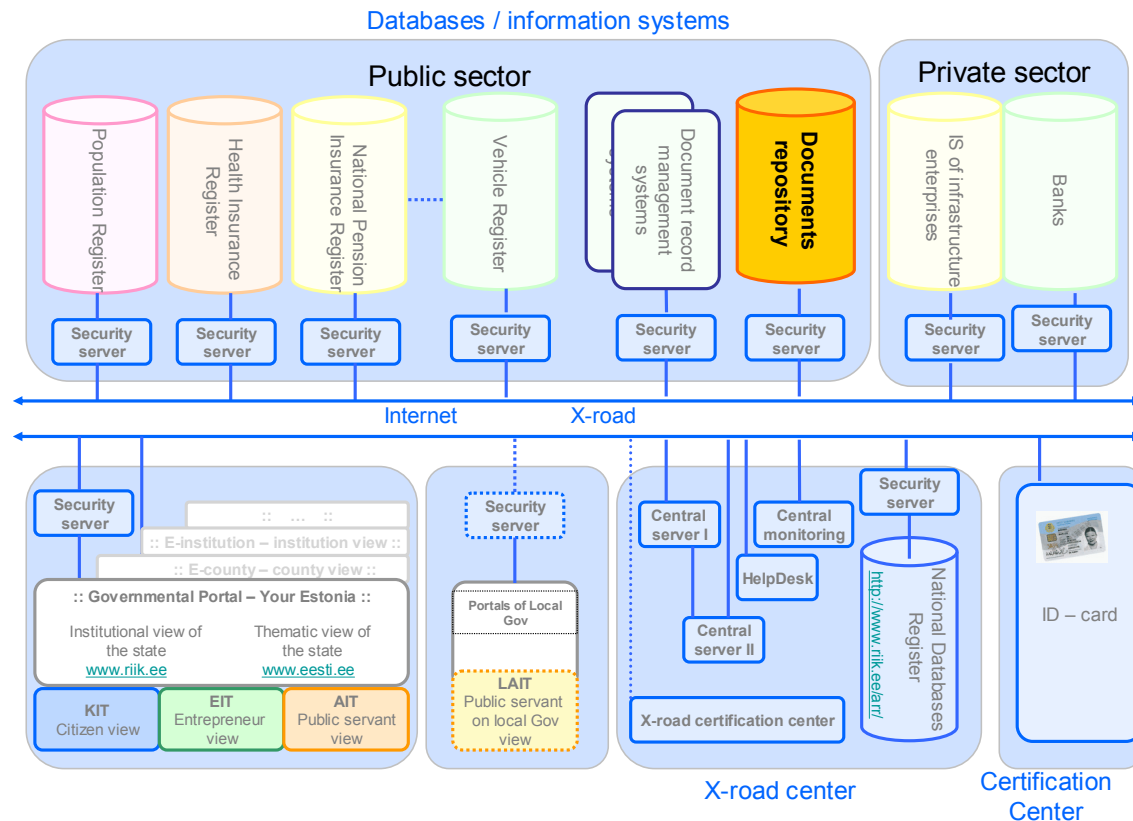
As the X-Road is a secure data exchange layer, the secure inter-agency e-mail service was also developed on the basis of that. What is especially important here is that such e-mails are free of spam.

### **2.4.3. X-Road as an element influencing the interoperability of the state information system**

The X-Road has, in several ways, influenced the development of information systems in Estonia. Initially, the X-Road was planned as a data exchange layer of databases and information systems over which enquiries would travel in an encrypted form into databases and their responses would come back into information systems. In the course of the years, the functionality of such data exchange has become significantly more versatile. In addition, there has been an enormous growth in the volume of data exchange as well as in the number of daily queries. At the same time, the synchronous exchange of enquiries has been accompanied by the asynchronous regime of data exchange, and data writing operations into databases as well as file exchange have been taken into use. Data can be found not only through simple search from one database, but a mechanism for performing complex enquiries has also been developed. The latter can be rightfully called an e-service.

Let us now take a look at the IT architecture of the state information system, trying to emphasize the role of the X-Road in it and to bring out the peculiarities differentiating the interoperability of Estonian information systems from that of information systems in many other countries.

The general eGovernment architecture in Estonia is presented in Figure 2.4.2. The main backbone of the eGovernment environment is the X-Road network of distributed and central servers. The eGovernment project itself started in parallel to the X-Road infrastructure project and the ID card and PKI projects were launched in parallel to the development of some back-office information systems. Of course, a set of information systems had already been developed before.



**Figure 2.4.2. eGovernment architecture in Estonia**

The essence of the eGovernment is that different information systems communicate with each other via security servers, which are built up as special firewalls storing all messages (queries, services) in logs. This means that after a long period of time it would still be possible to restore past situations, e.g. who has used the service and when, as well as what kind of decisions have been made in a particular content.

In the eGovernment environment, information systems provide and also consume services. The Estonian commercial banks (more precisely *Hansapank*, *SEB Eesti Ühispank*, *Sampo Pank*, *Krediidipank* and *Nordea Pank*) play three different roles in the eGovernment schema. First, they provide portals connected to the eGovernment environment with the authentication service for citizens. This is because all Estonian citizens do not yet possess the ID card, while more than half of the population already has contracts with commercial banks for using Internet bank facilities. The authentication mechanism provided by banks is regarded as trustworthy as the one based on the ID card and valid for using eGovernment services.

Second, some services are charged for and, therefore, a solution has been developed for paying these charges. At first, the citizen transfers money to the bank and right after the transfer the provision of the e-service will start automatically.

Third, the banks themselves are users of data and e-services, and they use this environment just like any other information system.

The Estonian Certification Centre (CC) is responsible for the developments related to the ID card, digital signature, and other PKI infrastructure elements in Estonia.

Direct communication between the citizens and the eGovernment environment works over a set of communication portals: the Citizen Portal (KIT), the Entrepreneur Portal (EIT) and the Civil Servant Portal (AIT).

The **Citizen Portal** was developed in 2002 and it serves as the main channel for mediating eGovernment services between the citizens and the government ([www.eesti.ee](http://www.eesti.ee)). The portal then started mediating services from Estonian databases. According to the law, every Estonian citizen has the right to know what kind of data the government has collected about him or her.

At the beginning of 2005, the first services of the **Entrepreneur Portal** were developed. The application for alcohol sales permit was then the most popular one.

In 2005, the **Civil Servant Portal** was implemented as a Mini-Information-System-Portal (MISP). It is now used in many central and local government agencies.

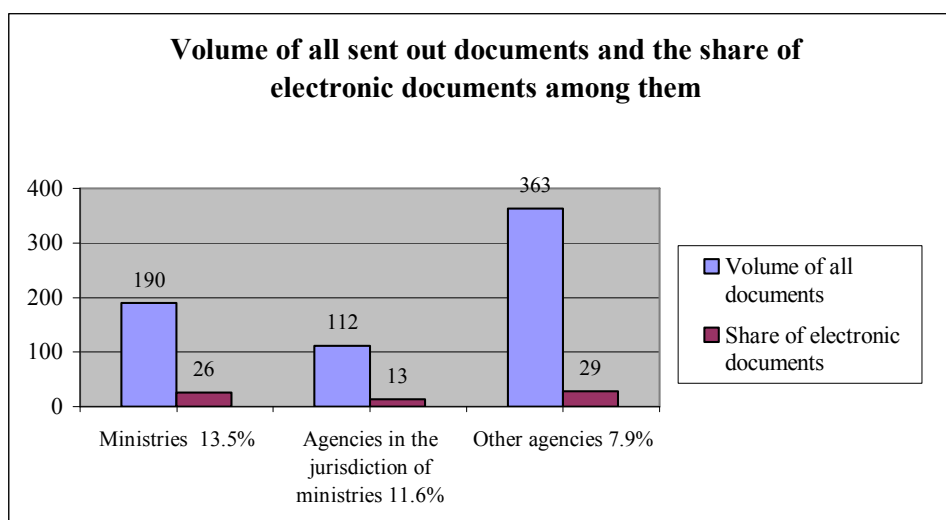
All the portals are organised as information portals, which can be used as user manuals and service portals for eGovernment services.

## *2.5. Launch of paperless communication between document management systems and development of the document exchange environment*

The European Union's vision for eGovernment in the next decade foresees "increasing the efficiency of eGovernance as a tool for good governance". While so far, eGovernance has primarily denoted more efficient services for the public, now increased emphasis is put on the rationality of the public administration; efficiency, openness and transparency of governance; and participatory democracy. From the viewpoint of document management, good governance means cost-effective and rational use of resources, simplification of administrative processes, increased availability and quality of services, and improved interoperability of document management systems.

The State Chancellery as a public body co-ordinating the development of document management in the Estonian public sector considers the interoperability of document management systems one of its priorities in the coming years. In 2005, the agency launched an electronic document exchange project between ministries with an aim to put an end to paper-based correspondence. In the course of the project, document management systems of ministries will be interfaced, ensuring thus their interoperability and paving way for the gradual transition to paper-free document exchange in the public sector. As a result of the project, the different document management systems of ministries will be able to exchange documents over the secure data exchange environment X-Road through a specially designed document exchange centre.

To map the initial situation, a survey was carried out at the beginning of 2005 on the basis of document exchange reflected in document registers of agencies. The analysis of volume of documents provided the basis for making the choice of ministries to be involved in the pilot project. The mapping of metadata also served as a preparation for the unification of metadata composition. The survey showed that despite the composition of documents in electronic form, the correspondence between ministries as well as administrative agencies in their jurisdiction is still mainly paper-based.



**Figure 2.5.1. Volume of all sent out documents and the share of electronic documents among them**

A directory was compiled of the mapped metadata in order to unify the composition of metadata components in agencies, support the document and information exchange between information systems and enable detailed search simultaneously in several information systems.

In the elaboration of the directory, the following characteristics of metadata were taken into consideration:

- Reusability – metadata created for document management must be re-usable in other fields of life and conform to metadata standards of other fields of activities.
- Multilevelness – based on an international standard on archive description, multi-level descriptions will be used in document management.
- Modularity – metadata is to be presented in groups by document management events; they can be used by organisations either one at a time or in combination with other metadata schemes.
- When employing metadata, a certain amount of metadata components is mandatory for all organisations. Additional metadata will be recommended, but each organisation will be able to decide upon their implementation depending on its document management requirements.

The project for the development of electronic document exchange in the ministries consists of the following stages:

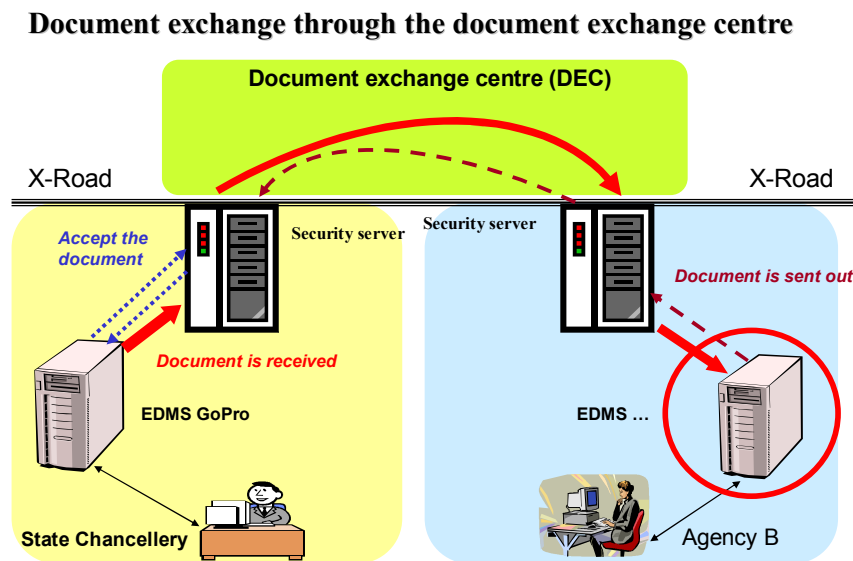
- Within a pilot project carried out in 2005, paperless communication based on a bilateral agreement was tested between document management systems using two different software. Agencies involved in the pilot included the Ministry of Defence, the Ministry of Finance, the State Chancellery, and the Ministry of Interior.
- In the second stage of the project, during 2006, the rest of the ministries were involved. Automatic and secure document exchange was tested between several different document management systems through the X-Road. The document exchange was based on a multilateral agreement. As a next step, county governments, administrative agencies in the jurisdiction of ministries etc. will be gradually involved in the project.

- In the third stage of the project, paperless document exchange will be gradually extended so as to include other types of documents (legal acts, invoices etc.).

Pursuant to the principles set out in the “Estonian IT Architecture and Interoperability Framework”, Estonia is moving towards an architecture based on multilateral agreements, which allows to significantly reduce the number of connections needed for the communication between information systems and facilitates the administration of those connections. The development of paperless document exchange between public sector document management systems is based on the same principle.

In 2006, the Estonian Informatics Centre procured and implemented a document exchange centre, which enables secure XML-based automatic data exchange between document management systems over the X-Road.

Document exchange through the document exchange centre is shown on Figure 2.5.2.



**Figure 2.5.2. Document exchange through the document exchange centre**

### ***Document exchange centre (DEC)***

The document exchange centre (DEC) is a common central component (information system) for document management systems and applications for handling the documents of state portals (eForms, DigiDoc). The objective of the system is to link dispersedly located document management systems through the X-Road and to ensure both short-term and long-term preservation and processing of documents. The functionality of the DEC is independent of the document format and does not impose any restrictions on the document type. In the future, the DEC will offer the following online services:

- logistics of documents;
- processing services;
- DEC's internal procedures with documents;

- functions of document management;
- enquiries and notification services;
- administrative procedures of the system.

In May 2005, the State Chancellery approved the concept elaborated by the Estonian Informatics Centre as a basis for the further development of electronic document exchange.

The main advantages of the chosen multilateral solution are the following:

- There is no need to conclude agreements with all communication partners. Thus, in order to launch electronic document exchange, an agency only needs to join the DEC and the environment's services must be opened for it.
- Document management systems willing to join the DEC only need to be able to make X-Road queries, they do not even have to be able to respond to them. At the same time, the DEC (as a database) must be able to respond to X-Road queries, but does not have to transmit them to many different systems.
- The DEC as a central high availability information system acts as an asynchronous buffer, ensuring the possibility to preserve a document when the document management system of the receiving agency is not available and accept the document at a time suitable for the receiver.

The DEC was implemented in May 2006. At the same, another pilot concerning document management that had been initiated by the State Chancellery was completed. In the course of the project, a data exchange interface enabling direct communication between document management systems Postipoiss and GoPro was developed. Besides, descriptions of the most widely used documents, letters and metadata were elaborated within the project.

In July 2006, the Estonian Informatics Centre organised a public procurement for the development of DEC interfaces for other document management systems.

During 2006, interfaces were developed for the following document management systems: Amphora, the Citizen Portal, Livelink, Postipoiss, Sharepoint, GoGpro, and Webdesktop.

The wider implementation of the DEC has only just begun. By November 2006, nearly 500 documents had been exchanged over the DEP by about 60 agencies. This number is on constant increase.

In the longer perspective, the use of the DEC will probably be extended so as to include other types of documents (e.g. financial documents, such as invoices). In addition, evolvement of the DEC into an infrastructure for the transmission of messages with described semantics can be foreseen. The DEC will allow to gradually implement paperless document exchange in the public sector regardless of document management software used in specific agencies. Such a document exchange will ensure the integrity of transmitted digital documents and create preconditions for their long-term preservation.

## 2.6. Improvements to central state portals and related application services

In 2006, the State Portal “www.eesti.ee” project initiated in 2005 was developed further. This project is funded from the EU Structural Funds under Measure 4.5: “Information Society Development”. The State Portal programme is a continuation to earlier state portal projects, such as the eGovernment portal<sup>6</sup> or the Citizen’s IT environment<sup>7</sup> (CIT).

The general objective of the programme is to create a central environment integrating the e-services of the public, private and third sectors. The focus of the portal has changed. The earlier approach used to be primarily citizen-oriented, whereas now the emphasis is on the enterprise and the employee in the entrepreneur’s view of the portal and on the agency and the office in the official’s view.

The project aims to further consolidate the existing portals and to increase the share of application services for the target groups of the portal. The integral development of the portal is ensured with the Estonian IT Architecture and Interoperability Framework, the State Portal concept, the development framework, the IT profile of the Estonian Informatics Centre and the framework documents related to the standard contract for IT development services.

Eventually, the institution-based eGovernment portal, the topic-based Information Portal and the Citizen Portal comprising various e-services should become an integral information and services environment, where citizens can find necessary information or services by navigating in the institution, topic or services view.

As the project has been implemented on the basis of iterative and incremental development methods, the results have been made available gradually for public use. Along with creating new functions, also the technological platform of the applications and the existing functions have been improved, taking into consideration the feedback received from end-users.

The strategic aim is to draw together public sector information and services and to provide state agencies with an environment for offering mobile, geo-information and other application services to end-users. The services offered through the portal are closely integrated with the infrastructure of the data exchange layer X-Road.

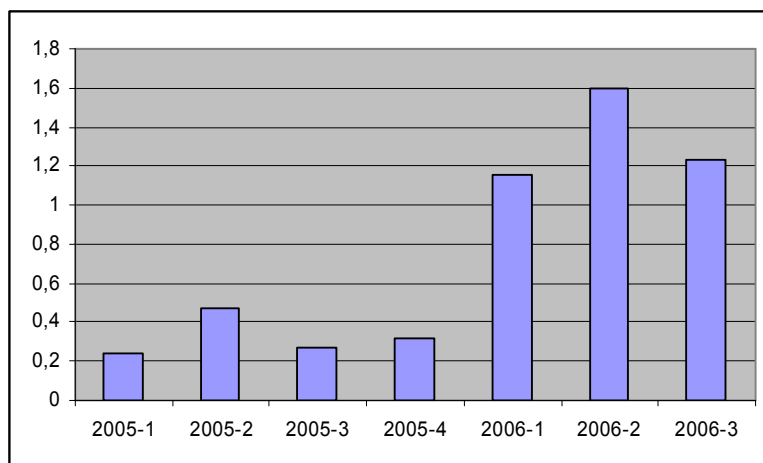
One of the outputs of the State Portal project is the technological platform called development framework. This framework is turning into an independent product, which serves as a software environment also for various other application services provided by the Estonian Informatics Centre and other state agencies. Among the users of this software environment are the Road Administration (the information system on transport permits), the Ministry of

<sup>6</sup> The eGovernment portal ([www.riik.ee](http://www.riik.ee)) was launched in 1998. It is a common access point for Estonian state agencies to the public information of constitutional institutions, state and local government agencies. The Russian and English versions of the portal give a comprehensive picture of Estonia’s public structures also to the rest of the world.

<sup>7</sup> The CIT (eCitizen) project was initiated in 2002 to develop the Citizen’s IT environment. In the framework of that project the Information Portal (<http://www.eesti.ee>) and the Citizen Portal (<https://www.eesti.ee>) were created. The **Information Portal** gives practical information about the rights and obligations of persons staying in Estonia and about the services of Estonian state agencies. For instance, it contains information on how to register a birth or how to apply for state benefits. The Information Portal includes forms, links to legislation and websites, relevant phone numbers, e-services and many other useful things. The portal is in Estonian, Russian and in English. The **Citizen Portal** was established in 2003. The portal users are identified with the ID card or through a bank and provided access to various services. These include giving digital signatures, completing and sending e-forms, checking personal data in state registers, forwarding the official e-mail (the standardised e-mail address @eesti.ee is provided by the state for each citizen), the notification service etc.

Internal Affairs (e-services of the Population Register) and the Police Board (e-services of the police). In relation to the establishment of a document repository (see Chapter 2.5) in May 2006, a procurement for system hardware and software was carried out. The new hardware and software platform enables to serve significantly more users and to launch application services for larger and more active target groups.

Figure 2.6.1 shows the dynamics of the use of the environment.



**Figure 2.6.1. Number of web enquiries by quarters (millions)\***

\* The enquiries of the X-Road portals, the Information Portal, the eGovernment portal [www.riik.ee](http://www.riik.ee) and the document repository are not included.

### Developments of the infrastructure for mobile services

In 2006, a public procurement was conducted to develop the infrastructure for mobile services. For the time being, push-type SMS and MMS notification services are under planning. The infrastructure should be completed in February 2007.

The procurement should provide for software and online services that would enable public sector agencies to offer SMS and MMS based services to citizens without a need for the know-how or developments specific to mobile communications. A central infrastructure for mobile notification services and a user environment in the Information Portal [www.eesti.ee](http://www.eesti.ee) will improve communication between the citizen and central and local government agencies and will contribute to creating new services while reducing IT development costs. Similar practices have been successfully introduced in the data exchange layer X-Road.

Before starting the development of the infrastructure for mobile services based on two-way information exchange, a feasibility study will be carried out to identify the user authentication methods and other requirements necessary for providing such services.

The procurement is funded from the EU Structural Funds under the measure for information society development.



### 3. Activities aimed at the development of inclusive society

#### 3.1. Computer Protection 2009

Look@World Foundation was established in 2001 by ten leading companies in Estonia with an aim to considerably increase the number of Internet users, raising thereby the living standard of Estonians and the competitiveness of our economy in Europe. The projects carried out so far include basic computer and Internet training for 100,000 people in Estonia, development and implementation of the eSchool environment and opening nearly 500 public Internet access points.

On 23 May 2006, the largest partners of the Look@World foundation as well as the Ministry of Economic Affairs and Communications of Estonia signed a co-operation agreement to launch a nationwide initiative called *Computer Protection 2009*. The aim of the project is to make Estonia a country with the most secure information society in the world by 2009. The initiative has become known as Look@World 2.

The Look@World partners Hansapank, EMT, SEB Eesti Ühispank and Elion will fund the initiative in the next three years in the amount of 60 million kroons (3.83 million euros).

The reasons that led to the signing of the agreement were the following:

- more than half of Estonian residents and majority of enterprises use different Internet-based services, meaning that the Internet plays a significant role in the daily life of Estonians;
- a need has arisen to considerably increase the security of public and private services provided over the Internet or via other electronic channels;
- nearly 80% of the population has the ID card that enables secure electronic authentication and digital signing;
- the digital signature solutions implemented in Estonia correspond to European standards and have also found international recognition.

Pursuant to the agreement, parties will ensure the sustainability of public and private sector e-services and IT-solutions. In addition, the parties will allow the users of these services to actively participate in the protection of the information society, ensuring at the same time a stable environment and trust for the functioning of these services. Within the framework of the agreement, parties will contribute to IT security related awareness-raising and skills upgrading. Furthermore, conditions will be ensured for increasing the simplicity, affordability and user-friendliness of relevant hardware and software.

To achieve their goal, the parties will join efforts so as to ensure the development and large-scale implementation of applications based on the ID card and other PKI (Public Key Infrastructure) and advanced cryptography solutions.

The parties aim to significantly widen the use of the ID card with an objective to have at least 400,000 people using the card for electronic authentication and digital signing by 2009.

The Ministry of Economic Affairs and Communications as a representative of the state in the co-operation agreement will contribute to the process by taking the following actions:

- putting information security matters high on the agenda in the elaboration of strategies and legislation concerning the information society and ensuring the efficiency of the activities of CERT Estonia;

- using solutions that take into account the possibilities of the ID card in the development of new secure public sector e-services and in the internal functioning of the public administration;
- promoting Internet security related dialogue and co-operation between the public and private sector;
- searching and exchanging information about EU programmes and funds targeted at the development of secure information society;
- promoting Estonia's experience in the field of electronic identification in the EU as well as facilitating best practice exchange with other countries;
- participating in the elaboration and promotion of Internet security indicators as well as in the implementation of surveys analysing the take-up of the ID card and e-services.

Activities to be carried out by the Look@World foundation partners within the *Computer Protection 2009* initiative include the following:

- promotion and priority development of the ID card in comparison with other forms of electronic personal authentication;
- integration of ID card and other PKI-based identification mechanisms into their services and ensuring maximum use of digital signature in their business processes;
- investing in infrastructure and the related services, in particular in the development of the infrastructure and services of AS Sertifitseerimiskeskus (the Estonian CA) so as to ensure high-quality service provision for ID card users and maximum security of the service;
- provision of training and information to Estonian residents, including entrepreneurs and civil servants, on why and how to use the ID card electronically;
- facilitating the availability of ID card readers for the population;
- elaboration and implementation of new ID card based services;
- consulting enterprises and institutions on the development of ID card based services;
- co-operating with each other in order to raise public awareness of information security, including:
  - launching, maintaining and developing the IT security portal at [www.arvutikaitse.ee](http://www.arvutikaitse.ee);
  - offering, under the auspices of the Look@World Foundation, IT security related information to the media so as to ensure that Internet users would be aware of IT security risks and know how to protect themselves;
  - developing Internet security indicators and promoting them.

The parties have also agreed to jointly move from password-based identification to the PKI-based one and, in addition to the above-mentioned activities, carry out other actions in support of Look@World 2 objectives.

The main activities of the foundation will include sharing of information on how to adequately recognize Internet threats and to protect oneself against them, promoting the ID card as the simplest and most secure self-protection mechanism in the use of e-services and raising awareness about other IT security related activities and tools.

Within the initiative, a website dedicated to basic ID card training at <http://koolitus.id.ee> (currently in Estonian and Russian) has been developed. The objective of the portal is to give

information on why is the ID card necessary, how to get it, how to authenticate oneself with the ID card, how to give digital signature etc. The website also contains information about the card's security and how to use it in the electronic environment. Furthermore, practical examples are given about numerous operations related to the use of the ID card, such as changing its PIN codes, renewal and unblocking of certificates etc.

In the framework of the initiative, Hansapank and SEB Eesti Ühispank will train their employees on the basis of the Look@World's ID card training plan, expecting to teach, by spring 2007, a thousand employees. As civil servants must be able to use the ID card and give digital signature, ATAK – the Centre for Public Service Training and Development – will use the training plan as a basis for the training of officials.

On the launch of the initiative, a gateway to IT security related information and discussions was opened, enabling computer users to obtain information about threats related to the Internet and find specific instructions on how to protect themselves. By today, the portal at [www.arvutikaitse.ee](http://www.arvutikaitse.ee) (in Estonian) as well as its Russian version at [www.infosecurity.ee](http://www.infosecurity.ee) contain numerous links, articles and news, having evolved thus into genuine guideposts for finding one's way in the world of information security.

### ***3.2. Contribution of the non-profit and private sector to the development of information society***

#### **3.2.1. Role of the ITL in developing ICT in Estonia**

The Estonian Association of Information Technology and Telecommunications (ITL) is a voluntary non-profit organisation<sup>8</sup> whose primary objective is to unite the Estonian information technology and telecommunications companies and educational institutions and which has contributed to the development of its own field as well as that of other sectors of the economy. The share of the ITL member companies in Estonia's 2005 GDP accounted for approximately 9%.

In 2006, the activities of the ITL were focused on the following:

1. To assist its member companies and Estonia's ICT sector in finding their place in the international division of work with the objective of achieving a substantial increase in the share of exports (becoming more global).
2. To make the business environment more favourable and improve conditions underlying the development of the national ICT industry, contributing to increasing both its member companies' and national wealth and thereby the investment ability (to boost domestic industry).
3. To establish conditions for cooperation between the ICT industry and related areas with the aim of enhancing Estonia's competitiveness and created added value via synergy and innovation and to restore Estonia's image as a successful e-state (mutual cooperation and cooperation with related areas).
4. To participate in and influence the public administration upon establishing the priorities, applying ICT, and compiling the budget of the country so that it would

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In 2006, 40 companies and organisations with over 3,400 employees belonged to the ITL. The 2005 turnover of ITL member companies amounted to over 13 billion kroons (830 million euro).

support the creation of possible innovative and research-intensive business solutions arising from the execution of public procurements by the ICT industry (to increase the role of the state in development).

5. To enhance the prominence of the ITL and its role in public and business life.

In order to get an overview of the size and various segments of the ICT sector in Estonia, the ITL, in cooperation with the Ministry of Economic Affairs and Communications, conducted a sectoral survey in 2006 (see 6.3) based on the data of the financial year 2005.

In the first half-year, the ITL organised several brainstorming sessions participated by representatives of companies and institutions of higher education with the aim of increasing the number of students majoring in ICT and improving the quality of their education. At the end of May, a survey commissioned by the ITL (and supported by the Ministry of Education and Research) was conducted among twelfth-graders. It displayed the high popularity of ICT specialties, but preference for the so-called soft specialties was also considerable. The efforts of the ITL found support from the state and on 31 May a cooperation memorandum was signed by the ITL, the Ministry of Education and Research, and the Estonian Information Technology Foundation (EITF). The objective of the memorandum is to provide the sector with a sufficient number of specialists, to improve the international competitiveness of ICT-related studies at Estonian universities and vocational schools, and ensure the professional qualification of our specialists and skilled workers at the most optimal level.

The main spheres of cooperation include:

- better organisation of field training to make sure there are enough places for conducting the training and the instructors are competent and motivated;
- increasing the popularity of ICT education with the aim of significantly increasing the number of ICT students at universities;
- improving the quality of ICT education by using top specialists from different enterprises as lecturers;
- improving information exchange between companies, universities, and the ministry to make the training more flexible;
- using project-based financing in order to find additional funds to support various activities. The opportunities made available by the EU structural funds are considered first.

The discussions resulted in the realisation that the ICT sector needs consistent promotion. Therefore, an action plan is being prepared on how to make the ICT field more popular with the young during the next two years. As the first step in meeting this objective, a competition was announced to find a slogan tying together different activities. Out of the 158 proposals received, the sentence “IT CREATES TOMORROW” was chosen as the winner.

As ICT crosses horizontally all the sectors of the economy, we participate in the cluster development projects of both the Tallinn City Enterprise Board and the Ministry of Economic Affairs and Communications.

Discussions held with representatives of other sectors' associations and enterprises have transpired many possibilities for using new ICT solutions in the development of manufacturing processes and products of the so-called traditional industry.

The ITL has always actively taken part in the preparation of state policy documents. Representatives of the association participated and submitted their proposals in the compilation process of the document “Estonian Information Society Strategy 2013” prepared by the Department of State Information Systems (RISO), a structural unit of the Ministry of

Economic Affairs and Communications. This is a document of great importance to enterprisers, because it includes the action field “Development of knowledge-based economy” together with measures to improve the competitive ability of the ICT sector.

The ITL has been involved in preparation of the documents underlying the country’s IT infrastructure and participates in the semantic interoperability working group of the state information systems established by the RISO. The association initiated discussions regarding the question to which extent the state itself should deal with the development and management of the IT infrastructure and services and what and how much thereof should be commissioned from the private sector.

In 2006, the ITL provided its opinion on more than twenty drafts mainly belonging to the field of electronic communications. Involvement of enterprises in the process of legislative drafting is a sure way to improve the quality of the devised regulations and makes it easier to enforce them.

As ICT is one of the three key areas of the Estonian knowledge-based economy, the ITL favours the proposal to launch a national ICT research and development programme within the framework of Estonia’s research, development and innovation development strategy “Knowledge-Based Estonia 2007-2013”. The objectives of the proposed programme are enhancement of Estonia’s research and development related capability in the respective field of technology and distribution and implementation of the key technologies in other sectors of the economy (primarily traditional industry, energy, transport, etc) and socio-economic spheres (health, social environment, etc).

Supported by its member companies, the ITL has made a great contribution to the development of a successful e-state and the association’s activities are continuing in the future as well, in cooperation with the public sector, other sectors’ enterprises, and educational institutions.

### 3.2.2. The role of the EITF in developing ICT education and e-Learning

The Estonian Information Technology Foundation (EITF, <http://www.eitsa.ee/inenglish/index.php>) is a non-profit organisation founded in 2000 by the Estonian Republic (represented by the Ministry of Education and Research), Tartu University, Tallinn University of Technology, Eesti Telekom, and the Association of Estonian Information Technology and Telecommunications Companies (ITL). The aim of the EITF is to assist in training highly qualified IT specialists and to support information and communication technology related development in Estonia.

#### The foundation:

- manages and administers the Estonian IT College founded in May 2000;
- administers the national support programme for ICT higher education “Tiger University+” (2005-2008);
- arranges and administers the activities of the consortia of the project-based e-University and e-Vocational School launched with the EITF, as well as their projects, including those financed by the EU structural funds;
- arranges and fulfils the function of commissioning inter-university ICT projects;
- in conjunction with universities and the ICT industry, arranges cooperation with the aim of improving the quality and popularity of ICT education;

- participates in the preparation of development and action plans, programmes and projects related to the field of ICT.

Thus, the key words of the EITF are: ICT education and ICT in education.

### IT College

IT College (<http://www.itcollege.ee/inenglish/index.php>) provides a three-year applied higher education programme in the specialties of IT Systems Development, IT Systems Administration, Information Systems Analysis, and Technical Communication. The curricula are fully accredited.

In 2006, IT College had more than 550 students and over 150 graduates. The number of state-commissioned student places was 90.

IT College offers full-time and part-time forms of study. As from the autumn of 2006, distance learning became also possible and currently there are 42 students using this option. The college is a unique experiment in Estonia, and its admission figures exceeded the forecast more than twice. E-distance learning means the student can pass 75% of the programme by watching and listening to lectures over the Internet, reading additional materials, and performing practical tasks and tests via the computer. The main advantage of e-distance learning is flexibility – students can choose the time and place most suitable for them for dealing with their studies. IT College summons e-students to Tallinn only once a month to polish their knowledge in lectures.

Cooperation between the ITL and its member companies has been extremely successful over the years in updating curricula and ensuring the good quality of the instruction. The college has a very good learning infrastructure, strong composition of lecturers, and high-level training commended by ICT companies.

### Tiger University

The programme “Tiger University+” (2005-2008) administered by the EITF continues to meet the objectives of the Tiger University 2002-2004, resting on the experience of the latter and its 2005 follow-up programme.

The aim of the programme (<http://www.eitsa.ee/inenglish/tigeruniversity.php>) is to support and stimulate strong, internationally competitive research and development activities and acquiring of academic higher education based thereon in the ICT specialties of the Estonian public universities, to develop and upgrade the ICT infrastructure at the Estonian higher education establishments and sustainable development of the ICT field at the higher education level. The second goal of the programme is to involve additional resources in the form of sponsorship and co-financing from other sources, financing from other (private and non-profit) sectors and EU structural funds, cooperation and aid programmes to support the national programme.

The national programme for ICT higher education “Tiger University 2002-2004” launched in 2002 as well as its follow-up programme “Tiger University+” (2005-2008) established as their objectives to support the development of the ICT infrastructure at the Estonian establishments of higher education, to enhance the learning environment, and to improve the quality of the staff and post-graduate education of the ICT field at our public universities. In order to meet these objectives, the EITF, which administers the programme, has organised 59 public project competitions in five years. As a result, 422 project and mobility benefits totalling to 21.6 million kroons (1.34 million euro) have been provided. In addition, the main universities providing ICT higher education have received support in the form of 99 provisions amounting to 51.6 million kroons (3.3 million euro), mainly for the development

and upgrading of the ICT infrastructure (computers, servers, networks, security of networks, etc).

The provisions were used to launch and develop within the framework of the Tiger University programme the Estonian e-University, an aggregate e-learning project launched in 2003 and representing a consortium of the major Estonian universities. From 2003 to 2006, the e-University has received 11.5 million kroons (735 thousand euro) from the Tiger University programme.

Supported by Tiger University, the Admissions Information System (SAIS, [https://www.sais.ee/index\\_en.html](https://www.sais.ee/index_en.html)) was launched and implemented in 2004. This is a service helping student candidates submit their admissions applications electronically through the Internet, thus simplifying the admission procedures of universities. SAIS was completed in June 2005 and since July 2005, the system is owned by the Ministry of Education and Research. In November 2005, the EITF transferred administration of the system over to the National Examination and Qualification Centre.

### E-Learning and e-Learning Development Centre

E-learning is ICT-assisted learning taking place both in and out of the classroom or official lesson. E-learning is implemented using ICT tools, the Internet, digital learning materials, correspondence courses, etc, with the aim of enhancing the quality and efficiency of instruction owing to better access to information and services, more flexible ways of learning, more effective cooperation between learners, and new teaching methods.

Passing the curriculum in the form of e-learning either partially or in full contributes to improving the quality of higher and vocational education by enabling students learn with the best lecturers:

- subjects of most interest to them following curricula that are 100% adjusted to their abilities and needs without being at the same time rigidly tied to any school or even country;
- at a suitable speed;
- at a suitable time and place.

E-learning turns studying into a very open process, making lifelong education possible for everyone irrespective of their age, profession, geographical location, or physical disabilities.

The EITF has been engaged in arranging, co-ordinating, and administering e-learning since 2003, when the Estonian e-University (<http://www.e-uni.ee/index.php?main=120>), a consortium of e-learning related universities, was established. In 2005, a consortium of vocational and applied higher education establishments called the Estonian e-Vocational School (<http://www.e-vet.ee/> - only in Estonian) was founded.

**The e-Learning Development Centre** was established as a separate structural unit under the Estonian Information Technology Foundation on 2 May 2006 by joining the functions of the above-mentioned consortia. The e-Vocational School consortium accounts for 68% and the e-University consortium for 90% of the total number of students of the e-Learning Development Centre member schools.

Establishment of the e-University consortium laid the foundation for central introduction and coordination of e-learning in the Estonian higher education. The founders included 6 universities, the Ministry of Education and Research, and the Estonian Information Technology Foundation. The primary objective of the consortium is coordination of e-learning related cooperation between universities, propagation and introduction of innovative

approaches into the learning process, inclusion of new target groups and promotion of international cooperation.

Launching the e-Vocational School consortium on 16 February 2005 was a natural follow-up to further development of the Estonian e-University consortium. The e-Vocational School consortium was founded by 4 applied higher education institutions, 34 vocational schools, the Ministry of Education and Research, and the Estonian Information Technology Foundation. The primary objective of the Estonian e-Vocational School consortium is launching e-learning related cooperation between its member schools and development of e-learning proceeding from the principles of lifelong learning and regional development.

The e-Learning Development Centre coordinates two projects of the EU Structural Funds: “Regionally accessible higher education via e-learning development” (REDEL) and “Development and introduction of e-learning into vocational schools and applied higher education institutions” (e-VÕTI).

The activities of the e-Learning Development Centre focus on five areas:

1. Developing of and providing support to lecturers / teachers
2. Developing the content of e-learning
3. Developing the e-learning infrastructure
4. International cooperation
5. Distributing information

In the field of international cooperation, the centre belongs to four international consortia: European Distance and e-Learning Network (EDEN); European Association of Distance Teaching Universities (EADTU); European Institute for E-Learning (EiFEL); European Foundation for Quality in eLearning (EFQUEL).

The main goal of the e-Learning Development Centre is to contribute to improving the quality and efficiency of learning at the Estonian universities and vocational schools via large-scale application of e-learning methods and ICT tools to the learning process with the aim of making these an integral, day-to-day part of learning. In other words, the letter “e” should be made disappear from the concept of e-learning.

The EITF has made its contribution via the projects described above and several other sub-projects to Estonia’s movement towards becoming an information society.

### **3.2.3. E-Governance Academy – Estonia’s e-gate for other countries**

The e-Governance Academy (eGA) Foundation was established in 2002 as a joint initiative of the Government of Estonia, the Open Society Institute (OSI), and the Regional Support Centre of the United Nations Development Programme (UNDP) with the aim of sharing experience concerning e-Governance, especially the system developments of Estonia’s e-Government, with other countries. The main fields of activity have been training courses for other countries’ high-level civil servants in both Estonia and abroad, consultancy projects, and research. As the activities of eGA are based on disseminating e-Governance related practical experience, a number of IT managers and administration managers from the main fields of



public sector development as well as politicians have participated. The working languages are English, Russian, and Estonian.

2006 brought along many significant changes for the e-Governance Academy. It was the first year to operate without base financing. In earlier years, part of the operating costs was covered by respective grants, but as from 2006, eGA is fully self-financing. This has somewhat complicated the situation, as similar organisations in other countries are often financed from the state budget. This is why eGA is often treated as a public sector body, which has made it more difficult to compete in international projects. On the other hand – the range of the activities of eGA has extended both geographically and practically.

Three main fields of activity transpired in 2006: the e-Governance programme for central governments, the e-Governance programme for local governments, and the e-Democracy programme. Seminars, conferences and researches have been carried out in all the three spheres.

As regards research topics, the share of studies on the Estonian public sector increased. The most noteworthy thereof are the survey on the usage of ICT by local governments (see also 6.5) commissioned by the State Audit Office, smaller researches regarding e-Democracy, and the e-Democracy conference, which took place in spring. In addition, an international conference “The Policy of Broadband Wireless Internet Access” and a conference on blogs, “Time Blogs – Pastime or a Sign of the Times?” took place in April.

Out of the training projects, the most significant are the 5-day training to a group of parliamentarians from Afghanistan, a week-long training programme for Kyrgyzstanis and Azerbaijanis, a training course for Albanians and Moldavians, and a training seminar for top executives from the Armenian central government. In addition, seminars introducing the development of e-Government commissioned by Ericsson were organised in Stockholm, North-Cyprus, Bishkek, Almaty, Macedonia, Serbia, Palestine, and Egypt.

Major consultancy projects included drawing up a common records management strategy and conception for the Republic of Armenia, completion of the e-model project for Macedonia’s local governments, analysis of IT development projects related experience of Serbia’s local governments, the e-Citizen project of European cities (which described the best-practice experience of different cities of various countries), and elaboration of the development strategy for Estonia’s local governments. A system analysis was performed for the Macedonian Parliament. The aim of the analysis is to create an e-Parliament there based on Estonia’s experience.

Another more extensive project worth mentioning is consulting Georgia in their “Deer Leap” project, the content and structure of which are similar to the Estonian “Tiger Leap” project.



*Panel discussion at the e-Democracy conference (April 2006)*



Photos from archive of eGA

*Visiting lectures Alexander H. Trechsel and Fernando Mendez at the e-Voting conference*

## 4. Development of ICT applications and e-services in the public sector

### 4.1 Information society projects developed with the support of the EU Structural Funds

As a member state of the EU, Estonia can take part in the development of the Community's regional policy and is eligible for respective financial assistance from the EU budget. As a basis for the strategic implementation of the EU financial support, a document entitled "Estonian National Development Plan for the Implementation of the EU Structural Funds – Single Programming Document 2004-2006" (RAK) has been elaborated in Estonia and approved by the EU. The SPD serves as a basis for the promotion of socio-economic development in Estonia.

Infrastructure and regional development priorities are implemented through measures with Community support amounting up to 75% from the European Regional Development Fund. The measure "Information Society Development" plays a significant role among those priorities. According to the SPD, the total funding for the projects related to the development of the information society in 2004-2008 is slightly more than 130 million kroons (8.32 MEUR). 19 most important projects from the viewpoint of the development of the information society have been included in the main list of projects to receive the EU assistance.

#### 4.1.1. eHealth projects in the Ministry of Social Affairs

The assistance to eHealth projects is definitely the highest among all information society projects supported from the Structural Funds. As there was a ceiling of 25 million kroons per project, the Ministry of Social Affairs submitted applications for several sub-projects of the eHealth information system. Four of them, with a total amount of 34.5 million kroons, were included in the main list of projects to be financed from the Structural Funds. These projects include Development of an Information System for Electronic Health Record, Digital Registration, Digital Images, and Digital Prescriptions.

These four main components of the eHealth information system will be the cornerstones of a single system for the use of the dispersed health data of patients. As such, the system will ensure an integral and necessary data set for the treatment of patients and create preconditions for improving the methods of treatment.

The Electronic Health Record (EHR) is a database containing the primary data of the patient, his or her entire health record, information on his or her visits to doctors, and other data. The EHR is the most central and voluminous part of the eHealth information system, offering basic functionality for other components of the information system – central exchange of messages, data storage service, system of rights, security solution, and administration of nationwide used standards.

The development of the eHealth information system is not an ordinary IT project, but a development activity with social orientation that involves numerous interest groups. Thus, the

development of IT components is not at the centre of this process – involvement of the public, standardisation, ensuring the necessary legal environment as well as solving ethical problems also constitute significant parts of the process.

The objective of the PR-work related to *eHealth* projects is to raise awareness both on wider (general public) and narrower level (employees and managers of health care institutions, IT experts etc.) and create trust towards these projects. The PR-work is targeted at reducing risks related to technology and medicine specific aspects of the project by minimizing the danger that the essence of the project will remain unclear for people and create, thus, distrust. As a result of the awareness-raising process, people will understand the essence and the objectives of the project, ensuring thus increased trust towards the system both among doctors and patients.

In the framework of the *eHealth* project, relevant legal environment will also be developed, determining the rights and obligations of users of the system and, based on the opinion of biotechnology and health ethics experts, solving ethical questions related to the project.

The EHR data can be used for treating patients, assessing their state of health, evaluating the quality of treatment, and compiling national statistics. Participants in the information system include health care institutions and other legal persons that have concluded a respective agreement with the system administrator and have the right to use the EHR data as well as to exchange health information through the system. The EHR provides for its participants an authorized access to the health data of patients and enables digital transmission of medical documents between health care institutions.

The functional scheme of the architecture of the *eHealth* information system is presented on Figure 4.1.1.

By now, the conceptual phase of the *eHealth* system has been completed and the project has reached the stage of actual development work. The management of the Electronic Health Record, Digital Registration and Digital Images projects has been entrusted with the Estonian *eHealth* Foundation, established in October 2005 by the Ministry of Social Affairs, organisations providing health services and medical associations.

The Digital Prescription project is led by the Estonian Health Insurance Fund and carried out in co-operation with the Ministry of Social Affairs and the Estonian *eHealth* Foundation.

### **Electronic Health Record (EHR)**

There are currently 1022 health service providers in Estonia, of which 58 are active care hospitals.

The EHR is, in essence, an integration environment – the development of the system will not bring any changes to the doctor's desktop applications in an already existing hospital information system (systems will only need adaptation for the realization of the central message-based data exchange).

Participants in the EHR and its internal services use a common message module (agent centre) – the preferred way of integrating the modules of the information system (there are exceptions for time-critical information) is through the agent centre. The agent centre is universal for all participants in the health information system and provides the following services for its other parts:

- central security solution;
- system of rights and administration of users;
- user authentication and authorisation;

- integration with external information systems (over the X-Road);
- message management and message-based integration with other modules of the information system;
- logging.

The EHR exchanges, on message level, all medical documents that have been established on the state level. Individual event-based documents that have been saved in the EHR will form a person's health record.

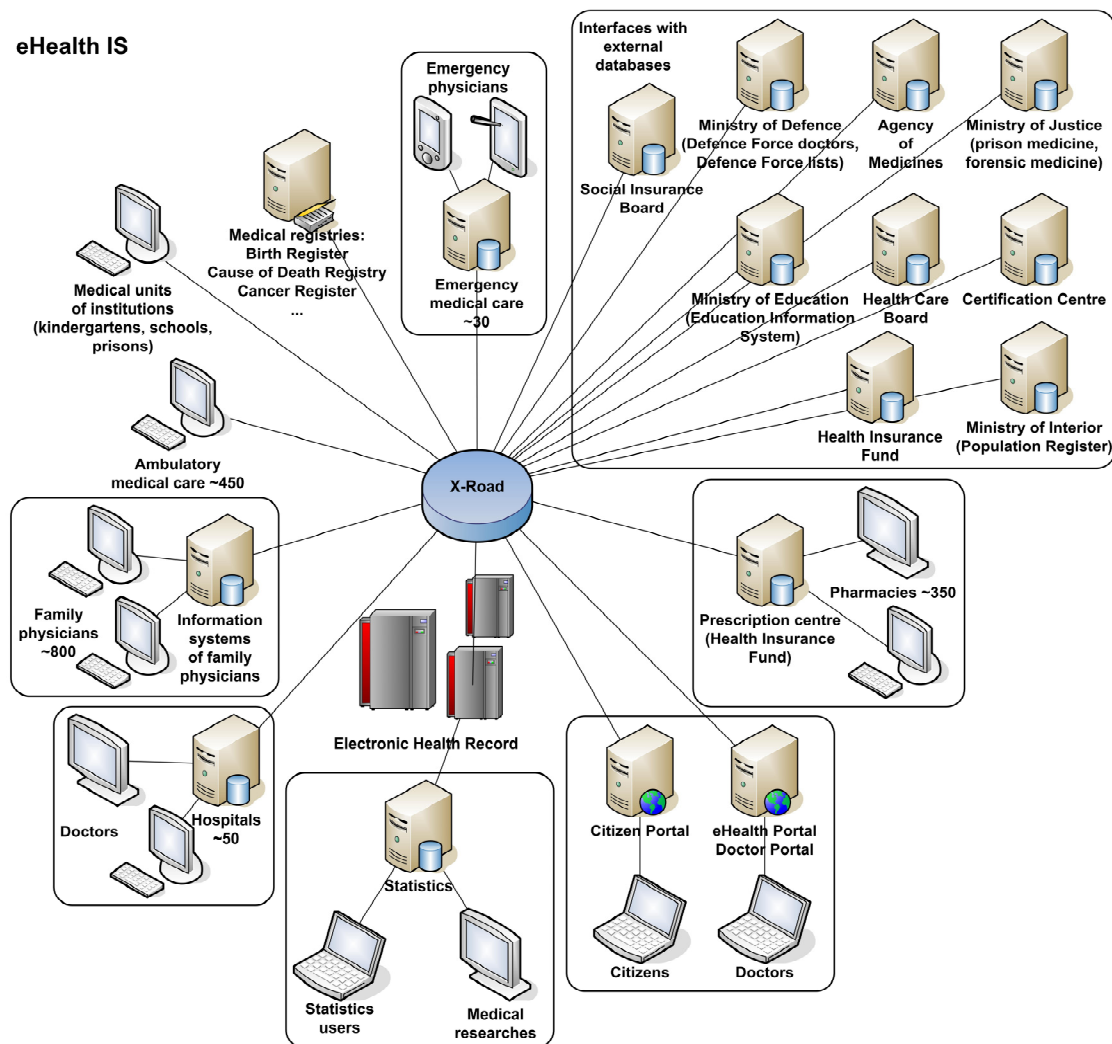


Figure 4.1.1. Functional scheme of the architecture of the eHealth information system

The implementation of the EHR information system will yield the following results:

- Patients will enjoy better, faster and more competent medical services, since doctors can quickly see all the necessary information about their patients' state of health.
- Patients will get a detailed overview about the use of their health data by health care institutions, the state, and other participants in the EHR.
- Health statistics will become significantly faster, more accurate and thorough, enabling thus higher quality and increased efficiency of the planning and organisation of health care.

- Doctors will have a better overview of their patients' state of health and more time for dealing with them.

### Digital Images

Several systems have already been developed in Estonia for the archiving of images (i.e. the Health Care Image Bank system in the Tartu University Hospital). Within the Digital Images project, all the currently independently functioning systems will be joined and interfaced with the EHR.

As a result of the project:

- It will be possible to monitor how an illness develops over the years and involve external experts in the evaluation of complex problems.
- Patients will no longer have to needlessly go to X-Ray diagnostics, which may cause excessive irradiation.
- Cross-usage will be ensured between digital image repositories.

### Digital Registration

Today, one of the main problems of the health care system lies in long uncoordinated treatment queues that reduce the efficiency of the cure.

In the course of the Digital Registration project, a centrally administered system for electronic registration will be developed by interfacing the already existing registration systems of different health service providers. The new system will yield the following results:

- It will allow patients and family physicians to see the reception hours of medical specialists as well as to make and cancel appointments online via one web portal.
- Reservations will be based on referrals, so patients will not be able to make an appointment at medical specialists of one and the same field in different health care institutions, which is one of the reasons behind long queues for treatment today.
- No existing registration systems will be replaced. Instead, common standards will be elaborated, based on which the existing systems will be linked with the central web portal.

### Digital Prescription

The aim of the Digital Prescription project is to develop a central system that will save the incoming prescriptions (messages) and issue, based on enquiries, a patient's prescriptions to the information system of pharmacies.

- The system will allow to monitor and manage the issuing of prescriptions.
- The system will ensure the similarity of business logic for medicines and discount prices.
- The system will ensure regularity of treatment-related information flow.
- The information system of an institution prescribing a medicine will get a confirmation of discount from the Health Insurance Fund's information system.
- The Health Insurance Fund will enjoy fast and correct reporting.
- The time doctors and pharmacies spend on issuing prescriptions will shorten significantly.

- Currently, nearly eight million prescriptions are issued each year. Majority of them will become digital.
- Doctors will get feedback about whether or not the medicines have been bought out.
- The implementation of the system will protect doctors from unforeseen expenses resulting from wrongly assigned discounts.
- The system will free patients from the need to carry prescriptions on them.
- It will be easier to protect the prescription data.

The EHR information system will be piloted in Estonia's biggest hospitals, such as:

- the Tartu University Hospital;
- the North Estonian Regional Hospital;
- the East Tallinn Central Hospital.

In addition, the Tartu Emergency Medical Centre as well as the centres of family physicians in Koeru and Järveotsa will be piloting the system. The testing of the information system will begin in the middle of 2007 and the pilot is expected to last for about a year. In case the pilot project will be a success, project indicators will be considered to have been achieved. The deadline for the launch of the eHealth information system is 31 August 2008.

For more information about the project see the website of the eHealth Foundation at: [www.e-tervis.ee](http://www.e-tervis.ee) (in Estonian). A short overview of the Estonian health information system in English has been published in the "Information Technology in Public Administration of Estonia, 2003" (<http://www.riso.ee/en/pub/2003it/p36.htm>).

#### 4.1.2. Integration and e-services of the police information system

It would be impossible for the Police Board to perform the tasks imposed on it by legislation without information of other information systems. For instance, in order to issue a fine for speeding, the offender's personal data as well as information about his or her earlier criminal record are needed. The proceeding of misdemeanour and criminal offences as one of the main fields of activity of the police are at the centre of its integration activities. Information generated in the course of proceedings by the police is necessary also for other institutions responsible for the state internal security and international law enforcement information systems. Integration usually denotes both giving and receiving. Thus, the police itself also needs information from many national and international databases.

Software architecture of information systems and technical solutions of the integration constitute an important aspect of an integration process. The integration of police information systems with other information systems has been based on the principles of the IT Interoperability Framework, making maximum use of the already developed infrastructure components. In this context, this means the data exchange layer X-Road.

Interfacing information systems within one institution is another important aspect of integration. The questions to be solved here include whether and how should personnel records, document management and the police main information system be linked with each other.

## Interfaces of the police main information system

In the context of this article, the police main information system denotes information systems supporting the main activities of the police. The police main information system supports the receipt and registration of messages, management of patrols, proceeding of criminal offences and misdemeanour, work of the criminal police and the regional police (constables), and ensuring public order. In the process of integration, organisational, legal, technical aspects as well as time-related criteria have to be considered.

Common use is another important objective for integrating the information systems of different agencies. For instance, the police information system is used by many other agencies, e.g. Tax and Customs Board, Border Guard etc.

One of the many tasks of the police is to ensure public order. While investigators and those conducting the proceedings use the information system of proceedings, which is a part of the larger police main information system, the policemen working primarily on the streets can make use of the *ePolice* system the instalment of which in their cars began at the beginning of 2005.

### *ePolice*

Within the *ePolice* project, police cars were equipped with a car PC (consists of a touch-screen monitor, computer, keyboard, and a chip-card reader) and a positioning device (look at the photos below). The positioning devices allow the police control centres to see the location of patrol cars on the map and make sure whether the car is busy (i.e. on the scene of events dealing with an incident, on their way to the scene of events) or free and can be sent to solve next incidents.



Photos: Siim Vaikna

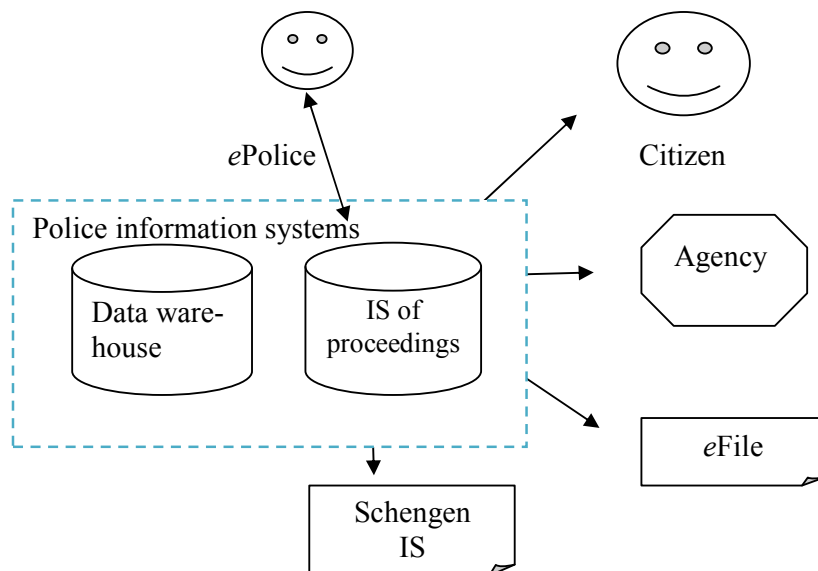
### *Equipment in the ePolice car*





*Positioning device on the ceiling of the car*

Based on this information, the closest located patrol can be sent to a scene of events. In addition, the policemen themselves see their location on the map, being thus able to mark the scene of events on it. The information about the location can also be transmitted to the patrol car from the operational management information system. The location of police cars is determined with GPS (Global Positioning Service); for data communications GPRS is made use of.



**Figure 4.1.2.** *ePolice – an example of interfacing for ensuring public order*

Control centres that manage the work of police patrols receive information for the proceeding of incidents and managing emergencies from several external registers:

- **Estonian Motor Vehicle Registration Centre (ARK)** – from here, the police receives information about the car involved in an incident as well as its owner and users.
- **Estonian Traffic Insurance Fund (LKF)** – from here, the police obtains information on whether and where the car has been insured.
- **Population Register** contains information about the person himself (his contact data) as well as his relatives, used in case an accident has happened to the person or if no contact can be made with him.
- **Estonian Health Insurance Fund (EHIF)** – another information system for finding a person's contact data if needed.
- **Real Estate Register** – from here, information can be found about the owner of a real estate. In addition, the location of an immovable can be found from here by the name of the real estate's owner in case it is difficult to find it and/or if the estate has no proper address. This information allows to find the scene of events easier and arrive there quicker.
- **Punishment Register** contains information about a person's punishments.
- **Register of Detainees** – if a person has gone missing, the register allows to check whether he has been arrested or put in prison. The place of imprisonment can be disclosed for those close to the detainee for visiting purposes.
- **Weapons Register** – in case a weapon has been registered in the address of an incident, the patrol will learn about this already on their way to the scene of events. In addition, it will be checked whether or not the person related to the incident has a weapon registered to his name.

From the police databases, the control centre gets information on whether or not a person is a fugitive or whether the car is stolen.

In addition to being connected with the control centre, there is another important component to the *ePolice* system – the possibility to make enquiries. Due to the integration with various state databases, the police can, by making just one query about a person or a vehicle, receive quick responses from many different databases. By entering the number of a vehicle or the name/personal identification code of a person, the police can check if the driver who has forgotten his driver licence at home has the right to drive a car (ARK), whether the car he is driving is stolen (the database of the police), whether a regular roadworthiness test has been conducted (ARK), and whether the car has a traffic insurance (LKF).

Responses to all enquiries are presented in an information system with which the *ePolice* software communicates via a special protocol. There are no physical databases in a patrol car. This ensures the security of data and conformity to check-up rules at the same time. Within the *ePolice* project, all patrol cars are planned to be equipped with respective devices by 2008. In addition, a possibility will be added for the on-the-spot compilation of procedural documents (to be transferred immediately after their approval to the *eFile*).

## E-services

The Police Board began to describe its e-services already in summer 2004. Detailed service descriptions were completed by the end of 2005. As a result of the analysis, a number of use cases falling into four categories were described:

- Open services – data published within these services has to reflect the information on the current website of the police, but the website will be updated both in terms of content and structure. For example, the renewed website must still contain the contact data of the Police Board, its objectives, instructions etc. In order to widen the scope of use of the website, geo-information possibilities are planned to be employed in the publication of information to the public (i.e. finding the office of one's constable on the map).
- Directed services to be developed by the Police Board will be realized in the Citizen Portal at: [www.eesti.ee](http://www.eesti.ee). It is in this environment that the user authentication as well as the actual use of services will take place. The implementation of directed services will improve the communication between the citizen and the police, as the Citizen Portal allows to offer more individualised services and information to citizens, i.e. submitting applications to the police, checking data on one's own misdemeanour procedure etc.
- Inter-agency services will be realized as X-Road services, allowing to transmit information from one information system to another. The realization of those services will benefit three parties: the citizen, other administrative agencies, and the police. The implementation of those services will accelerate data transmission and make it more convenient as the data exchange between two agencies will be fully electronic.
- Administrative services – services necessary for the administration of the e-services portal will encompass all necessary administration tools – user management, service management etc.

The website of the Police Board at: [www.politse.ee](http://www.politse.ee) will be renewed both in terms of design, content and functionality in spring 2007. In addition, new features will be added to it for the use of X-Road services as well as for improved information exchange between the Police Board and other administrative agencies.

## Single procedural information system eFile

The objective of the procedural information system eFile is to connect different law enforcement information systems and registers and join them into a commonly functioning whole (for more information see Chapter 4.2). The eFile encompasses activities related to not only misdemeanour and criminal procedures, but also to those concerning the civil and administrative procedures.

The eFile system is being developed by the Ministry of Justice in co-operation with other law enforcement authorities.

The system exchanges information mainly between the following law enforcement information systems and registers: the police information system, the Register of Criminal Procedures, the court information system, probation supervision information system, the information system of bailiffs, the information system of prisons, the Punishment Register, and information systems of other agencies related to proceedings (Security Police Board, Border Guard, Tax and Customs Board etc.). Agencies without any special proceeding information systems are interfaced with the eFile through an application developed for participants to proceedings.

For the police, integration with the eFile mainly means the digital transmission of procedural documents and other related data over the X-road into the eFile, where the information is used by the Public Prosecutor's Office and courts. The services are not one-sided (transmission of

data into the eFile), but function both ways, e.g. the Prosecutor's Office and courts can transmit data and documents to the police in a similar way. Thus, the eFile enables electronic communication at the operational level or, in other words, digital proceeding – i.e. requesting approval for procedural decisions from the Prosecutor's Office, assigning of tasks by the Prosecutor's Office to the police, sending requests for professional assistance by the police to other administrative agencies (Border Guard, Tax and Customs Board etc.).

Furthermore, X-Road services allow the users of the police information system to follow, through the user interface of their own information systems, the proceeding of offences they have dealt with in the Prosecutor's Office and courts. In addition, they can also see ongoing and terminated proceedings and the related persons that have been treated by other people/agencies. The central part of the eFile system as well as the integration of the police information system with it should be completed by the end of 2007.

### **Integration with international information systems**

The Estonian Police Board has contacts with several EU and other international information systems, such as the Schengen Information System (SIS), the Visa Information System (VIS), the Interpol's information system, the Europol Information System, EUCARIS – an information system linking the EU car registers etc.

For the integration with the SIS, a local gateway called E-SIS will be established in Estonia, which will mediate enquiries between the Schengen Information System and agencies processing its data. Ideally, E-SIS could evolve into a gateway to other international information systems processing similar data categories (e.g. Interpol). As an added value, E-SIS will accommodate the national Register of Fugitives. The solution will facilitate and increase the efficiency of activities related to fugitives on national level.

The development works for joining the SIS were started in 2005 within the Schengen Facility programme.

### **Data warehouse – a possibility for in-house integration**

In order to solve the problems that emerge in the daily work of the police, it is necessary to carry out analyses (to explore crime trends, conduct crime site analyses, determine confidence intervals etc.) so that the leaders of the police could make well-grounded management decisions. Data required for conducting an analysis is often missing at the decision-making time. Reports compiled by police authorities often lack coherence and reflect a state of affairs rather than a trend. Furthermore, data in information systems are not always readily available for analysis. To make well-grounded decisions, the management of the police has to rely on analyses based on integral data. Considering the complexity and speed of analyses, data should come from one and the same source – from a data warehouse.

The data warehouse will integrate all important information systems of the police and standardise data formats used in them. The implementation of the data warehouse will be based on a universal dimensional data model that increases the availability of data; allows to make cross-queries, parallel surveys and analyses; and facilitates the processing of data. Thus, the data warehouse will ensure that people carrying out analyses in the police will have a quick access to refined and ordered data available in numerous combinations. The data warehouse will be implemented by the end of 2007.

### **New architecture of the police information system**

The description of the new architecture of the police information system was completed at the end of 2005. The keywords of the new architecture include service-oriented approach and

division of functionality into loosely connected sub-systems. Depending on the peculiarity of a single service or that of an entire sub-system, different interfaces (i.e. RMI, SOAP, an X-Road service) can be chosen. Orientation to services and loose connections make it easier to add and remove services provided by information systems of other agencies as necessary.

The service-oriented architecture (SOA) serves as a good precondition for the provision of services to other systems, since the whole business logic is already service-centered. The police intends to transfer all the old information systems to the service-oriented architecture by the end of 2007 and also proceed, in the development of new systems, from SOA principles.

When developing the technical solution for the new system, general development trends of the state IT as well as the positive and negative experience of the police in data exchange with other agencies were taken into account. As the X-Road has become the *de facto* service bus, the data exchange layer was chosen as a basis for the development of the system. Temporarily, JMS-based message exchange will be used on special occasions until the service provider will have developed all the necessary X-Road services. In 2007, the police intends to give up all interfaces functioning on any other technology than the X-Road.

\* \* \*

The modernization of the police main information system and the ePolice system are funded within the measure “Information Society Development” from the EU Structural Funds. Two projects have been launched: “Reorganisation of the main information system of the Estonian police and development of e-services for citizens and public agencies” (9.33 million Estonian kroons / 596,000 euros) and “Serving citizens outside the police authorities (on the scene of events)” (20 million kroons / 1.28 million euros, of which the Community contribution accounts for 6 million kroons / 383,500 euros).

#### 4.1.3. ePRIA – the farmer’s digital friend

*The Estonian Agricultural Registers and Information Board (PRIA) is a government institution subordinated to the Ministry of Agriculture. PRIA is responsible for the administration of national assistance schemes for agricultural and rural development as well as granting support under the respective EU programmes, implementation of the EU agricultural market regulation measures as well as milk quota system, maintenance of agricultural registers and databases, and processing and analysing data.*

*PRIA was founded in 2000 with an objective to organise the distribution of pre-accession aid and support aimed at the development of agriculture and rural life in Central and Eastern European countries.*

*The central office of PRIA is located in Tartu with regional offices, altogether 15, in all counties of Estonia. In order to ensure systematic distribution of support, a respective information system has been developed in PRIA and joined with the data exchange layer X-Road in 2003.*

Within the framework of the measure “Information Society Development” of the Estonian Single Programming Development (SPD) 2004-2006, a project called “Development of e-services provided by PRIA” was included in the main list of projects to be funded with the EU assistance. The total cost of the project was 2.8 million kroons (179,000 euros).

ePRIA is a customer portal allowing PRIA's clients to submit documents and see their data in the agency's registers. The portal enables PRIA's customers to exchange data conveniently over the Internet without having to physically visit the agency.

The implementation of the project was divided into two stages – development of the framework and services, and creation of additional services. A profound analysis was carried out before both stages.

The first stage was completed by the end of 2006. Activities carried out during the first phase of the project included the development of a software architecture for ePRIA, establishment of data exchange between ePRIA and the agency's already existing information systems, and creation of security measures and several services. In October 2006, the ePRIA portal was opened for testing to pilot users and on 7 December 2006 it was launched for use by all.

For the time being, the portal allows to use e-services related to the PRIA's Register of Farm Animals. Thus, at the moment, ePRIA mainly facilitates the life of animal keepers, who can use the portal for submitting declarations and see different data on their animals. On average, approximately 600 paper documents per day arrive at PRIA from animal keepers. These can now be submitted electronically via the ePRIA portal. Naturally, it is possible to submit applications on paper.

In the future, the service will be extended to include the possibility of submitting grant applications online. For instance, the portal is planned to be opened for applicants of area-related grants, the number of which currently amounts to nearly 19,000.

The portal makes it possible to use PRIA's services in the web environment, ensuring at the same time the security and reliability of the solution both for PRIA's employees and its customers. The portal significantly facilitates direct communication between PRIA and its customers both in terms of submitting documents and exchanging information. The solution enables PRIA's customers, in the form of self-service, to perform the following operations:

- submission of applications and monitoring the procedure;
- administration of registry data;
- administration of data on customer accounts and authorisations.

The portal is essentially a "framework" that does not provide all the services itself, but delegates the provision of services to other systems, offering primarily support services (infrastructure services) to the existing services as well as to potential e-services provided by PRIA to be integrated in the system in the future. The security measures of the portal save into logs all operations performed by PRIA's employees and its customers.

The portal is accessed with the national ID card or by using the X-Road based authentication possibilities of the Citizen Portal.

Customers of ePRIA include natural persons, self-employed entrepreneurs or legal persons, who have been entered in the Register of Agricultural Support and Agricultural Parcels or are registered as keepers of animals.

In the course of authentication, the user's personal identification code is ascertained. Authentication constitutes one part and authorisation the other part of user identification. The most complicated task of the project was the elaboration of the system of authorisation, i.e. how to link a legal person  $n$  with a natural one. The system of authorisation has two levels: full and partial authorisation (these are not legal terms, but are relevant in the context of ePRIA). Full authorisation is granted for natural persons and authorised company representatives, while partial authorisation is service-/activity-based and can be given by an authorised representative through the portal.

PRIA's customers or their authorised representatives willing to start using the services of ePRIA must first conclude an agreement with the service provider. As a rule, agreements too can be signed via the portal. Agreements are needed so that it would not be necessary to sign documents digitally each time one needs to submit his or her documents to ePRIA (a person's authenticity has already been verified through authentication). With the agreement the signatory confirms that the documents he or she submits are equal to those having a handwritten signature. Conclusion of agreements with customers is a one-off activity.

The information system of PRIA is not the only one with which ePRIA communicates. The data on authorised company representatives are transmitted to ePRIA from the Commercial Register over the X-Road. Cross-usage of registers facilitates the administration of full authorisation of company representatives – their authorisations are transferred to ePRIA automatically. All in all, this reduces bureaucracy.

The structure of ePRIA is service-based. The software together with PRIA's systems functions as a huge environment for exchanging XML documents. XML can be compared to a service. XMLs move from ePRIA over the X-Road to PRIA's information systems.

Here, a clear line can be drawn between ePRIA and the PRIA information system – ePRIA can function entirely independently of the latter. This means that in case the PRIA information system should be “down” for some reason, ePRIA would still be operational, though with certain limitations. One would not be able to see the data maintained in the PRIA information system or send documents to the agency. However, it would still be possible to complete and save documents.

XML documents that have been submitted through the ePRIA portal and have passed a security server are transferred to the ePRIA's management system, which directs them to respective parts (or modules) of the PRIA information system. By now, ePRIA has been interfaced with five parts of the PRIA information system: Register of Animals, Customer Register, system for the administration of support, document management system, and market organisation software.

The design of the portal follows the principle of a uniform user interface design. The portal has been realised in the object-oriented Java language and has been developed to be platform-independent. Database software is Oracle 10g. The connection uses https-protocol that is based on SSL2 security protocol.

ePRIA is located at: <https://www.eesti.ee/epria/> (in Estonian) and can be accessed both through PRIA's website [www.pria.ee](http://www.pria.ee) and via the Citizen Portal.

## ***4.2. A single procedural information system for law enforcement authorities – eFile***

### **What is the eFile?**

The eFile is an information system ensuring that parties to a criminal, civil, administrative or misdemeanour procedure would have an operational overview of its different stages, proceedings and conclusions.

So far, law enforcement authorities have administered their procedural information independently. The eFile, however, will allow to gather all information, ensuring for all parties an operational overview about the status of a procedure as well as proceedings about

and decisions etc. related to it. As a result, the need to enter the same information multiple times will disappear and information will only be added or upgraded in different procedural stages.

If a criminal offence has been committed, the information usually travels along the following path:

Police ⇒ Prosecutor's Office ⇒ Courts ⇒ Bailiffs ⇒ Prisons ⇒ Probation supervisors.

Currently, information concerning criminal offences is re-entered by every authority. With the implementation of the *eFile*, information submitted by the police will be transmitted directly to the *eFile*. Next authorities needing it will be able to access the information through a user interface, being at the same time able to amend and upgrade it.

### What does the *eFile* offer to citizens?

For citizens, the *eFile* gives legal certainty – they will be able to see, through the *eFile* citizen interface, whether any procedures (e.g. claims for fine) have been initiated against them, whether they have been declared fugitives etc. The implementation of the *eFile* should eliminate cases, where the citizen learns about fines issued to him or her only after the fine for delay has been running for years or suffers as a result of someone with the same name having been declared a fugitive.

The citizen interface will enable to commence a lawsuit (i.e. to apply for alimony, submit a payment order or sue somebody) from a home PC with the ID card. Such a possibility will save time and money by freeing citizens from the obligation to go to the courthouse for these proceedings.

In the *eFile*, the citizen will only see cases to which he or she is a participant. Logging into the *eFile* citizen portal will be based on the ID card and its passwords, which is a more secure way of authentication than the one based on Internet banking codes (one can log in only if he or she has the ID card and knows its passwords; in case the ID card is lost, nothing can be done without its passwords).

### What changes will the *eFile* bring for civil servants?

With the implementation of the *eFile* it will no longer be necessary to enter one and the same information multiple times – if data related to a crime or a person have already been entered in the *eFile*, other authorities proceeding this information will not have to re-enter it. Information on a criminal case together with persons involved in it will be immediately available. As a result, criminals will be easier to find and a common contact base will be established.

The disappearance of multiple data entry will facilitate office work, though a certain need for control will probably remain.

### Why is the *eFile* developed?

During the penal law reform, legislation was amended and the structure and work processes of agencies were changed. The IT support, however, was not developed to the same level of detail: as there are too many information systems, their independent functioning is not particularly efficient (multiple entry of data, slow movement of data) and does not support new process of work organisation. Furthermore, the development and maintenance of many different law enforcement information systems requires more and more financial resources.

The *eFile* is an integration project for law enforcement information systems.

At first glance, the term “law enforcement” certainly seems vague, especially due to its wide scope of application. Law enforcement encompasses all agencies, organisations and persons



dealing with the protection of rights of the state and the citizens. In the penal law, law enforcement manifests itself in the detection and investigation of offences, bringing offenders in front of the court as well as prosecuting and defending them against unfound prosecution – this is how the society protects itself against illicit behaviour. These activities help to maintain and keep legal order and ensure legal peace. Furthermore, law enforcement covers the protection of each person's rights, be it against unfound criminal prosecution or in the civil law. Thus, the *eFile* as an IT project deals with all possible aspects of law enforcement – with all areas of law.

In order to solve this problem, the Ministry of Justice, the Ministry of Interior, the Police Board, and AS PriceWaterhouseCoopers drew up a detailed Analysis of the Information Architecture and Technology in Law Enforcement in February 2005, focussing on the possibilities of integrating different information systems with each other.

In short, the essence of the *eFile* could be formulated through the following keywords:

- **legal certainty** (the citizen can see procedures initiated against him or her);
- **considerable saving of time** (possibility to start a court procedure from one's home PC, apply for alimony etc.);
- **saving of taxpayer's money** (much of the irrelevant work, i.e. multiple entry of data, will be done away with);
- **equal access to information for all participants in a procedure;**
- **security** (data are not preserved in a paper file on a shelf, but under password protection in a server. Citizens can access data only with the ID card and its passwords, which is a more secure way of authentication than the one based on Internet banking codes);
- **simplification of the work of public agencies** – there will be no multiple entry of data. Once the data has been entered in the *eFile*, they can be accessed simultaneously from other related information systems;
- **shortened proceeding times** – all data will be saved in a central server (no need for every investigative body to do it again) and other authorities will be able to access it in the server. Due to the one-off entry of data, the number of errors related to the process will be reduced.

### Open *eFile*

The materials of the *eFile* can be made available to all persons related to the process. Let us admit: the practice of the European countries shows that, on average, people need to go to the court once in their lifetime. Thus, ensuring access to the *eFile* for citizens cannot be the main aim of the project. The ultimate goal of the project is to ensure electronic access to the materials of the *eFile* primarily for professional representatives (advocates, trustees in bankruptcy etc.), who have not had this opportunity until now. In addition, enabling access to the *eFile* for criminal defence counsels ensures the equality of parties to a criminal procedure – in order to guarantee a fair outcome, equal opportunities for the participation in the procedure have to be ensured both for the prosecutor and the advocate.

Focusing on the interests of advocates does not mean that citizen interests have been neglected. Citizens may consider the *eFile* necessary for lodging claims to the court about small loans (payment orders) and filing alimony actions.

In addition, citizens will definitely take interest in the possibility to check, through the *eFile*, data concerning their punishments and/or information related to their misdemeanour procedures. So far, one of the constant problems in the misdemeanour procedure has been the

availability of decisions – a problem to which the *eFile* provides a solution. Besides, entering a decision on a misdemeanour into the *eFile* allows to appeal against it pursuant to a simplified procedure.

In order to ensure their usability, public services of the *eFile* will be integrated with the already existing state portals and the national ID card will be used for user authentication. To simplify the use of services it is possible, in certain fields (payment orders, actions for alimony) to develop special applications helping the user to enter data and transmit them to a body conducting the proceeding.

Though for agencies involved in proceedings, the *eFile* mainly means that procedural information will be centralized and maintained in one and the same location, the general public will probably associate the *eFile* mainly with its open part (with a project name AET), which will allow everyone to electronically participate in the proceedings.

### Impact of the *eFile*

The *eFile*'s impact will undoubtedly be the greatest on organisations directly involved in the administration of justice, such as courts, the Prosecutor's Office and the police. Proceedings in these institutions should become considerably faster – multiple entry of data will be done away with and data will usually be entered at the very same location where they are generated. This will not only increase the transparency of the administration of justice, but reduce expenses related to it as well.

Since 2003, advocates have made excessive use of digital signature when submitting their documents to the court. This system allowed fast information transmission between the participants to a proceeding, but there was still the additional task of finding the location of a document. With the implementation of the open *eFile*, this task will disappear, since documents will be attached to a relevant case immediately.

Transition to the *eFile* will also allow to compile, for the first time, statistics on proceedings collected by respective agencies. Data will become comparable.

In addition to the above-mentioned, the *eFile* will facilitate the analysis of case law – additional solutions can be developed to the systems publishing adjudications. For instance, specialized lawyers will be able to comment on case law they are interested in.

### Co-ordination and financing of the project

By a Ruling of the Government of the Republic of September 2005, an expert committee comprising the ministers and secretary generals of the Ministries of Justice, Interior, Finance, and Economic Affairs and Communications was established and specialist working groups were formed. The committee draws up an annual action plan for the development and implementation of the *eFile*. It is chaired by the Ministry of Economic Affairs and Communications, who is the co-ordinator of the development of state information systems.

Based on the action plan, the committee makes proposals for the planning of necessary budgetary funds in the state budget. In addition, it is the committee's task to approve technological standards and prepare the integration of other law enforcement information systems with the *eFile*.

All parties to proceedings have to take the costs related to the implementation of the *eFile* into account. Other ministries or agencies must plan resources for integrating their systems with the established *eFile* and avoid, first and foremost, any duplicate development, since most of the developed system will be given to all agencies/developers as a ready-made independent user interface or, where necessary, as a service that can be connected to their information system.

## Time perspectives

In terms of realization, the main priorities of the eFile project are the criminal and misdemeanour procedures, which are expected to be completed by the end of 2007. The transfer of the criminal and misdemeanour procedure to the eFile environment will definitely have been terminated by 2008. In parallel with the implementation of the criminal procedures, the open part of the eFile in the field of criminal and misdemeanour procedure will be developed with an objective to ensure that all lawyers would have equal opportunities for the participation in proceedings.

The civil and administrative procedures as well as relevant improvements in terms of public services will be transferred to the eFile by 2008 at latest. During the final stage of the project, connections will be developed with the Register of Enforcement Procedures and other information systems at the end of the procedural chain (i.e. probation supervision, information system of prisons).

Considering the extremely wide scope of the project, the development of eFile services will probably continue in the coming years. Even if everything goes well, the project will not be completed before five years. The main services of the eFile environment should, however, facilitate the life of bodies conducting proceedings as well as of that of citizens already in 2008.

## 4.3. Development of complex e-services in Estonia

### 4.3.1. Inter-institutional e-services of childcare information system

Recently, universal availability of public services targeted at citizens has begun to gain importance, meaning that the citizen should be able to use services, both central and local, either at home via the Internet or conveniently at an administrative agency closest to him or her. If citizen's data has already been collected into state different databases, the citizen does not have to spend his or her time on running between officials or browsing the websites of different agencies. There exists the Citizen Portal, accessible securely with the national ID card, where one can select an appropriate service for the provision of which necessary data is gathered from different databases via the X-Road.

#### Childcare information system – for whom and why?

The objective of the childcare information system (LHIS) is to improve the availability of the childcare service; increase its efficiency and transparency; ensure operational information for service providers and service users about the fulfilment of kindergartens, alternative childcare opportunities and qualified child-minders.

The LHIS is used by different parties – parents, kindergartens, child-minders, local government officials, county governments, Ministry of Social Affairs, Ministry of Education and Research, Statistical Office, Office of the Minister of Population Affairs etc.

For each party, a special view (role) has been developed.

The LHIS was developed on a central database as an application service of the Citizen Portal. Citizens as service users as well as childcare service providers and officials all use the same system, having access only to the data they require for performing their tasks. This can be done due to the division of roles in the information system.

When developing the LHIS concept, the Estonian Informatics Centre proceeded from the precondition that the main target group of the system is the parents, including those of

children with profound and severe disability, to whom the state compensates, beginning from January 2007, a certain amount of childcare costs for care at a qualified child-minder.

### Possibilities of the LHS:

- For the parent, the system gives an overview of all childcare possibilities, both kindergartens and alternative opportunities. In addition, the parent can apply through the system for childcare both in kindergarten (as a place for receiving pre-school education; the field is co-coordinated by the Ministry of Education and Research) and at a qualified child-minder (as a social service co-coordinated by the Ministry of Social Affairs). The parent uses the system via the Citizen Portal. If the parent does not have the possibility to use the Internet, necessary proceedings can be made on his or her behalf by a local government official or the service provider (a director of a kindergarten, a person or body providing the childcare service).
- The service provider (a kindergarten, a qualified child-minder) can administer information about offered services, receive reservations for the use of the service and submit financial data to a local or central government agency for compensation. A qualified child-minder has undergone training as a result of which he/she has been awarded the professional qualification of the child-minder (i.e. the data of his/her professional certificate are entered in the Register of Professions) and he/she has registered his/her activities in the Register of Economic Activities.
- The local government official, who is responsible for the co-ordination of childcare both in kindergartens and as a social service, can administer information about services offered on the administrative territory of his/her local government; perform proceedings on behalf of the parent if necessary; and compile relevant reporting.
- The system allows to satisfy the statistical needs of different agencies, such as the Ministry of Social Affairs, Ministry of Education and Research, Statistical Office, local governments, Office of the Minister of Population Affairs, and the Ministry of Interior.

### What databases is the LHS linked to?

In order to use the LHS voluminous data are needed. A significant part of the required data are maintained and processed in different information systems and registers that belong to the state information system, for instance:

- the Estonian Educational Information System EHIS (chief processor – Ministry of Education and Research): data about childcare institutions, education licenses, educational background of child-minders etc;
- the Register of Professions (chief processor – Estonian Qualification Authority): data about professional certificates of child-minders;
- the Register of Economic Activities (chief processor – Ministry of Economic Affairs and Communications): data about childcare service providers having started an economic activity;
- the Commercial Register (chief processor – Ministry of Justice): data about enterprises providing the childcare service;
- the Population Register (chief processor – Ministry of Interior): personal data of the child and the parent, family ties, address data;
- the Pension Insurance Register (chief processor – Social Insurance Board): data about children with disabilities and about parental benefits;

- local government information systems: applications submitted by parents etc.

At the same time, there exists data for the maintenance of which there is currently no system, such as:

- operating data on service providers (a company's contact data, information about offered services, data about the employees etc.);
- data about kindergarten reservations;
- data about childcare service providers (data on the usage of the childcare service, data on applications for childcare benefit);
- data about the certificates of child-minders (certificates of the Health Register and the Punishment Register).

The above-mentioned data can be divided into two groups:

- 1) data elaborating a subject or object in the context of the childcare service that has already been described in information systems – i.e. activity licence data. In order to process such data, the composition of data in respective information systems (Register of Economic Activities) should be widened;
- 2) data related to the processes of service provision (e.g. place reservation data). Such data are necessary only in the context of a certain process. Once this is over, the data lose their meaning since at its completion, data proving the provision of a public service are entered in respective information systems. These data should be processed in an information system supporting the respective process. Examples of such systems include the Citizen Portal, the education information system of Tallinn, the document management system of the Tartu city etc.

### From project phase to implementation

The life cycle of an information system does not end with the completion of the initial development project. Then, the provision of the service (administration of the system) begins, in the course of which:

- users are to be consulted – parents, directors of kindergartens, child-minders, local government officials, persons submitting data from interlinked systems;
- changes are to be introduced to the system if users make good proposals or legislation is amended. As the organisation of work in local governments is different, the system will probably have to be adapted accordingly in the course of the implementation;
- information systems with which data is exchanged have to be monitored: if changes are made in those parts of other information systems that affect the LHMIS, the system of service provision of the latter has to be changed duly.

By the beginning of 2005, the project had reached a stage, where work should have been continued together with the system's future administrator. It appeared, however, that the administration of such an inter-institutional information system does not fall under the responsibility of any government agency and, thus, the Social Benefits for Disabled Persons Act had to be amended.

In the latter, provisions for the establishment of the childcare information system were set out and the responsibility for its administration together with respective obligations and funding requirements were assigned to the Ministry of Interior. Launch of the system – 1 August 2007 – was also established in the amended act.

## In conclusion

By today, the issue of LHM administration has been solved by making a specific amendment in the legislation. However, a problem concerning the implementation of some other information system providing inter-institutional e-services may well arise tomorrow. Thus, we are facing the challenge of bringing the public administration in accordance with the requirements of the management of life in the information society.

### 4.3.2. E-services provided by the Health Insurance Fund

The Register of Insured Persons (RIP) of the Health Insurance Fund (HIF) comprises the administration of insurance of the insured persons, management of practice lists of family physicians and everything related to the European health insurance card. Reporting both for internal purposes and for the Health Insurance Fund's partnering organisations is of no lesser importance. The information system of the RIP is rather resource-demanding – each year, health care institutions perform nearly 17 million enquiries to check the insurance of people and employers make about 300,000 entries connected with insurance cover.

Since September 2006, all the RIP data are maintained in a new information system based on the SAP software.

The new register provides, via the X-Road environment, services for citizens, employers and other registers significant from the point of view of health insurance. At the same time, the RIP itself uses services of other state registries over the X-Road.

RIP's transition to the SAP-CRM platform allows the Health Insurance Fund to process data electronically and ensure their conformity to data protection requirements.

When developing the new register, the latest SAP technologies and applications, such as SAP CRM 5.0, SAP Netweaver<sup>04</sup> and Exchange Infrastructure (XI), were used. In addition, the new solution was integrated, over the X-Road, with the Citizen Portal, the Entrepreneur Portal etc. The system is believed to be the first of its kind among institutions providing insurance services.

#### What necessitated the development of the new system?

The former Register of Insured Persons had become technologically and functionally outdated. Its main shortcomings were low level of integration, insufficient reliability and limited flexibility in terms of development and maintenance.

First and foremost, the new system was expected to improve the reliability, availability and traceability of data.

#### How was the choice made?

Prior to the launch of the project, the system development department of the HIF carried out a feasibility study from which SAP CRM came out as the best register application and XI appeared as the best platform for data exchange. Three alternatives were considered:

- first, to continue with the existing register and programme of benefits in cash;
- second, to implement a new non-standard software solution for the maintenance of the register and proceeding benefits in cash;
- third, to implement the SAP software for the maintenance of the register and proceeding of benefits.

The feasibility study evaluated the above-mentioned three alternatives from three perspectives – that of an information system, a process, and a financial and customer one.

**Alternative I.** The quality of the existing software is the poorest among the three alternatives. Achieving the targeted level of efficiency of main and support processes would not be possible.

**Alternative II.** The main shortcomings of the non-standard software platform are limited flexibility and, in comparison with standard software, lower level of integration, which would affect negatively the efficiency of both support (e.g. expenses related to the implementation of development works) and main processes (e.g. speed of benefit payments).

**Alternative III.** The advantages of the standard solution include high level of integration both with external systems (supports standardised data exchange formats) and HIF's internal systems (other business software systems of the Health Insurance Fund are also based on SAP), flexibility, reliability and security. This ensures the efficiency of main and support processes, customer satisfaction and achieving of other strategic goals. The main disadvantage of the solution lies in lower level of user-friendliness compared to a non-standard solution. This can, however, be compensated by the flexibility of the software, enabling to increase user-friendliness through customisation of user interfaces, management of workflows etc.

### Are the results satisfactory?

The employees of the Health Insurance Fund are satisfied with the results. In addition to the register, a new data exchange platform was taken into use with an aim to make data exchange service-oriented both with partners and the insured. This was enabled by the implementation of SAP XI. Data exchange with different agencies is now faster, data processing is less time-consuming and takes place real-time (over the X-Road).

The quality of data has improved significantly, data are checked and corrected now automatically at the data source. While earlier, special error reports were compiled and sent between agencies, data are now checked on their receipt and those with errors in them are sent back right away.

In the course of the project, nearly all check-up mechanisms were unified and standardised and are now identical for all.

From the entrepreneur's point of view, the number of mandatory procedures is now smaller: while earlier, all entrepreneurs had to sign an individual agreement with the HIF, now RIP's services are open for everybody entered in the Commercial Register.

For the Health Insurance Fund, the administration of the register is now simpler and less costly. In case of the old register, a new piece of a programme had to be procured whenever a change (i.e. due to amendments in legislation) had to be introduced to it. The technological content and solution, however, often left a lot to be desired. Now, it is the HIF's in-house development team making such changes. A solution like this is undoubtedly more flexible, faster, more convenient, and also cheaper.

### What kind of services does the information system provide?

Below given is a list of services provided by the information system to citizens and enterprises:

- a complex service to the Citizen Portal, where the citizen can see and change his or her contact data (e-mail address, phone number, bank account, and mailing address);

- a complex service to the Entrepreneur Portal, where an authorized user can see, on behalf of the respective organisation, and change the organisation's contact data;
- a complex service to the Citizen Portal, where the user can see information about his or her health insurance, insurance area and family physician;
- a service to the Citizen Portal in order to apply for the European health insurance card. The service allows to submit an application for the card for oneself or for a child and determine the manner of its delivery – either by traditional mail or via the HIF's customer service;
- „insurance basis” as an entirely new service for employers in order to create, extend, terminate and suspend the health insurance;
- a service for health care institutions in order to check a person's insurance cover;
- a service for partners, who need to indicate the insurance of persons.

### What next?

The transition of the Register of Insured Persons to a new information system constitutes just one part of moving all sub-systems to the SAP software. As a next step, processes related to the proceeding of benefits in cash are planned to be transferred to the new platform. Soon, services for checking and changing the data on practice lists of family physicians will be developed for family physicians, health care institutions and county governments.

HIF's e-services for citizens can be accessed via the Citizen Portal at: <http://x-tee.riik.ee/portaal/> (in Estonian) and the health insurance administration service for legal persons and self-employed entrepreneurs entered in the Commercial Register is available on the Entrepreneur Portal at: <http://x-tee.riik.ee/eit/> (in Estonian) or at: <http://www.eesti.ee/> (in Estonian) in a column entitled “X-Road services for entrepreneurs”.

### 4.3.3. eSTAT: a new channel for the submission of statistical data

The main task of the Statistical Office is to provide an overview of the economic, demographic, social and environmental situation and trends in Estonia. To this end, the Statistical Office conducts official statistical surveys, i.e. collects and processes data and publishes national statistics in accordance with the Official Statistics Act and international quality criteria.

In recent years, the Statistical Office has proceeded from four major development objectives in addition to its main task:

- increasing electronic data collection;
- making preparations for the use of governmental databases;
- improving the quality of customer service, and
- improving the quality of management within the Statistical Office.

### Electronic data collection and eSTAT

The use of electronic channels in data collection is nothing new for the Statistical Office. It has been possible to submit all kinds of reports as MS Excel files for years already and about 30% of the reporting agents also use this option. The drawback of this solution lies in the complicity of automatically downloading the received files in databases. Moreover,



information providers cannot see the reports filed earlier. The website of the Statistical Office includes all reporting forms, but does not indicate exactly which of these forms need to be completed by various reporting agents. There was no operational overview in the Statistical Office of the reports filed through different channels and contacts with the providers of these reports. Therefore, a project was launched to create the *e*STAT.

The *e*STAT is a web-based channel for filing official statistical reports, which the Statistical Office made available for reporting agents in February 2006.

In the *e*STAT, providers of information can see the list of all statistical reports they have to submit, including those that cannot be filed through the *e*STAT yet. In addition, the *e*STAT enables to draft and send reports; check the respective data and correct the mistakes that may have occurred during completing the forms; see the earlier reports submitted by the company or agency via the *e*STAT; add and change the contact data of the company or agency, etc. Presently, improvements to the *e*STAT are under way to make the system even more user-friendly.

The *e*STAT enables the employees of the Statistical Office to monitor the receipt of reports regardless of whether sent by mail, fax, e-mail, through web or any other way. In addition, the *e*STAT enables to manage all contacts with the reporting agents, for instance agreements on postponing the deadline for submitting the report, which in turn allows for taking such agreements into account upon sending relevant reminders. Unlike with the reports filed through other channels available, the information provided via the *e*STAT can be processed further without additional manual work being necessary.

In 2006, the Statistical Office expected reports from 32,000 enterprises and agencies of whom 17,000 could submit at least one report via the *e*STAT system. All in all, 21 statistical reports could be filed through the *e*STAT in 2006. As the reports that can be delivered via the *e*STAT are the ones with the largest number of reporting agents, more than half of those liable to reporting have the opportunity to join the system. In 2007, it is already possible to submit all monthly and quarterly reports through the *e*STAT.

### Security

The Statistical Office has ensured the security of the data in the *e*STAT by implementing modern information security measures. The *e*STAT can be accessed either through Internet banks (hanza.net, U-net) or with the ID card, whereas connection between the user's computer and the *e*STAT is encrypted. It is possible to determine for all users which reports they can access and what they can do with them. This way, every user can see only the data necessary for his or her work. All the activities of external as well as internal users are logged within the system and the logs are regularly monitored by the security manager of the Statistical Office.

### Administration of users

Though the reporting agent is the company, it is the private person that can enter the *e*STAT system. To enable contact persons to submit data through the *e*STAT, the Statistical Office creates the so-called main user for each reporting agency. The main user can create users and administer their rights. The main user is determined by the official representative of the economic unit, for instance the person indicated in the Commercial Register as the manager of the company. All the other users of that economic unit are then created by the main user without any involvement from the Statistical Office. One person (contact person) can submit reports for several reporting agents (e.g. an accountant working in an accounting firm) and the reports of one reporting agent can be filed by several persons (for example when the accountant, staff manager and company manager draft different reports). In 2006, the application for creating the main user could be submitted by mail, whereas from 2007 on it is

possible to submit and sign the application electronically directly on the front page of the eSTAT.

### **Changes in the data collection process**

The introduction of the eSTAT system largely affected also the organisation of work within the Statistical Office. For instance, in addition to the help desk for the users of statistics also a help desk for the reporting agents had to be created. For a long time, the servicing of reporting agents was report-based, meaning that in order to ask questions about a statistical report one had to contact the statistician of the respective field. This way, very professional service was ensured within one report. In relation to the application of the eSTAT a help desk for the reporting agents was created. For that purpose the Office's phone system was provided with an integrated call centre and a central customer service unit was established.

The implementation of the eSTAT should reduce the volume of data input in the Statistical Office. The time it takes depends on how fast the reporting agents get used to the eSTAT.

The penetration and popularity of the Internet gives reason to believe in the sustainability of the eSTAT. During the first seven months of 2006, more than 3,000 companies and state agencies had joined the system, which is approximately 25 per cent of the potential. Users are satisfied with the eSTAT: the main features pointed out in the feedback are convenience, speed and comprehensiveness of the system, which also enables better planning of work and cost saving. The eSTAT was awarded the grand prize in the competition "Best Innovation 2006" held by the State Chancellery.

### **Developments of the eSTAT in the near future**

The future plans for the coming years include providing the system with the option to upload reports in XML-format and automating data transmission between the information systems of data providers and the Statistical Office. In a few years, the eSTAT will turn into an e-services portal for the customers of the Statistical Office. In addition to providing data, it would be possible to use the services of the Office, such as contract works, enterprise-oriented analyses, etc.

The eSTAT can be found at <https://estat.stat.ee> (in Estonian only).

#### **4.3.4. E-services provided by the Environment Information Centre of the Ministry of the Environment**

Environmental data are of essential importance for the development of a country, keeping in mind the interests of the public. These data serve as the basis for planning socio-economic development and settlement policies (plans, development plans, and programmes), regulating economic activities, laying down restrictions on the right of ownership and on freedom of movement, etc.

The significance of environmental data is not determined only by the number of respective inquiries (though this number might reach hundreds of thousands per year) but also by the possible threats arising from the lack of such data. For instance, there might be only one inquiry per year in extreme ice conditions, but the lack of such data might result in serious marine casualties with victims. Another example is pollution (e.g. as regards drinking water): the lack of respective data does not enable to construction, health care or state benefits. Thus, environmental data must be available regardless of the number of inquiries.

## E-services

To date, over 500,000 documents have been entered in the information systems administered by the Environment Information Centre. All information systems have been created so that the data provider can insert data over the internet. By now, over 1,500 active users (persons submitting data) have been registered in various information systems, while this figure is constantly growing. The e-service of sending data to an information system with an SMS has been used successfully over 500 times. The following includes a list of information systems and the information provided in them.

Links to all e-services of information systems can be found at the website of the Environment Information Centre of the Ministry of the Environment ([www.keskkonnainfo.ee](http://www.keskkonnainfo.ee) – in Estonian and English).

**Emissions Trading Registry** – <http://khgregister.envir.ee/> (in Estonian and English)

### Short description of the information provided:

The Emissions Trading Registry was launched on 1 November 2005 in Estonia. The registry enables the legal and natural persons of Estonia and other EU Member States to trade with greenhouse gas emissions in an international trading system. To open an account in the registry, an online application must be first completed and the conditions of use of the registry must be accepted. The administrator then processes the application.

**Information System of Environmental Permits (KLIS)** – <http://klis.envir.ee/> (in Estonian)

### Short description of the information provided:

The Information System of Environmental Permits is a web-based document management system. Its aim is to ensure integral processing of environmental permits, as it enables monitoring and analysis of environmental use on the basis of valid environmental permits.

KLIS includes permits issued for earth's crust, waste, water, ambient air and also integrated permits. Moreover, it contains information on the certificates for the recovery of packaging, inventory records on polychlorinated biphenyls, and hazardous waste consignment notes and management licences.

**Fisheries Information System (KALA)** – <http://kala.envir.ee/> (joint website of the Ministry of the Environment and the Ministry of Agriculture; only in Estonian)

### Short description of the information provided:

The Fisheries Information System enables the issuers of permits and the submitters of data to provide information on fishing collected in accordance with the requirements of international laws and agreements. This way, all necessary data is available for those who need it for work related use and who have the right to access it.

Public information includes fishing permits and special fishing permits issued to fishing vessels as well as the fishing vessel register.

The responsibility for data acquisition is shared between two ministries.

### Ministry of the Environment is responsible for:

- conducting surveys on fishing resources;
- conducting scientific research;

- granting special fishing permits;
- imposing catch limitations when necessary;
- organizing recreational fishing;
- issuing fishing cards, and
- collecting data on recreational fishing.

**Ministry of Agriculture is responsible for:**

- commercial fishing;
- sales notes;
- logbooks of fishing vessels;
- landing declarations;
- logbooks on coastal fishing;
- declarations of transfer;
- granting fishing permits to fishing vessels;
- granting fishing permits to fishermen;
- fishing vessel register, and
- issuing fishing vessel certificates.

**Estonian Nature Information System (EELIS)** – <http://eelis.ic.envir.ee/> (in Estonian and English)

**Short description of the information provided:**

The Estonian Nature Information System contains, for example, data on the protected areas and nature monuments in Estonia and allows one to see the location of objects on the map. It also includes the option to add comments on objects.

**Waste Data Management System (JATS)** – <https://jats.keskkonnainfo.ee/> (access with password; in Estonian and English)

**Short description of the information provided:**

This is a web-based work environment for waste reporting entities and officials.

Public information comprises only aggregate data available at <http://www.keskkonnainfo.ee/jaatmed/aruanded> (in Estonian and English).

Digital forms for reporting waste handling can be downloaded at <http://www.keskkonnainfo.ee/jaatmed/vormid> (in Estonian only).

**Ambient Air Pollution Reporting System (OSIS)** – <https://osis.keskkonnainfo.ee/> (access with password; in Estonian only)

**Short description of the information provided:**

The information system on air pollution sources is a work environment for calculating the emissions of pollutants in order to ensure high-quality data handling, and enabling the administration of necessary fixed field data and drafting international and national statistical reports.

Through OSIS, enterprises can submit digital reports on their air pollution activities and make use of relevant data analysis.

Public information comprises only aggregate data available at <http://www.keskkonnainfo.ee/ohk/aruanded> (in Estonian and English).

Digital forms for reporting waste handling can be downloaded at <http://www.keskkonnainfo.ee/ohk/vormid> (in Estonian only).

*National Environmental Monitoring Programme* – <http://eelis.ic.envir.ee:88/seireveeb/> (in Estonian only)

**Short description of the information provided:**

The environmental monitoring website contains information on environmental factors and changes in the status of the environment gathered through constant monitoring and assessment. The data collected through environmental monitoring provides input for planning, taking and adjusting environmental measures.

*National Register of Products of Concern* – <http://proto.envir.ee/> (in Estonian and partly in English)

**Short description of the information provided:**

The National Register of Products of Concern has been established to maintain records on the products of concern launched in or imported to Estonia, producers of such products, and recycling and disposal of waste (including waste exported from Estonia) arising from the use of such products. The objective is to keep records on the compliance with the target figures established by government regulations for recycling and to submit data on waste to the European Commission. Enterprises can input required data over the Internet.

In order to organize reporting, digital reporting forms (in Estonian) are available for downloading.

Annexes for the National Register of Products of Concern in xls-format can be downloaded at <http://proto.envir.ee/files/Lisad.xls> and

for OpenOffice Calc at <http://proto.envir.ee/files/Lisad.ods>.

Further information on the above-mentioned services is available on the website of the Environment Information Centre at <http://www.keskkonnainfo.ee>.

**In conclusion**

Owing to the rapid development of information technology, a large amount of environmental data has been disclosed in a public data network in Estonia, and further efforts are in progress to make the publication of such information even more user-friendly. In addition to the establishment of the Environmental Register, the Environmental Register Act also provides for ensuring the reliability, accuracy and comparability of environmental data with those of other countries. The web-based systems already launched have created the opportunity to monitor environmental information, whereas this information is compliant with the EU directive 2004/3/EEC and the Århus Convention, which both stress the need to disclose more environmental information through easily accessible electronic databases.

#### ***4.4. Co-operation between the information systems of the Estonian public administration and those of the EU***

##### **4.4.1. Preservation of digital cultural heritage and making it available for the public**

Cultural heritage is the historical memory of a nation, information passed on from generation to generation the substance and integrity of which form the basis of a nation's identity and continuation. National cultural heritage determines a nation's cultural space, its status and peculiarities of development.

Preservation of the national cultural heritage is the duty of the Estonian state and people to its own as well as to the world culture. The obligation to preserve the national heritage is established in the Estonian constitution. Consistent preservation of cultural heritage as a whole has to be ensured even in relation to heritage without obvious topical or political significance. Special attention needs to be placed on cultural heritage in danger of being destroyed and born-digital cultural objects<sup>9</sup>.

The role of digital information for the educational, economic and cultural systems of the society is increasing. On one hand, this is due to the digital information is used (its speed, availability, processing possibilities etc.) and its wide spread. On the other hand, it is caused by the society's increasing orientation towards fast data exchange. In conditions of digital information management, memory institutions (archives, libraries, museums) will not remain solely passive information gatherers, but on the contrary, will take on new roles and tasks, being active preservers and protectors of digital information as well as organizers of its use. Examples of e-services developed by memory institutions include: DEA – a database of digitised Estonian newspapers (<http://dea.nlib.ee>), DIGAR – an archive containing digital copies of publications issued in Estonia (<http://digar.nlib.ee>), SAAGA – a collection of digitised family history sources (<http://www.eha.ee/saaga/index.php?lang=eng>), an archival information system AIS developed by the National Archives of Estonia (<http://ais.ra.ee/ais/> - user guide also available in English).

As more and more information is born and disseminated only in digital form, memory institutions need to quickly solve the following issues: what kind of digital information should be collected and preserved, how to obtain and describe it so that it would respond best to user expectations, how to preserve it cost-effectively, and how to make it available for all.

In addition to having started to collect born-digital materials, memory institutions have begun to digitise material objects containing valuable information (objects, documents, books, maps, records etc). By doing so, memory institutions seek to increase the possibilities for the wider public to partake in the nation's cultural heritage and orientate themselves towards the needs of lifelong learning.

The number of digital copies made of cultural objects of significant value in Estonian museums, archives, libraries and media establishments (TV, radio) currently amounts to nearly 12 TB, constituting an important share of all collections (there are nearly 3,500,000 digital objects altogether)<sup>10</sup>. However, memory institutions still lack proper digital preservation infrastructure and, thus, long-term high-quality preservation of digital collections cannot be ensured.

<sup>9</sup> Sectoral strategy Digital Cultural Heritage 2007-2010:

[http://www.kul.ee/webeditor/files/Digi\\_Kult\\_AK\\_loplik.pdf](http://www.kul.ee/webeditor/files/Digi_Kult_AK_loplik.pdf)

<sup>10</sup> [http://www.kul.ee/webeditor/files/Digi\\_Kult\\_AK\\_loplik.pdf](http://www.kul.ee/webeditor/files/Digi_Kult_AK_loplik.pdf)

The creation and protection of digital cultural heritage are global problems a solution to which is sought at all levels. Within its *Memory of the World* programme, the UNESCO has published a document entitled *Charter on the Preservation of the Digital Heritage* (2004)<sup>11</sup>, which underlines that digital matter constitutes a part of cultural heritage and needs to be protected. To contribute to the implementation of digitisation projects and assist those responsible for the preservation of digital cultural heritage, UNESCO has elaborated the *Guidelines for the Preservation of Digital Heritage* (2003)<sup>12</sup>.

In the framework of the EU's *eEurope* 2005 Action Plan, a programme was launched for the elaboration of national digitisation strategies, co-ordination of digitisation projects and implementation of good practice principles. The EU member states agreed on the basic principles for national digitisation strategies at a meeting in Lund in 2001 and the principles became known as the *Lund Principles*<sup>13</sup>. The Action Plan drafted on the basis of the Lund Principles emphasizes the need for shared responsibility and co-ordination with actions proposed ranging from bottom-up involvement of memory institutions to top-down policy initiatives. In Estonia, the National Strategy for the Digital Preservation of Estonian Cultural Heritage for 2004-2007 was completed in February 2004. A Council for the Digital Preservation of Cultural Heritage has been established for the co-ordination of activities related to the digitisation and preservation of cultural heritage. At the leadership of the above-mentioned council, a sectoral strategy called Digital Cultural Heritage 2007-2010 was completed at the beginning of 2007.

### Co-ordination activities and support through Minerva projects

The objective of the MINERVA project, launched in 2002, was to develop a network between the ministries and other organisations of the EU member states in order to allow co-operation partners to discuss activities related to the digitisation of scientific heritage, exchange information, co-operate in the dissemination of information about digitisation, create a common European platform made up of recommendations and guidelines about the digitisation of cultural heritage, metadata, long-term accessibility and preservation. In 2004, MINERVAPlus initiative was launched, in the course of which new partners, including the Ministry of Foreign Affairs of Estonia, joined the MINERVA network. Within these projects, a National Representatives Group (NRG) was established with a task to co-ordinate digitisation of cultural heritage in member states. At the initiative of the NRG a new action plan entitled *Dynamic Action Plan for the EU Co-ordination of Digitisation of Cultural and Scientific Content* (DAP) has been elaborated, determining the next important tasks for the implementation of the Lund Principles.

In October 2006, a follow-up project to MINERVA called MinervaEC was initiated. The new project seeks to contribute to the implementation of *i2010 – A European Information Society for Growth and Employment* and DAP, as well as to promote the co-ordination between competence centres of member states.

### Emphasis on building the European Digital Library

The European Union's information society action plan *i2010* sets out, as one of its action fields, the promotion of digital libraries and digital preservation in member states<sup>14</sup>.

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 will contribute to Europe's competitiveness and support EU action in the field of culture.

<sup>11</sup> [http://portal.unesco.org/ci/en/ev.phpURL\\_ID=13366&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/ci/en/ev.phpURL_ID=13366&URL_DO=DO_TOPIC&URL_SECTION=201.html)

<sup>12</sup> <http://unesdoc.unesco.org/images/0013/001300/130071e.pdf>

<sup>13</sup> <http://www.kul.ee/index.php?path=0x895>

<sup>14</sup> [http://europa.eu.int/information\\_society/activities/digital\\_libraries/index\\_en.htm](http://europa.eu.int/information_society/activities/digital_libraries/index_en.htm)

The *eLibrary Development Plan 2007-2012* of the Estonian National Library seeks to develop a user-friendly environment for the exchange of information via a computer-mediated network. The development plan envisages the National Library as a competence centre in the field of digitisation, co-operating with other libraries, museums and archives in order to digitise and archive national publications and actively participate in EU programmes, such as *eContentPlus* and *eTEN*.

Since 2002, the National Library has been digitising microfilms. In addition, an IT environment has been developed for the scanning of publications and saving, converting and describing the scanned images. The National Library uses the solution for the regular digitisation of old newspapers, which readers can access through the database of digitised newspapers *DEA* (<http://dea.nlib.ee>). In co-operation with the Archival Library of the Estonian Literary Museum and the Academic Library of the Tallinn University nearly 752,000 image files from 127 different newspapers have been entered in the database.

Beginning from 2004, the National Library participates in an *eContent* project called *ReUSE*. The objective of the project is to develop a national digital repository that would correspond to the requirements of long-term preservation and enable preserving and making available digital copies of publications obtained from public institutions in Estonia. The first version for the administration of the digital repository *DIGAR* as well as the respective contract management system have been completed. In addition, entry of documents into the system has been started with nearly 1316 objects (there are 8134 files altogether) archived by today.

In 2005, the National Library joined a project involving the ten national libraries from EU member states called *TEL-ME-MOR*. The aim of the project is to develop a single point of entry for information resources and other library services of the leading European national libraries via the European Library (*TEL*) information portal. Multilingual user interfaces will be developed so as to ensure that users of new member states could use the collection of high-quality pan-European information resources in their native language.

### Virtual museum

Though Estonia does not currently participate in the *MICHAEL* project<sup>15</sup>, development of a new information system of museums is underway at the initiative of the Ministry of Culture. The objectives of the system include keeping records of museum objects, facilitation and acceleration of the work of museum workers, and making information about museum objects easily available for researchers and the wider public through an e-service called “virtual museum”. The improved availability of information will reduce the need to take museum objects out of storage, ensuring thus their better preservation.

In the future, the “virtual museum” should become a part of the pan-European system preserving and making accessible cultural heritage.

Digital preservation of cultural heritage presumes the development of conditions for secure long-term preservation of digital matter. Thus, work will be started on the description and development of a common digital archive for long-term preservation. A common solution will take considerably less resources than the development of respective infrastructure in all agencies or in all fields individually. To realize this objective, the Ministry of Culture co-operates through *NRG* with other partners in Europe.

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<sup>15</sup> The *MICHAEL* project is a partnership between France, Italy and the UK with an objective to deploy a cultural portal platform developed in France. *MICHAEL Plus* extends the *MICHAEL* project to the Czech Republic, Finland, Germany, Greece, Hungary, Malta, the Netherlands, Poland, Portugal, Spain and Sweden. The two projects are closely aligned. The projects focus on the integration of national initiatives in the digitisation of the cultural heritage and interoperability between national cultural portals to promote access to digital contents from museums, libraries and archives.



#### 4.4.2. Developments in the field of information systems in the Citizenship and Migration Board

The field of internal security will remember 2006 as a year of significant cooperation projects and the period of extensive preparations for accession to the Schengen visa-free zone. Another thing to make the year memorable is the receipt of financing means from EU funds (the Schengen Facility) that made it possible to carry out substantial infrastructural changes and simultaneous large-scale developments in various fields of internal security. In this respect, the Citizenship and Migration Board (CMB) had to face several challenges, which were met using IT-solutions: establishment of a national interface (NS-VIS) connected with the trans-European Central Visa Information System (CS-VIS), realisation of production and employment solutions related to the issuance of travel documents carrying biometric data, implementation of biometric identification algorithms, and development of infrastructure contributing to the fulfilment of the two aforementioned objectives. In addition, several smaller internal changes were made, which qualify as streamlining various measures of safeguarding security, but the three fields emphasised above are relevant on the state level.

##### Establishment of the national interface (NS-VIS)

The objective of the entire long-term action plan is to interface with the common system VIS, which guards the external border of the Schengen visa zone and enables all the visa system members perform a uniform check of those wishing to enter the zone. In order to meet the goal, several important interim objectives will have to be achieved. Three of them are the most noteworthy:

- National system for coordinating the issuance of visas. This is an integral automatic system for summarising the opinions of the field of security (the aim is either to approve or refuse from granting a visa). The significance of the solution lies in the emergence of a real-time integral body of information systems through which various security authorities (e.g., the Estonian Police, the Security Police, the Border Guard of Estonia, and the Citizenship and Migration Board) conduct their proceedings of electronic requests for approval with automatic cross-usage (X-Road based development). Another thing of importance is that the system synchronises the authorities' workflows to conduct proceedings of requests for approval. The solution is relevant owing to the fact that it involves the areas of governance of various ministries and contributes to cooperation, with the Ministry of Foreign Affairs being one of the consultation parties.
- Updated national central system for visa processing. Estonia already has access to a central real-time solution (available at all the 35 foreign representations and at the border), but a fully updated system would provide added value to such services as biometric identification and cross-usage with other security authorities.
- Interfacing readiness with the respective EU central system in order to obtain information necessary for consultations and conducting procedural acts. Respective tests of interfacing readiness will take place in the summer of 2007, marking the end of the NS-VIS project.

##### Realisation of production and employment solutions related to travel documents carrying biometric data

Arising from public and political pressure caused by the heightened threat of terrorism, as well as from EU regulations, Estonia is obligated to insert biometric data in the travel documents of the country's residents. The same phenomenon has also been referred to as the

“e-passport” and “biometric passport”. Supplementing travel documents with the respective functionality means that the systems of the CMB have to undergo considerable changes. The changes will be implemented step-by-step. First of all, only the person’s face will be inserted electronically in the passport (this should make it more difficult to counterfeit or change the photo). Later also a fingerprint is added. Changes in the organisation of work and supporting systems of the CMB occur in both customer service and document issuance systems. Such projects require higher data protection, better transparency of solutions and implementation of the new requirements in cooperation with other simultaneous changes. Estonia’s cooperation partner in this project is the Finnish document producer Setec. The new developments are expected to be introduced in the first half of 2007.

### **Completion of the base IT infrastructure**

In addition to changes in the procedures of conducting proceedings, compliance with higher requirements to the functioning of the infrastructure and safeguarding access to data is a significant precondition for the two projects described above. With the aim of meeting these challenges, the CMB has devised a longer-term conception for infrastructure development. The investments made in 2006 were based on the conception. Investments were made in the following areas: construction of back-up server rooms, continuous feed systems (UPS and generator solutions), climate solutions, the common storage area network (SAN), the network infrastructure (both SAN fibre network devices and LAN devices, intrusion detection systems, network traffic analyzers, and other specific security solutions), and the server infrastructure. The total cost of IT infrastructure investments amounted to approximately 60 million Estonian kroons (3.83 million euro) in 2006, enabling to create the most integral IT infrastructure solution in Estonia. Functioning of this integral system should both meet the high requirements to availability established by the VIS central system and make it possible to carry out operations requiring high computing power in order to identify persons based on biometric features.

### **Implementation of biometric identification algorithms**

The CMA as the authority responsible for establishing identity in Estonia is now able to resort to innovative IT solutions for better performance of its duties. By end-2006, the CMB held digital picture data of more than 1.2 million people. So far, IT solutions were not of much assistance to officials in identifying people, but now the data bases and search platforms have reached the level where it is possible to decrease the circulation of false identities in the society on the basis of biometric searches. Respective developments were procured in 2006 and should be applied in 2007.

### **Application of the ID-card and electronic proceedings**

The CMB continued further application of the usage of ID-cards in order to strengthen internal security and make the electronic records management more efficient. The most important application included setting off the encryption solutions of the CMB’s mobile workstations (laptops) using ID-card identification. In addition, access to different applications (special applications) was also made identifiable by the ID-card. The situation where in order to access the CMB data the users are first identified by the ID-card upon their entry in the network, then upon their access to the applications (for the usage of both internal and external bases via the X-Road), upon their entry in the mobile workstations, and also upon working at home has already been achieved.

As regards the continuous implementation of electronic proceedings, the number of the CMB’s data exchange partners has remained the same year-on-year (15 partners), but the amount of queries made into the CMB’s data base has considerably increased, and currently the data bases are servicing more external users (mainly from the internal security

institutions) than internal ones. The CMB is also integrating into their proceedings queries from the institutions that have been able to make their services necessary for the CMB available in the X-Road.

#### 4.4.3. Developments in the eTax and eCustoms Board in 2006

*The Estonian Tax and Customs Board was established in 2004 by joining two agencies that had so far been operating separately. The e-applications (eTax Board and eCustoms) of the two agencies also functioned as two separate communication channels.*

*In order to harmonise these e-solutions, the Tax and Customs Board started to reorganize its channel for delivering e-services. As a result, the e-services environment, which is based on different roles and which will be completed in 2007, will be updated so as to make it more user-friendly by accelerating navigation and optimizing the menu structure.*

*On 14–15 September 2006, the Estonian Tax and Customs Board organized a meeting in Tallinn to share ideas and experience on e-services in the field of tax and customs. The meeting brought together participants from the tax and customs boards of 11 countries, representatives of the Estonian eGovernance Academy and AS Webmedia – the new co-operation partner of the eTax Board.*

By 2006, the eTax Board had been more or less completed and the number of users has been increasing every year (82% of Estonian tax-payers submitted their income tax declaration electronically via the eTax Board in 2006). The eCustoms information systems have been under development since 2002 when Estonia started preparations for joining the European Union and there was a need for co-operation in the common EU customs system.

#### Multi-Annual Strategic Plan

The eCustoms Multi-Annual Strategic Plan (MASP) is a programme of the European Union. Its concept stems from the Lisbon Strategy approved by the EU Member States in 2000 as a ten-year reform plan aiming at making the European Union “the most competitive and dynamic knowledge-based economy in the world”.

For international customs administrations, MASP sets the following key objectives:

- the customs administrations of the EU Member States should function as one body so as to protect the interests of the society (security, finance, and the environment);
- 100% paperless communication should be introduced;
- the use of simplified procedures should extend from national to Community level;
- harmonisation of customs procedures.

In order to meet these objectives, Member States should build and launch, in co-operation with the European Commission, secure, integrated and interoperable customs information systems. These electronic systems are created in order to make customs clearance more effective, reduce administrative costs, and increase the security of the movement of goods and international trade.

In 2005, the Tax and Customs Board started to implement the eCustoms Multi-Annual Strategic Plan of the EU as a part of the eGovernment development concept. Respective activities continued in 2006 when the web-based system for processing customs declarations

(COMPLEX) and the Export Control System (ESC) were implemented and the project for the electronic exchange of TIR data (TIR 2007) and the elaboration of the system for processing summary declarations (SUMDEC) was started.

### **COMPLEX: new system for processing customs declarations**

COMPLEX is a freely available web-based system for processing customs declarations. It was launched on 1 May 2006 as a replacement for the present system ASYCUDA.

The need to implement a new system proceeded from the European Union requirement to apply new requirements of filling in customs declarations in all EU Member States starting from 1 January 2007 at the latest. Transition to paperless (electronic) customs clearance is one of the new requirements.

COMPLEX is a modern, interactive, convenient and user-friendly web-based system for processing customs declarations. It was developed to

- provide for a fast and convenient option of submitting customs declarations;
- modernize customs clearance;
- simplify the use of electronic clearance;
- reduce the costs related to customs clearance, both for companies and for the country;
- ensure uniform application of legislation in all Member States, and
- improve the protection of society.

The advantage of a web-based system is that it can be used from any computer with an Internet connection. Users need not worry about system updating and maintenance as this is done by the Tax and Customs Board. This means that in order to make use of COMPLEX, customers need not use the services of a system maintenance company.

COMPLEX is entirely Estonia's own product.

The new requirements to customs declarations also established new requirements to the previously used system ASYCUDA. Since the changes that had to be implemented in ASYCUDA were so extensive, the Tax and Customs Board decided to replace it with COMPLEX. The word "complex" is very characteristic of the unique internal structure of the system. COMPLEX is connected to a great number of supporting and auxiliary subsystems, such as the system of processing permissions and of securities, the Estonian Customs Tariff and the register of taxable persons. The subsystem of non-financial obligations also enables to submit reports to the Tax and Customs Board electronically.

In the development of the new system also other future systems of the EU have been taken into account, such as the Export Control System (ECS) and the Import Control System (ISC), which Estonia must introduce in the coming years pursuant to the Commission Regulation No 1875/2006. The first stage of the ICS would be the elaboration of a national system for processing summary declarations (SUMDEC). The new system for processing customs declarations has been developed so that it can be interfaced with the above-mentioned pan-European systems when necessary.

The system is for everyone who wishes to submit customs declarations or reports to the Tax Board or apply for a customs procedure, etc.

By October 2006, the launch of COMPLEX had increased the share of using eCustoms to approximately 100% within five months. Before that, the share of electronically submitted customs declarations was nearly 57%, whereas by the end of the third quarter the respective figure was already 97%.

COMPLEX has considerably simplified customs clearance, reduced administrative costs and increased the quality of service.

Owing to that programme, Estonia has taken a major step forward towards the EU objective of transition to paperless customs. Moreover, COMPLEX won the second place in the service competition held in 2006.

Additional information on COMPLEX is available at <http://www.emta.ee/?id=4247>.

### Export control system (ECS)

The Multi-Annual Strategic Plan provides for the implementation of the Automated Export System (AES) in EU Member States in order to develop electronic customs clearance during 2006–2013. According to the preliminary plan, that system (further “ECS/AES”) will be put into operation in two stages.

**Stage 1:** the development and implementation of the Export Control System in the Member States to be completed by 1 July 2009.

Stage 1 consists of two substages. The first substage should result in establishing electronic communication between the customs administrations of the Member States (i.e. between the export customs office and the office of exit). The deadline is 1 July 2007.

The second substage should result in the implementation of security requirements arising from the Commission Regulation (EC) 1875/2006. These requirements must be implemented as of 1 July 2009.

**Stage 2:** the development and implementation of the Automated Export System during 2009–2013. This should result in establishing electronic communication between the customs and clients and other executive bodies.

The ECS/AES should enable the customs offices involved in export procedures (exports, re-exports, outward processing) to electronically exchange information about the movement of goods in order to accelerate goods flows, increase the effectiveness of inspection carried out to discover VAT frauds and other tax evasions, as well as to enhance the security of the supply chain.

The main objective is to implement the ECS/AES for international exports, i.e. when goods are released for exports in one Member States and exported through one or several Member States to a customs office of exit where these goods actually leave the territory of the EU.

### System for processing summary declarations (SUMDEC)

SUMDEC is developed for receiving summary declarations on goods imported or exported by maritime, road, air and rail transport and conducting risk analysis on the basis of these data to comply with the Regulation (EC) 648/2005.

The system provides the customs and other competent stage agencies with timely and sufficient information for identifying the risks of commodities crossing the border. The system enables to maintain records on the transshipment or temporary storage of goods received on the basis of summary declarations and subsequent customs procedures.

Summary declarations are submitted electronically to the customs before the imports of goods to the EU territory or before the exports of goods from the EU territory within the time limits prescribed by law.

SUMDEC is planned to be implemented in several stages:

- development and implementation at the national level;

- further developments for data exchange for the purpose of risk management between the Member States and for the gradual application of the single window<sup>16</sup> and one-stop shop<sup>17</sup> concepts during 2006–2012 in line with the development of other systems under MASP.

### New e-service of the eTax Board

In order to enhance control over products subject to alcohol excise, a new procedure for revenue stamping was established on 1 July 2006 to make it easier for consumers to differentiate between legal and illegal alcohol and to prevent the sales of the latter in the legal sales network.

According to strict security requirements the tax stamp for strong alcohol must be a circular hologram with the diameter of 20 mm and contain a unique combination of letters and numbers.

On 5 June 2006, the Tax and Customs Board applied an information system that should simplify and accelerate companies' procedures related to the tax stamps for strong alcohol and facilitate the work of supervisory bodies.

The information system for administering tax stamps aims at drawing together all respective procedures into a single electronic environment. Customers can perform various procedures: e.g. submit electronic applications for tax stamps to the Tax and Customs Board, see the status of the application in real time, check the time and date of issue of the tax stamp, administer the attaching of tax stamps on alcohol products, the dispatching of tax stamped alcohol and the delivery of products under excise suspension agreement to another excise warehousekeeper, and see electronic reports on the tax stamps the customer uses.

Moreover, the information system facilitates the work of the tax administrator and other supervisory bodies, as it provides a real-time overview of the process of issuing a tax stamp to a company, the attaching of a tax stamp on a certain product and the dispatch of tax stamped alcohol or delivery to another excise warehousekeeper.

In addition to tax officials also retailers, producers and importers were involved in the elaboration of the information system so as to address the needs of various parties. Access to the system has been provided on the portal of the eTax Board.

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<sup>16</sup> "Single window" refers to one-time data entry: the company submits all data necessary for crossing the border to the customs, including data necessary for other agencies, and the customs office then forwards the respective information to other agencies.

<sup>17</sup> "One-stop-shop" is a logistical concept: the consignment is inspected on the border simultaneously by different agencies.

## 5. Developments in IT legislation, standardization and data security

### 5.1. Developments in ICT legislation in 2006

In recent years, there have been several changes in the field of national ICT, which have also started to affect legislation. Information society development through the elaboration and implementation of IT solutions (data exchange layer of information systems, portals, ID card applications, electronic health record etc.), growing demand for the implementation of innovative solutions and increasing need for borderless Europe and world have started a process, which calls for establishing ever more exact rules of conduct and decision-making.

When legislative drafting is far ahead of the actual implementation of laws, it is difficult, if not possible, to anticipate any possible circumstances so as to have the respective field fully and wisely regulated. The ongoing social processes have demonstrated the increasing role of the European Union structural funds that have greatly facilitated the development of eGovernment in Estonia. The obligation to harmonize national legislation with the EU legislation has been fulfilled but the description of actual needs and concrete circumstances is taking place only now when vision has become a reality.

Thus, 2006 was the year characterized by translating the laws adopted for the purpose of applying EU directives into the needs of information society. The vision of the regulation of databases, personal data protection, problems related to digital signatures and certificates, and communications and telecommunications issues have all become a reality. Moreover, the practical importance of the accessibility of information and the principle of administration in free form has grown considerably.

#### Personal Data Protection Act

As regards the field of personal data protection, the draft Personal Data Protection Act has been prepared which will bring along several changes and is planned to be entered into force on 1 January 2008. Thus, the classification of personal data into three groups (personal data, private personal data and sensitive personal data) introduced in the Public Information Act will be replaced by classification into two: personal data and sensitive personal data as the subclass under special protection. The previous list of private personal data will be transferred to the Public Information Act by the implementing provisions of the draft Act and will not be stipulated as a subclass of personal data, but as a single ground for establishing restrictions on access to public information. For the sake of clarity, the definition of personal data has been specified in the draft Act, indicating that the protection of personal data shall extend to all forms of data, including audio and graphic data as well as biometric data (e.g. fingerprints and eye iris patterns).

The processing of the personal identification code is no longer regulated in the draft. The legislation in force provides for the processing of the personal identification code without the consent of the data subject only in the cases specified in acts, regulations or international agreements. In all other cases consent is necessary. Such an arrangement has caused inconveniences for both the data subject and the processor of personal data. Therefore, the draft Act extends all general principles for processing personal data also to the processing of the personal identification code.

The draft Act includes a new definition: *person liable for the protection of personal data*. Namely, the processor of personal data (the chief processor) can, as an alternative to registering the processing of sensitive personal data, appoint a person liable for the protection

of personal data who has to be independent and make sure that the processor processes personal data in accordance with data protection requirements.

In addition, the obligations of the processor of personal data to the Data Protection Inspectorate have changed – the draft Act also regulates the processing of personal data for research and statistics.

### **Public Information Act**

For practitioners, the draft Public Information Act marks the beginning of a new era in data processing. This is mainly because in addition to smaller amendments also the provisions related to the regulation of databases have been added to the draft Act, whereas these provisions by nature fall under the provisions of (public) information and processing of such information. Upon the adoption of the Public Information Act Amendment Act the present Databases Act will become invalid.

Thus, in the draft Act the focus has been shifted from the classification of databases (general register, state register, local government database, internal database) to the classification of data and regulation of data services. Instead of classifying databases, the definition of “basic information” has been introduced. Another new concept is the principle of data authenticity which is important in terms of data quality. According to this principle, the primary data are unique data that are collected pursuant to law in a database of a state information system and not in any other database and that are generated upon the performance of public duties by the database administrator.

For the first time, the composition of a state information system, the organisation of databases belonging to a state information system and the legal bases for providing and using data services are determined. The objective is to make agency-centred databases of the state information system service-oriented and create a data exchange environment that would contain information about the existing information systems and databases and would allow monitoring data flows between information systems. This would enable database administrators to better plan the budget and development activities and agencies co-ordinating state information systems to analyse the effectiveness of databases and draft proposals for the development of databases and provision of new services.

The draft Act provides for an approach integrating different areas of government through legislation that defines the administration system of the state information system and other support systems for the state information system as well as the status of databases, which are established within the public sector information system, in the integral state information system. Another new principle in the draft Act is that the state should provide local governments with the resources necessary for integrated data acquisition in case data are processed upon the performance of duties assigned or delegated to local governments by the state.

### **Digital Signatures Act**

The Digital Signatures Act Amendment Act was initiated so as to specify the regulation of the use of digital signatures and to provide for the use of digital stamp, as respective technological solutions already exist and most of the provisions for use have also been set down.

A digital stamp is a data unit, created using a system of technical and organisational means, which a person that gives the stamp uses to indicate his or her connection to a document.

Thus, a digital stamp should enable the determination of the time at which the stamp is given and the person who has given it, and link the digital stamp to data in such a manner that any subsequent change of the data or the meaning thereof is detectable. In addition, the draft Act



includes a principle according to which the system has to allow for the identification of the application principles followed.

### Electronic Communications Act

The issues related to electronic communications have been on the agenda because the European Commission has recommended the Member States to complete the transition to digital television broadcasting by 2012 at the latest and Estonia has been among the last to have started the process only on 26 January 2006. The necessary measures for transition have been drafted and also adopted by the Government and the legislative proceeding is under way.

### eHealth Information System Act

The elaboration of the eHealth Information System Act was initiated in order to implement projects (e.g. Electronic Health Record, Digital Images, Digital Check-In, Digital Prescription – see also Chapter 4.1.1) based on the concept of eHealth information system developed in the Ministry of Social Affairs. Each of these projects has a number of reasons for drafting a specific law.

Since medical law has not been codified in Estonia, none of the regulations in this field have established the specifics of processing medical data or using respective IT solutions that would regulate the use of data by patients, health care providers and third parties.

Drawing the above provisions together into a single specific law would lead to a situation where the regulations on the eHealth information system would be understandable to patients and other persons related to eHealth, rights and obligations would be clear and respective provisions easy to find. This would enhance the protection of patient's interests and public health through increasing the availability and security of data.

By laying down general principles for the management of health information, the eHealth Information System Act also establishes the bases for the maintenance of medical registers.

During the preparation of the draft Act, the possible joint effects of this Act and other legislation in force have been analyzed to ensure harmonized legislation that would take into account the maximum implementation of all valid laws on IT and other fields. Work with the draft Act continues. Hopefully, the Act will enter into force before August 2008 when the implementation of the first four eHealth information systems will take place.

### Conclusion

Although none of the above-described draft Acts were ready to be adopted by the Riigikogu in 2006<sup>18</sup>, considerable work has been done so far. This is a response to the public will and to the regulation of social behaviour in information society which can be considered the evolution of positive law in the information and communication technology.

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<sup>18</sup> The Public Information Act Amendment Act was adopted by the Riigikogu on 24 January 2007. – Edit.

## 5.2. *New IT standards adopted in Estonia*

In 2006, translations of five international IT standards and one amendment to a standard were prepared through the joint efforts of the Estonian Technical Committee for IT Standardisation (EVS/TK4), the Estonian Centre for Standardisation and the Ministry of Economic Affairs and Communications. Compliance with international standards helps us to bear in mind the bigger picture, ensuring the mutual compatibility of the standards applied.

It is recommendable to use a process approach for the establishment, implementation, operation, monitoring, review, maintenance and improvement of an organisation's information systems and vital applications. For an organisation to function smoothly, it must define and administer its numerous activities. Every activity that makes use of resources and is managed in order to convert input resources into outputs can be considered a process. The output of one process often serves as the input for the next process. The process approach is the implementation of the system of processes in an organisation along with the definition, interaction and management of these processes.

The **technical report ISO/IEC TR 19760:2003 Systems Engineering – A guide for the application of ISO/IEC 15288 (System life cycle processes)** gives guidelines for the application of the international standard ISO/IEC 15288 “Systems engineering – System life cycle processes” adopted as a standard in Estonia for a variety of systems in different sizes. The guidelines included in the technical report can be adapted for a specific system and project.

Enterprises have to conduct business and public sector agencies have to fulfil their duties, using information systems and related products and services. The standard facilitates the primary activities of a company, providing a general framework for the development, use and management of a system upon concluding and carrying out contracts between suppliers and providers.

The **amendment A2:2004 to EVS-ISO/IEC 12207:1995 Information technology – Software life cycle processes** is related to the above-mentioned technical report.

The structure of the ISO/IEC 12207 standard widely used in Estonia comprises the whole life cycle of a software from the creation of its concept to the withdrawal from use and consists of the procurement and supply processes of software products and services. Software is an inseparable part of IT systems and also traditional systems, such as transport, the military, health care and finance. The above-mentioned amendment sets objectives and expected results for several processes defined in the standard along with some amendments introduced for technical reasons.

**ISO/IEC 15504-1:2004 Information technology – Process assessment. Part 1: Concepts and vocabulary** provides guidance on process improvement and on the assessment of process performance and capability.

One of the fields requiring a systematic approach and the application of the process-based method is information security.

The standard **ISO/IEC 27001:2006 Information technology – Security techniques – Information security management systems – Requirements** provides a model for the establishment and implementation of information security management systems (ISMS). The introduction of an ISMS should be among the strategic decisions of an organization. Both, internal and external parties can use this standard for the assessment of the conformance of ISMS to the standard.

When drafting security controls in compliance with the requirements of ISO/IEC 27001, the guidelines of the new improved version of **ISO/IEC 17799:2005 Information technology – Security techniques – Code of practice for information security management** might be of use.

This standard establishes guidelines and general principles for initiating, implementing, maintaining and improving information security management in an organization. Establishment of an information security system should take account of legally important security measures that are compliant with common information security procedures. Information security is important for both public and private sector and in terms of protecting vital infrastructures. In both sectors, information security enables to achieve the objectives of eState or eBusiness activities and to avoid or reduce the related risks.

The technical report **ISO/TR 13569:2005 Financial services – Information security guidelines** provides guidelines to financial institutions for the elaboration of information security strategies.

Along with the uptake of computer and web-based technologies, finance has also become more dependent on electronic transactions. Huge amounts of money and securities are transferred every day through electronic communication mechanisms. In order to manage financial risks, a sound and effective information security strategy should be in place in every company. It is important to take into account operational risks, including fraud and crime, natural disasters and acts of terrorism.

When establishing efficient documentation in an organization, the technical report **ISO/IEC TR 9294:2005 Information technology – Guidelines for the management of software documentation** provides guiding principles on the management of software documentation to executives responsible for the production of software or software-based products.

Documentation is needed in all stages of the software's life cycle. Documentation starts with the initiation a software project and continues with the design, development, testing, installation, use, modification and improvement of the software. The process of documentation can be considered completed only when the respective software is no longer needed and is withdrawn from use.

All the above standards cover various types of organizations, such as business companies, stage agencies, non-profit associations, and are aimed for a broad readership.

### **5.3. Developments of the standard security system for information system - ISKE**

ISKE is a three-level baseline protection system for information systems. The development and implementation of the system has drawn from the information security standard IT Baseline Protection Manual<sup>19</sup> (*IT-Grundschutz Handbuch*<sup>20</sup> in German) of the German Federal Office for Information Security (*Bundesamt für Sicherheit in der Informationstechnik – BSI*).

The Estonian information security policy principles foresee, among other activities, the elaboration and updating of information security regulations. One of these information security regulations provides for the development and implementation of ISKE.

<sup>19</sup> Available at <http://www.bsi.de/english/gshb/manual/index.htm>

<sup>20</sup> Available at <http://www.bsi.de/gshb/downloads/index.htm>

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 the 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. Moreover, also business companies can use it for ensuring the security of their IT assets.

The first version of ISKE's implementation guide was completed in October 2003. The system includes three levels of security – low (L), medium (M) and high (H). The necessary level of security is determined by determining security classes (security sub-classes).

Baseline protection consists of a typified minimum set of security measures to be taken in order to accomplish and preserve the necessary level of security. The set of measures of ISKE has been developed based on the security analysis of typical information assets and related security practices.

The word “minimum” here means that in order to ensure the necessary level of security all compulsory measures specified for the specific type of information assets and security level must be taken. Moreover, additional measures have been recommended for every level of security.

At the same time, such minimality indicates also optimality since if even one compulsory measure is ignored it is not possible to achieve the required level of security. The unjustified use of other measures would entail additional costs, a decrease in the availability of information assets and the slowing down of work processes.

Version 2.01<sup>21</sup> of the implementation guide of ISKE was completed in 2006. It includes changes to catalogues and security specifications arising from the changes to the base system introduced in the latest German version (December 2005) of the BSI manual.

Upon determining the security classes, the new version proceeds from the 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 unauthorized alteration.

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

The required security of the information system is achieved by meeting these three objectives.

Ensuring the security of an information system and the data it contains calls for choosing security measures pursuant to the security requirements established on the basis of security needs. The greater the requirements to the security of certain data, i.e. to the time criticality, integrity and confidentiality of data, the stronger the security measures have to be.

The safety requirements for an agency's information system depend on many circumstances. These circumstances and the value of data are best known to the owner of data who is therefore also able to determine the suitable level of security, i.e. the level of time criticality, integrity and confidentiality, for these data.

<sup>21</sup> Available at [http://www.ria.ee/public/ISKE\\_rakendusjuhend\\_2006\\_2\\_01\\_23112006.pdf](http://www.ria.ee/public/ISKE_rakendusjuhend_2006_2_01_23112006.pdf) (in Estonian only).

When determining the security sub-classes the following types of requirements should 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 annexes of the implementation guide of ISKE include short descriptions of various threats and security measures. It should be mentioned, however, that these annexes are above all informational and consist of summaries that are not meant to be instructional but rather explain the content of the catalogue names of certain threats and security measures. These summaries do not replace the full text of the catalogues in the BSI manual and they cannot be regarded as the translations of catalogues. In order to get a complete overview of the threats or security measures, the implementers of ISKE should read the original texts of the BSI manual.

It is not compulsory to take the security measures of the security levels L and M of ISKE as they have not been covered in the latest English version of the BSI manual and they have not been sufficiently described in the implementation guide either.

The new version of ISKE is certainly a step forward in the development of security requirements. Moreover, the drafters of the new version have various ideas on how to improve the version even further in the coming months. Further work mainly entails adding explanations to the more important modules and security measures, drafting instructional guides and providing training for the implementers of ISKE.

#### **5.4. First year of CERT Estonia**

In order to protect an organisation's assets and ensure their security, timely detection of security incidents, their proper handling, as well as appropriate follow-up activities are of vital importance. The management of these activities may have a considerable impact and, thus, should be of critical importance for all organisations.

The Computer Emergency Response Team of Estonia (CERT Estonia) is an organisation responsible for the management of security incidents in .ee computer networks. Its task is to assist Internet users in Estonia in the implementation of preventive measures in order to reduce possible damage from security incidents and to help them in responding to security threats. CERT Estonia deals with security incidents that occur in Estonian networks, are started there, or have been notified of by citizens or institutions either in Estonia or abroad.

The unit was established in the second half of 2005 and has thus been operational for slightly over a year. The tasks of CERT Estonia are performed by the Department for Handling Information Security Incidents of the Estonian Informatics Centre.

#### **CERT Estonia's practical lessons**

CERT Estonia learned many practical lessons during its first year of operation.

Though the unit assists in handling security incidents, it is not the CERT's role to take over the management of those incidents. Only the "owner" of the incident knows his system thoroughly enough to make adequate decisions. Each incident is unique, which is why it is impossible for CERT Estonia to give precise instructions. The assistance provided by CERT consists of exchanging best practice and earlier similar experience.

In 2006, CERT Estonia participated in the handling of various information security incidents, such as the classical system takeover, attempt of an unauthorised alteration of data, collection and phishing of passwords and user names, and denial-of-service attacks.

One of the most recent incidents – phishing of Internet banking codes from customers – received also media coverage. The case was not limited to the customers of Estonian banks, but targeted also those of hundreds of other banks all over the world. In such situations, CERT Estonia must ensure the co-operation of different parties.

Most of the above-mentioned incidents were solved within a reasonable time. For the time being, it is difficult to say, how many rascals have received their punishment thanks to CERT Estonia's efforts and this is not really the unit's ultimate goal. This is for the courts to decide. The most important thing for CERT Estonia was to keep harm on an acceptable level.

### **CERT Estonia as a contact point**

As the Internet knows no borders and evil-doers never respect them, international co-operation plays an extremely significant role. Involvement of multiple parties from numerous countries in one incident is common. Information exchange and smart action cannot be ensured without specified mediators. A generally recognised solution is to entrust the co-ordination of such activities with a national CERT.

CERT Estonia's partners include defence, security and internal security authorities as well as organisations operating in the field of ICT co-ordination, supervision, legislation and information security. Without its partners, CERT Estonia would not be able to fulfil its mission (purposeful functioning of the .ee network and realize its vision (customers of the .ee network may feel safe).

### **In conclusion**

In order to avoid major losses, a systematic monitoring of the Internet has been started for as early detection of attacks as possible. Presently, only a part of the .ee network – the one joined with the backbone network for Estonian governmental institutions – is under CERT Estonia's supervision. Thus, the overview of actual Internet traffic in the .ee network is still partial and future work will be directed at improving it. At the same time, respective regulations have to be elaborated, since the line between the prevention of and protection from attacks and the protection of privacy is still ambiguous. Furthermore, the distinction between internal security and national defense is still extremely strict. Solutions can only be found in co-operation and CERT Estonia is glad having found several parties, who acknowledge the existence of problems and the need for co-operation.

## 6. Overview of the surveys on information society, eEngagement and ICT

### 6.1. Surveys on information society in 2006

As in previous years, several surveys on information society commissioned by the Ministry of Economic Affairs and Communications were conducted also in 2006, including a survey on ICT take-up by Estonian enterprises (conducted by Faktum-Ariko), a survey on the use and user-friendliness of public sector e-services (conducted by AS Klaster) and an *eTrack* survey on the computer and Internet use of Estonian households carried out by TNS Emor. The following describes these surveys in more detail.

#### Computer and Internet usage

According to the *eTrack* survey by TNS Emor, 48% of Estonian households had a PC at home in November 2006. The number of PC owners has grown the most in Tallinn and in smaller towns. It has also increased in households with two or more members, with children and with lower income levels. 60% of people aged 15 to 74 can use a PC at home.

59% of people aged 15 to 74 use the Internet, which is 6% more year-on-year. 80% of Internet users use it mostly at home, and this share is constantly growing. 42% of Estonian households have a PC with Internet connection (i.e. 88% of the households with a PC). Given the ageing of Estonia's population and the accompanying challenges, it is especially positive that the number of Internet users among older people, in particular those aged 50 to 59, has increased. Internet usage facilitates communication with friends and family as well as with the rest of the world. Presumably, if various health care and social e-services are made easier to use, even more older people would be motivated to use the Internet. Compared to 2005, Internet usage among people aged 60 to 74 increased as well: from 9% to 14%, whereas this age group accounts for only 4% of all Internet users.

Taking into account the *eInclusion* concept, the reasons for not using the Internet are likewise important, which is why AS Klaster studied also these aspects. As it turned out, about half (51.5%) of the non-users do not use the Internet because they do not have a PC at home as it is too expensive to purchase one. A third (29.2%) of the present non-users plan to use the Internet if their financial situation improves. Another major reason for the non-use of the Internet was insufficient skills for finding one's way in the virtual world (39.4% of the non-users pointed that out). Thus, it is important to continue with providing all members of society with basic computer and Internet skills. It is noteworthy that half (51%) of the present non-users are of the opinion that they will never start using the Internet. Therefore, policy-making and the elaboration of new solutions should take account of the need for multi-platform solutions and the fact that a certain amount of people will always prefer eye-to-eye contact upon using public services.

Since the use of the Internet poses ever greater challenges to people's security awareness and their ability to protect themselves against the threats arising from the use of the Internet, the Ministry of Economic Affairs and Communications asked TNS Emor to study the security awareness of Estonians. According to the *eTrack* survey of November 2006, compared to the 2005 survey there were a lot more people who had not experienced problems with Internet security (in 2005 the respective indicator was 56%, whereas in 2006 it was 61%).

According to the November survey, 75% of people aged 15 to 74 had obtained the ID card and 61% of them had used it for identification. However, only 9% of the ID card owners had

used it for identification in an electronic environment and 1% had used it for giving digital signatures.

In June 2006, the two largest telecommunications companies (EMT and Elion) and the two major commercial banks (Hansapank and SEB Ühispank) launched an initiative called "Computer Protection 2009". This initiative aims at raising people's security awareness and bringing the number of those using the ID card in an electronic environment to 600,000 by the end of 2009 (see Chapter 3.1).

### Use of and satisfaction with public sector e-services

Citizens' satisfaction with public sector e-services can be considered satisfactory. According to a respective survey, 85% of Internet users considered time-saving as the main benefit of e-services and 74.1% brought out the speed of acquiring necessary information. As in 2005, the main reason for dissatisfaction with e-services was lack of personal contact with the official (pointed out by 57.5% of those dissatisfied with e-services). Although the second most common reason was uncertainty about the security of e-services, the share of people worried about security has considerably decreased: from 64% in 2005 to 37.9% in 2006.

The survey also aimed at identifying the fields where there is a need for more e-services. Results showed that the most e-services are needed in the social field, particularly in health care (brought out by 68.9% of Internet users), job-seeking (59.7%) and tax-paying (57.4%). Somewhat less people want to use e-services for acquiring or changing identity documents (49.9%), in the field of social insurance (42.1%) and in communication with the police (40.1%).

To better understand the developments related to the use of and satisfaction with e-services, besides quantitative studies also qualitative research methods are necessary. Quantitative research values the representativeness of data, whereas qualitative research is rather about getting an insight into the respondents' way of thinking and analysing their standpoints. In order to better understand the use of e-services through users' eyes, the Estonian Informatics Centre organized a research on the usage of the Information Portal [www.eesti.ee](http://www.eesti.ee) in five focus groups in 2006 (conducted by OÜ Saar Poll). The focus groups named various reasons why the use of e-services is not as popular as it could be. The most common reasons were related to lack of information. People often do not know where or how an e-service could be made use of. Another aspect highlighted was the incompleteness of e-services (at some point paper must be used instead of an electronic channel). Moreover, similarly to quantitative studies, there were doubts about the security of e-services (private sector solutions were considered more secure because private sector investments are bigger). Nevertheless, the majority of focus group members were interested in using electronic channels. Respondents also stressed the importance of making as many public services available also via electronic channels as possible. This way people would know that the Internet might be of help in case of any state related issue.

In conclusion, the survey confirmed the need for a single-point portal upon communicating with the state, whereas this need has been addressed, though partly, already at this point. The portal [www.eesti.ee](http://www.eesti.ee) should be the place containing all the necessary information and services related to the state. The key starting-points for the development of the system should be user-friendliness, on the one hand, and making optimal choices as to what kind of information and services users need more, on the other. Moreover, the system must not be too complicated. Furthermore, as such a portal contains lots of information and functions, it should also comprise necessary applications, instructions and a help desk to assist users.



## Use of ICT in Estonian enterprises

In the course of drafting the “Estonian Information Society Strategy 2013” the Ministry of Economic Affairs and Communications commissioned a survey from Faktum-Ariko on the take-up of ICT in Estonian enterprises.

### *Availability of a home page*

The results of the survey showed that enterprises have started to acknowledge the importance of a homepage as an information and marketing channel. If a few years ago approximately half of the companies that had an Internet connection also had a homepage, then today this share is 77%. Compared to previous years, they also better understand the need for constantly updating the homepage. In spring 2006, at least 43% of enterprises that have a homepage were updating it at least every month, whereas 8% do it on a daily basis.

### *eCommerce*

The share of *eCommerce* in Estonia is still relatively small. In 2005, 24% of Estonian enterprises received orders via the Internet (e-mail excluded) and 69% of companies placed orders through the Internet to other companies. The main reasons for not receiving orders through the Internet included the unsuitability of products/services for *eCommerce*, limited demand and consumers' preference for eye-to-eye contact.

### *eBusiness*

The survey also analyzed the use of ICT in making business processes more effective, i.e. the integration of companies' information systems with other systems within the company as well as with those of co-operation partners and clients. As it turned out, 41% of the enterprises surveyed already had or were planning to have an information system for order management. In 49% of cases such an order management system was mainly related to the company's accounting system. A fifth to a third of companies have it related to other information systems (e.g. the production system, the information systems of co-operation partners and suppliers or the logistical system). Quite many companies are interested in connecting their order management system with the information systems of their clients.

Enterprises that have implemented *eBusiness* applications have pointed out the following advantages: better quality of services and higher customer satisfaction, shorter delivery dates, increased turnover, cost reduction, emergence of more new products and services, and larger profits.

However, it must also be mentioned that companies often do not understand the impact of ICT on their business performance indicators. Only 16–18% of companies acknowledge the effect ICT has on cost reduction, larger turnover and profits and launch of new products and services, whereas 22–24% cannot value the positive influence of ICT at all. In that respect, there is plenty of room for development. This also reflects in the fact that companies brought out large investments with no guarantees of return as the main problem related to the uptake of ICT.

As regards the corporate sector's expectations about developments in the field of *eBusiness* carried out by the state, 80% of companies are, above all, looking forward to the further elaboration of enterprise-oriented e-services.

## 6.2. Surveys carried out in the field of eEngagement in 2006

eDemocracy, including the electronic engagement of citizens in public life, is considered a tool for increasing the involvement of the general public in decision-making processes. For certain social groups, the Internet facilitates and increases the attractiveness of participation. In addition, it contributes to the reduction of barriers hindering the engagement and participation of citizens. Furthermore, the application of ICT in democratic decision-making processes offers simpler, more open and efficient participation opportunities for those citizens and marginal groups, whose possibilities to voice their opinion and influence the decision-making through traditional engagement methods – for instance, through social dialogue – are limited. Thus, the growing importance of eEngagement tools besides those of traditional inclusion is self-explanatory.

In May 2006, the State Chancellery commissioned a survey on the use of ICT for the engagement of citizens in democratic decision-making processes by ministries and the Parliament<sup>22</sup>. Methods used for the realisation of the survey included a comparative analysis of websites and an electronic questionnaire to the members of the Parliament. Results and conclusions of an analogous survey carried out in 2004 by the Centre of Policy Studies PRAXIS were used for comparison.

Below given is a short overview of the results of the survey.

Website analysis was chosen as a survey method since people willing to have their say in public life must be able to get basic information and have a simple possibility to express their opinion via public channels. In addition, the number of Internet users in Estonia is on constant increase (see Chapter 6.1.), facilitating thus eInclusion on a wider scale.

Engagement of citizens in decision-making is a multi-faceted process, which increases – according to some authors – the accountability of decision-makers to their electors, especially in case of eDemocracy. Surveys dealing with eDemocracy tend to be based on a model, where engagement is based on three pillars – **information dissemination, consultation and participation**.

**Information dissemination** is a one-way communication, where the state informs interest groups and citizens about its activities without expecting any feedback from them. In case of **consultation**, feedback is sought – the state asks and the citizens or interest groups respond. **Participation** denotes a partnership between the state and its citizens, an active mutual communication between them in the elaboration of policies and legislation. The Government and the Parliament maintain the power of decision, but citizens and interest groups can actively initiate decision-making processes and have their say in all stages of policy-formulation.

In case of **eEngagement, information dissemination** mainly takes the form of publishing information on draft acts, policy documents, work plans etc. on a website. In addition, news, calls for consultations, reminders, reviews of drafts etc. are disseminated in the form of e-mails or via electronic mailing lists.

Information dissemination is a precondition for efficient consultation and participation. If those interested in participating in decision-making lack sufficient background information, overview of possible decisions, or knowledge about what will be the basis of the decision-making, they will not be able to give a proficient contribution.

<sup>22</sup> Eveli Illing, “Application of ICT for the engagement of citizens in democratic decision-making processes by ministries and the Parliament,” Tallinn 2006 (<http://www.riigikogu.ee/?id=36583> – in Estonian)

**eConsultation** tools may include simple possibilities to give feedback or express one's opinion on websites, various electronic opinion polls, online questionnaires or gallups, written consultations with the publication of relevant materials on a website or a specific forum, FAQ (Frequently Asked Questions) columns, guestbooks, citizen or entrepreneur panels, and blogs.

**eParticipation** is facilitated by the use of various forums, online chat rooms (one-to-one, one-to-many or everybody-to-everybody conversations), blogs, eReferenda, ePetitions etc.

### Development of eEngagement in ministries and the Parliament

Like several other countries (Finland, the UK etc.) and the European Union, Estonia has developed, on the basis of the above-mentioned survey by PRAXIS, its "**Good Engagement Practice**". The document, elaborated at the initiative of the State Chancellery in co-operation with ministries, representatives of NGOs and Estonian inclusion experts in 2005, focuses on eight recommended principles that public sector agencies and NGOs proceed from in involving citizens and interest groups in decision-making.

By today, examples of good engagement practice have been showcased at several conferences, forums and regional seminars. Thus, some basic awareness-raising activities in the field have been carried out. In order to increase engagement and implement the Good Engagement Practice, a **single point of entry** or an **engagement portal** is planned to be developed.

The results of the survey carried out in autumn 2004 led to a conclusion that the websites of ministries and the Parliament contain mostly information and draft acts, while policy documents become public only in later stages (when a draft is ready to be sent for approval), and there is still a lot to be done to develop electronic consultation and participation. The outcomes of the 2006 survey, however, prove that the methods of information dissemination have developed considerably and tools for electronic consultation and participation have been added to websites.

#### **eJustice (eÕigus)**

By today, the information system for electronic approval of draft acts – eJustice – has become the most popular and most widely used tool. All draft acts and related information that have been sent for approval are publicly available at <http://eoigus.just.ee>. Thus, eJustice can be considered a common instrument for the dissemination of information.

#### **TOM – Today I Decide**

The direct democracy portal TOM at <https://www.eesti.ee/tom/ideas.py/avaleht> is another tool for supporting active participation that has been in use for already five years. In June 2006, the portal had 6646 registered users; 1807 ideas had been proposed through it, of which 622 had been sent to ministries for responding.

The original objective of TOM was to serve as a comprehensive participation portal for

- a) proposing the development of new or amending the existing policies or legislation, and
- b) for earnest discussion on topics concerning public life.

In practice, TOM has come to be used by individuals (loyal visitors), not interest groups; the portal lacks legal basis that would make it a serious tool for government agencies; the portal's real impact on the initiation of legislation and policy formulation cannot be assessed; and it fails to function as a public forum. In short, TOM reflects the views of its (loyal) visitors, not

the public opinion. The portal does not currently function in accordance with its title “Today I **Decide**”, but as “Today I **Think**” or “Today I **Propose**”.<sup>23</sup>

Up to 2004, there existed a legislative forum **Themis**, administered by the Estonian Law Centre and aimed at the facilitation of consultation and participation. The experience received from the administration of the portal is planned to be taken into account in the development of the new engagement portal.

The survey commissioned by the State Chancellery analysed information, consultation and participation possibilities on the websites of the Government, ministries and the Parliament.

The Parliament, the Ministry of Economic Affairs and Communications (MoEAC), the Ministry of Social Affairs (MoSA), and the Ministry of Finance were given the highest rankings.

The survey results reveal that tools aimed at disseminating information – prior information and news, links to legislation and eJustice on the front page, legislation archive, FAQ, and search engine – are used the most.

Three ministries – the Ministries of Economic Affairs and Communications, Environment, and Social Affairs – have special areas for engagement related issues on their websites. The first two have also elaborated principles of engaging interest groups in their ministry.

A special sub-page “Have Your Say!” (“Räägi kaasa!”) on the website of the Ministry of Economic Affairs and Communications is a significant step in the development of eEngagement in Estonia. The analysis of the portal shows that the page conforms to OECD recommendations on the development of eInclusion websites.

Another positive feature about “Have Your Say!” is that the page is linked to traditional forms of engagement (information about coming events and overviews about partner days) as well as to participation in the EU decision-making processes. The page also contains a tool for active participation – a forum – which has not yet been taken into active use.

The sub-page “For Citizens” on the website of the Ministry of Environment covers topics that are important for citizens from the point of view of engagement. However, the page mainly provides information without promoting consultation or participation.

Unlike the two above-mentioned ministries, the Ministry of Social Affairs does not have a single engagement portal. Nevertheless, the ministry has developed the so-called engagement environments for the discussion of major policy documents (i.e. information portals for health care policy, child protection policy, social inclusion etc.). The portals contain all the necessary information – background information, documents, links, contacts, and feedback.

Compared to the results of the PRAXIS 2004 survey, the websites of ministries and the Parliament have improved considerably – both in terms of availability and interactivity of information. The front pages of the Parliament as well as of several ministries (i.e. Ministries of Education and Research, Economic Affairs and Communications, and Agriculture) are very comprehensive, allowing the information seeker to quickly locate links and contact data he or she is searching for.

**Electronic consultation and participation** tools only exist on the websites of the Parliament, the MoEAC and the MoSA. Despite the good availability of information, websites of other ministries still provide only limited opportunities for voicing one’s opinion on draft laws or policy documents online. FAQ columns and gallups are rare, yet the most common among consultation tools. A few feedback forms, questionnaires, Questions and Answers pages, guestbooks, and a blog were also found on the websites of ministries and the Parliament.

<sup>23</sup> Marko Palo, “The first quinquennium of the direct democracy portal TOM”, a presentation at a conference “Democracy in the Society”. June 9, 2006: [http://www.ega.ee/public/Marko\\_Palo\\_TOM\\_5.ppt](http://www.ega.ee/public/Marko_Palo_TOM_5.ppt) (in Estonian)

Proper possibilities for commenting drafts are currently provided only on the “Have Your Say!” sub-page on the website of the Ministry of Economic Affairs and Communications. However, even the MoEAC mainly makes use of the so-called classical written consultation method, where comments are to be sent to a certain official. Since April 2005, over 60 consultations have been held via “Have Your Say!” with the ministry’s Communications Department being the most active user of the possibility.

On some websites of ministries it can be seen that feedback about a specific draft has been sought. Since in most cases, feedback submitted by citizens or interest groups is not published on the website, it is unknown, where the information went and what has happened to it (including whether the person giving the feedback has received any response from the official).

There is a **FAQ** column on the website of the Parliament as well as on those of nine ministries. However, no particular interactivity can be brought out in this context as FAQ columns currently tend to be a rather passive form of information dissemination. It does not allow to immediately pose additional questions – respective forms or contact data are missing.

Regular **gallups** are organized by the Ministry of Agriculture and the Ministry of Social Affairs. Occasional gallups can be found on the websites of the Ministry of Economic Affairs and Communications, the EU Structural Funds portal of the Ministry of Finance, and the corruption portal of the Ministry of Justice.

**Forum** can be used on the websites of the Ministry of Economic Affairs and Communications and the Parliament. In addition to its forum, the front page of the Parliament promotes its “Write to Riigikogu!” column or the guestbook, where citizens can ask questions and make comments (including raising problems, informing about gaps in legislation, making proposals and complaining about personal problems) that are usually answered by the members of the Parliament.

The only blog found in the course of the analysis is located at: <http://svos.blogspot.com/>. The blog, maintained by the Gender Equality Department of the Ministry of Social Affairs, serves as an open information channel with the possibility to comment on entries and have a discussion. The latter, however, has been used only seldom.

**Online interviews** constitute an engagement tool that has gone unused on the websites of ministries.

In terms of **audio** and **video**, best possibilities are offered on the website of the Parliament, which allows to see its live sessions. Government’s press conferences, too, can be followed in real time via the Briefing Room. As to ministries, the Ministry of Agriculture and the Ministry of Internal Affairs occasionally publish recordings of their press conferences.

While the 2004 PRAXIS survey concluded that the results of engagement are not made public on websites, the outcomes of the May 2006 survey reveal that five ministries and the Parliament still offer this information in one way or another. In order to maintain a constant and structured dialogue with citizens and interest groups, feedback should be given to them. This principle is emphasized also in the Estonian Good Engagement Practice.

### Development of eEngagement in local governments

In May 2006, the National Audit Office commissioned a survey from the eGovernance Academy (eGA) on the development of the information society in local governments (see Chapter 6.5). One of the aims of the survey was to analyse the compliance with the requirements imposed on local governments for the maintenance of websites and dissemination of information via the Internet. Based on that, the survey sought to evaluate the

capability of local authorities to apply modern ICT solutions for improved service delivery and engagement of citizens in decision-making processes.

Estonia has a one-tier local government system with 33 towns and 194 rural municipalities. The number of inhabitants in local units varies greatly – from 399,000 in Tallinn to 101 in the island of Ruhnu. As a result, the availability of human and financial resources for ICT projects also varies considerably.

Up to now, most of Estonian local governments have not clearly defined their web-based activities as specially targeted to involve the public in policy-making. However, there are features on their websites, which can be classified as *eEngagement* instruments. By those citizens can ask for additional information and express their views and attitudes on local issues. In the following table are presented the statistical data on different *eEngagement* tools on local government websites:

<b>E-tools</b>	<b>Rural municipalities (194)</b>	<b>Towns (33)</b>
Request for information	92 (47%)	21 (63%)
Guestbook/Questions-Answers	41 (21%)	17 (51%)
Gallup poll	17 (9%)	10 (30%)
Forum	48 (25%)	10 (30%)

There is an obvious need for a government-level strategy to encourage the use of ICT tools for participatory democracy on local level.

### **eVoting**

In 2002, the Parliament of Estonia developed legal basis for the implementation of Internet-based voting in all elections and referenda. The first *eVoting* took place in the municipal elections in 2005. National ID cards were used for voter authentication. A database of citizens with the right to vote was developed prior to the elections. The number of valid *eVotes* was 9287, accounting for 1.85% of all votes cast.

The principles of the Estonian *eVoting* system were discussed in "IT in Public Administration of Estonia in 2005" ([http://www.riso.ee/en/pub/yearbook\\_2005.pdf](http://www.riso.ee/en/pub/yearbook_2005.pdf)).

*eVoting* was used alongside traditional voting system also in the Parliamentary elections in March 2007. The *eVoting* environment was opened on advance polling days from 26 to 28 February. *eVoting* was used by 30,275 citizens or 5.5% of all voters. 11,891 of them used the ID card in its electronic functions for the first time. Thorough *eVoting* instructions were published on the website of the National Electoral Committee as well as on state portals in Estonian, Russian and English (<http://www.vvk.ee/engindex.html>).

### **In conclusion**

The volume of information on public sector websites is increasing. Although the quality, quantity and scope of information on websites varies, an increasingly more conscious approach towards engagement can be noted in some state authorities, which have started to offer relevant information and developed special pages for engagement related matters. The best example here is the "Have Your Say!" engagement portal launched in 2005 by the Ministry of Economic Affairs and Communications.

Compared to the results of the 2004 survey, the methods of information dissemination have evolved considerably. In addition, tools for electronic consultation and participation have been added to websites. When comparing *eEngagement* instruments in Estonia with the

practice of other countries and recommendations given in different eInclusion surveys, it appears that government agencies in Estonia make no use of calls for consultation or the so-called “send this to your friend” e-letters, citizen or entrepreneur panels, online chat rooms or interviews, and interactive games. Web-based forms for giving feedback and making comments, as well as web-based questionnaires, forums and blogs are seldom used. Furthermore, a surprisingly small number of ministries offer the possibility to subscribe for information via e-mail.

### 6.3. Estonian ICT sector in 2005

The ICT sector is considered one of the main forces driving the Estonian economy and it has also gained wide international recognition. Therefore, it is important to monitor general developments in that sector as well its internal processes and dynamics.

#### What does the ICT sector stand for?

The ICT sector is often used as the common name for IT and telecommunications companies. But the reality is much more complex. Statistically speaking, there is no ICT sector or a separate telecommunications sector or IT sector as such. According to the register of the Classification of Economic Activities in Estonia (EMTAK 2003), which is based on NACE Rev.1.1, ICT companies can be found under at least eight different fields of activity, whereas subclasses comprise enterprises that belong to the ICT sector but also those that do not. The following outlines fields of activities and their subclasses under which ICT companies can be found.

#### **Manufacturing**

##### Manufacture of pulp, paper and paper products; publishing and printing

- Pre-press activities (incl. preparation of digital data, computer design and computer processing)
- Reproduction of computer media

##### Manufacture of chemicals, chemical products and man-made fibres

- Manufacture of unrecorded computer discs and tapes

##### Manufacture of electrical and optical equipment

- Manufacture of office machinery and computers
- Manufacture of electrical machinery and apparatus not elsewhere classified
- Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy

#### **Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods**

- Wholesale trade and commission trade, except of motor vehicles and motorcycles
- Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods

#### **Transport, storage and communication**

- Post and telecommunications

**Real estate, renting and business activities**

- Computer and related activities
- Research and experimental development on natural sciences and engineering (incl. information processing)

**Construction**

- General construction work for communication, electricity distribution and cable lines
- Installation of telecommunication wirings and antennas

**Public administration and defence; compulsory social security**

- Public administration of transport and communications

**Education**

- Computer studies

Such a classification of fields of activities goes way back – at the time it was established there was no ICT sector in the modern sense and a new classification has not been developed yet.

The classification is not the only problem. The number of companies that have also other activities besides IT or telecommunications is constantly growing; they are often engaged also in the sale of household electronics, domestic appliances or office equipment. The line between ICT and various related activities is getting more and more obscure too – MP3 players, digital cameras and network printers are just a few examples of devices classified under IT rather than under electronics. Thus, in addition to “classical” IT and telecom companies, there are various enterprises with only part of their activities pertaining to the ICT sector.

**Internal classification of the ICT sector**

In order to analyze internal processes in the ICT sector, classification into telecommunications and information technology is not sufficient as there are at least four different types of companies:

- Telecommunication companies form quite a distinct group, although they have started to invade also the traditional IT market. Several companies of that group are already now among major hardware sellers.
- Distributors are a special category in the sense that, as a rule, their turnover is not included in the total turnover of the ICT sector – most of the goods they sell reach the final consumer through resellers and thus it is a double turnover. However, the profit earned by distributors is included as this is a value added. There are also companies (mainly among system integrators) who for some suppliers are distributors and for other – resellers. For that reason, part of their turnover should be excluded from the total calculation as it is double turnover.
- Branches and representative offices of foreign companies usually do not disclose their financial performance in the host country. But even if they did, such information would not necessarily indicate the volume of business activities but rather the cost-base in that country or the results of a narrower field of activity.
- The rest of IT companies can, with some concessions, be considered one group with similar business specifics, although here too system developers, system integrators and service companies could be brought out separately for assessing certain processes.



### Year 2005 mostly successful

Owing to the procedure established for submitting and processing annual reports and the slowness of processes, preliminary data become available only in the third quarter of the subsequent year and complete data only at the end of the year. Therefore, the data submitted should be taken with some reservations, particularly as far as “traditional” IT companies are concerned. The present analysis is based on the data of 135 enterprises with the total turnover of 12.5 billion kroons in 2005 (798.9 million euros) which, excluding the share of distributors, accounts for approximately two thirds of the Estonian ICT market.

On the whole, 2005 was a year of moderate growth: turnover increased by 5% and profit by 11%, year-on-year. At the same time, the number of employees rose by 7% and labour costs by 13%, whereas the growing labour shortages will boost wage costs even further in the coming years. If such a trend continues, the services of Estonian IT companies might become too expensive for the domestic market and local clients might start outsourcing services from cheaper markets. The telecom sector and companies providing onsite maintenance and support form an exception, as it is difficult for companies not operating in the Estonian market to offer these services here. But since the Estonian labour is still relatively cheap for the Scandinavian market, there is a real risk that the Estonian ICT sector might diverge from the rest of Estonia’s economy – Estonian IT companies are more and more outsourcing for foreign companies and local clients are turning to cheaper markets with greater human resources.

In terms of volume, the ICT market grew relatively little but the market structure saw significant changes. The first refreshing sign is the success of the “second wave” companies, particularly software developers, who in 2005 obtained a large market share on account of older market participants. It is also positive that there are more and more companies that do not rest on their laurels after first success but set new and higher goals. While in 2004 smaller companies with a turnover of 10–20 million kroons prevailed, then in 2005 companies with a turnover of 20–25 million kroons grew the most. With an average of 16% increase in turnover, these companies have doubled their profit, whereas the number of employees has grown only 3%.

**Table 1.** Changes in economic indicators across groups of companies in 2004-2005

Level of turnover	Number of companies	Turnover	Profit	Employees
100+ MEEK (over 6.4 MEUR)	12	4%	9%	14%
50–100 MEEK (3.2–6.4 MEUR)	9	13%	-15%	25%
20–50 MEEK (1.3–3.2 MEUR)	32	16%	100%	3%
10–20 MEEK (0.6–1.3 MEUR)	35	11%	31%	2%

The situation of medium-size enterprises with a turnover of 50–100 million kroons is still the most critical. Most of them are growing companies, undergoing restructuring and processes inherent to larger firms. As a rule, this calls for hiring many employees some of whom are not related to company's business activities but to the development and operation of internal processes. The number of employees in the companies of that group increased 25%, year-on-year, whereas their turnover grew by only 13% and profit fell by nearly 15%.

The table contains also the data of bigger enterprises with over a 100 million kroons turnover but the dynamics of their economic indicators cannot be directly compared with those of other groups. Since major companies primarily include telecommunications network operators and distributors whose business specifics are substantially different from those of other ICT companies, the structure of their turnover and labour force also differs from those of "traditional" IT companies. One of the main problems of the Estonian ICT sector is the lack of internationally competitive IT companies that would operate successfully also outside the Baltic region, for instance in Scandinavian or Western European markets.

### Telecom sector showing signs of changes

Data on telecom companies are usually made available for the public relatively quickly<sup>24</sup>, which is why these data can be considered more comprehensive than those of the total ICT sector.

In 2005, the turnover of the firms operating on the electronic communications market reached 9.54 billion kroons (609.7 million euros), marking an 8.5% annual growth. The main trends in the market are the continuous decrease in the share of traditional phone services and the increase in the share of mobile services. Although in 2005 mobile phone penetration exceeded the 100% level in Estonia, this does not imply that development is completed – the mobile services market continues rapid growth. The decrease in the phone services market has been offset by new services for private and business customers. The triumph of digital television is only one of such developments.

Besides bringing new services to market, telecom companies have been also expanding their activities in the traditional IT market. Their sales volumes of IT equipment outpace those of most IT companies. In addition to the direct sale of hardware, IT equipment reflects also in the monthly payments for various services.

### Distributors focused on profitability

In Estonia, there are only a few companies engaged in large-scale distribution. Their turnover is excluded from general accounts and so is part of the turnover from the sales channels of

<sup>24</sup> See also an overview in English at [http://sa.riik.ee/atp/failid/SA\\_aastaraamat\\_2005\\_ENG.pdf](http://sa.riik.ee/atp/failid/SA_aastaraamat_2005_ENG.pdf)

system integrators and smaller producers. Though in terms of turnover, distributors are virtually the only ones to provide some competition for the telecom sector, their profitability usually remains at the level of medium-sized IT companies. All in all, in 2005 the turnover of distributors increased by 5% and profit by 9%. Further rise in profitability is possible through the provision of such additional value added services to resellers that would not compete with the business activities of those resellers but that would give them the opportunity to expand their sales volumes or increase the effectiveness of sales.

The price policy and sales volumes of smaller and “part-time” distributors differ considerably from those of larger distributors which is why their share in the turnover of that group of companies is marginal, yet it is still significant in terms of profit.

### **Traditional redistribution of the IT market**

There are seldom new entrants to the market among telecom companies and distributors, whereas in case of traditional IT companies there is a clear trend of firms founded at the beginning of 2000s providing growing competition for the “first wave” IT firms established at the beginning of 1990s. Owing to the recession period that occurred a while ago, such companies grow considerably faster than the whole ICT sector, although part of that growth accounts for the recovery of the market. Based on the data of 135 enterprises analyzed, in 2005 the turnover of IT companies increased by 15% and profit by 48% year-on-year. However, these figures should be interpreted with caution, as the sample of firms does not include some major market participants. All in all, the results for 2005 can be considered a success for IT companies. Further development, however, largely depends on finding ways to cope under conditions of limited human resources. In the context of growing market, internal processes and product/service development are often left aside. But the coming years will witness the rise of firms that are not only able to find additional human resources but also engage these resources effectively.

## ***6.4. Overview of the usage of ICT tools in public administration agencies in 2005***

In order to receive feedback on the results of the measures of state information policy, a survey is conducted to find out about the existence and usage of ICT tools at state agencies, especially government agencies. The survey has been taken place annually since 1994, and for the past two years data have been collected using a web-based information system.

Objects of study include the following government agencies: ministries, agencies, inspectorates, county governments, their divisions more important from the point of view of IT (different centres, bureaus, institutes, etc), as well as agencies of the constitutional institutions (President of the Republic, the Riigikogu, the Chancellor of Justice, the State Audit Office, etc).

The following aspects have been studied: need for computer workstations; existence of computer workstations, incl. mobile workstations; equipment of computer workstations with Internet connection and ID-card readers; existence of IT specialists and ICT structural units at agencies; hardware, incl. personal computers (PCs) and server computers, their number, age, operation systems they use, the share of leasing upon acquisition of hardware, existence of hardware by more prominent product types and products, and the number of users per product; data communication types used; possible transmission speed (broadband); data communication service providers, etc.

The following brief overview presents the main results of the 2005 survey. The definitions used are the following:

**Public administration agencies (PAAs)** is a group of state agencies consisting of government agencies and agencies of the constitutional institutions (the Riigikogu, the President of the Republic, the Chancellor of Justice, the State Audit Office, etc).

**Personal computer** (from the point of view of hardware) is a small computer for one person to use at work.

**Server computer** (from the point of view of hardware) is a special-function computer for the joint servicing of the network workstations (i.e., personal computers in the network).

**Computer workstation** (from the point of view of the organisation) is the possibility of the employees of an agency to use in their workstations an autonomous or LAN-connected personal computer or LAN-connected terminal with the necessary software, peripherals, and data communication possibilities.

The **need for computer workstations** at an agency is an estimated figure showing how many members of the regular staff need (would need) an individual computer workstation to perform their work duties. The need for computer workstations is established as an expert estimate proceeding from the agency's functions, the nature of the work, the composition of employees, the ICT possibilities, etc.

The **rate of computer-equipped workstations** is a ratio showing the percentage of availability of computer workstations from the total need therefor.

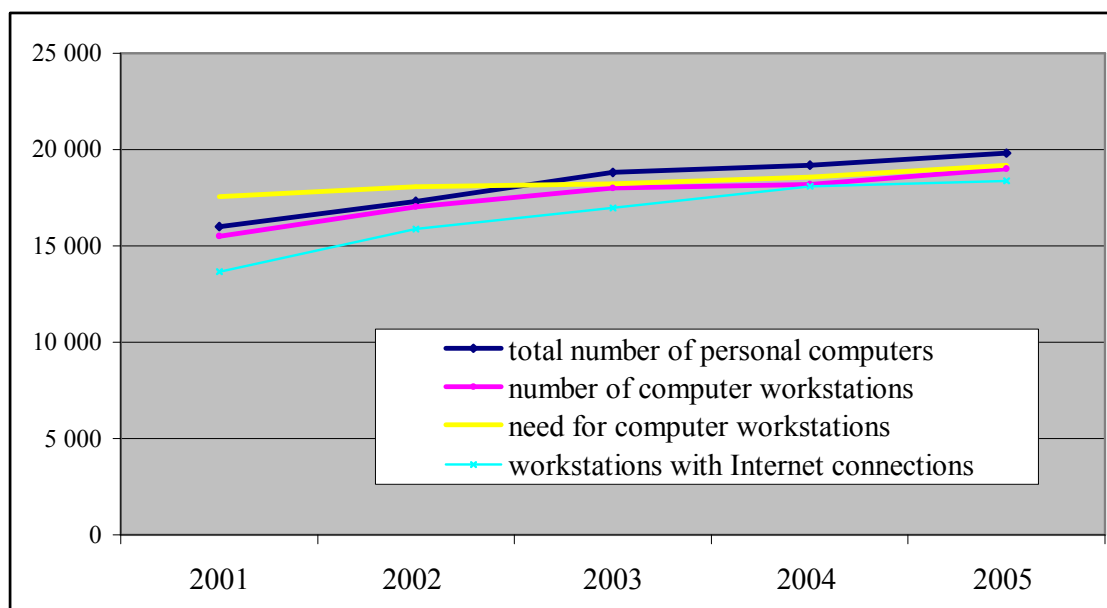
### Computer workstations and need there for at state agencies

As regards the total number of necessary computer workplaces, PAAs estimated that 81.6% of their full-time employees need a computer workstation. In the administered agencies, the respective estimate amounted to 52.5% of the regular staff.

It should be pointed out that the need for computer workstations has significantly increased over the years. Eight years ago, in 1997, the PAAs' need for computer workstations formed only 36.9 % of the regular staff, which indicates that computer workstations have become an important part of the functioning of the state apparatus.

Although the rate of computer-equipped workstations at PAAs – 98.9% at end-2005 – shows there is an additional need of 1.1% (see Figure 6.4.1), it is an expression of the demand for workstations with more appropriate qualitative properties rather than a sign of an actual lack of computer workstations. When comparing the entity of computer workstations (approximately 19,000 in 2005) with the total number of personal computers (approximately 19,800) at the same agencies, it can be concluded from the chart that the actual number of personal computers at PAAs exceeded the estimated indicator of the total need already in 2003 and that since then, all PAAs have been 100% equipped with computers.

As regards the administered agencies, equipment thereof with computer workstations (over 3,600) amounted to 94.5% at end-2005. The actual need of administered agencies for new computer workstations is currently 5%.



**Figure 6.4.1. Development of the total number of personal computers and the number, need and Internet connection of computer workstations at PAs 2001 – 2005.**

In PAs, 96.6% and in the administered agencies, 93.7% of the existing computer workstations had Internet connection at end-2005. Exploration on data communication possibilities shows there exist no technical hindrances to reaching a 100% level of Internet connection. However, owing to security or other reasons, it is unnecessary to connect all the computer workstations to the Internet.

Mobile workstations created on the basis of portable computers accounted for 13.7% of the total number of computer workstations in PAs and 9.7% in the administered agencies at the end of 2005.

Equipment of workstations with ID-card readers was a new indicator studied. 28.1 % of computer workstations at PAs and 9.6 % of computer workstations at the administered agencies had ID-card readers. Apparently, more extensive usage of ID-cards in the state information systems is being seriously inhibited by the small number of ID-card readers, which means additional measures need to be taken in this respect.

### IT specialists at public administration agencies

The number of IT specialists employed by PAs has grown rather modestly over the years, reaching around 700 people by the end-2005. However, one of the trends characteristic of PAs has been an increase in the number of full-time employed IT specialists. They accounted for 89.5% of the number of employed IT specialists at the end of 2005 and 2.8 % of the total number of regular staff.

In the administered agencies that submitted reports there were 200 IT specialists employed at end-2005, accounting for 1.9 % of the number of regular staff working for these agencies. 68.5% of them worked full-time.

The survey also inquired about the number of specialists working as project managers. In PAs, the number of such specialists amounted to 56 (8.1% of the IT specialists) and in the administered agencies to 19 (9.5 % of the IT specialists). These figures are in a way

characteristic of the ability of PAAs to perform and manage development-related activities themselves.

### Server computers

The number of server computers at PAAs increased by around a hundred in 2005, totalling to 1,540. Out of the 69 administered agencies that submitted reports, 46 (66.7%) had servers at the end of 2005. This means around 400 server computers were at their disposal. The share of leased server computers accounted for 3% of the total number of servers in PAAs and 1.5% in the administered agencies.

11 PAAs and the same number of administered agencies were using the server hosting service by the end of 2005. There are also public administration agencies using the same server computers in a common LAN.

When looking at the age of the server computers used by PAAs on the basis of the year when they were put into operation, it can be seen that as at end-2005, there were 27% of server computers that were 5 or more years old, and new server computers (obtained in 2005) constituted 21% of the total.

By operating systems, MS Windows based systems (58%) were the most used in server computers at the end of 2005, followed by Linux, whose share has increased to 33% (from 28.6% in 2004) on account of abandoning UNIX and other operation systems.

As regards the server computers of the administered agencies, the share of Linux was even bigger – 41.2% (MS Windows 54.1%). The survey shows that the recommendations made by the state to start using more open-source software and freeware have not been vary extensively implemented.

### Personal computers

By the end of 2005, public administration agencies were in possession of over 19,800 PCs. The total number of PCs increased by approximately 600 year-on-year. 96.0 % of the PCs were used as computer workstations and 93.4 % were connected to LANs as network workstations. The share of portable computers in the total number of PCs was 13.7 % (2,715 computers) at the end of 2005, of which 97.5% were used as mobile workstations. The share of leased computers went up from 8.9% to 13.3% during the year, totalling to 2,640 computers by the end of 2005.

From the point of view of age, computers that were 5 or more years old formed 28 % of the total number of PCs, and the share of new, less than a year old computers accounted for only 19%. Taking into account the 5-year cycle of renewing the computer park, the share of both computers that are 5 or more years old and new computers should have been close to 20%.

When speaking about operating systems, Windows XP and Windows 2000 were the most widely used ones. Although open-source software and freeware have been extensively promoted at state agencies, the share of Linux as an operating system has not exceeded 1.9% (only 0.3 in 2004). As regards renewal of operating systems, the decision has been made in favour of MS Window CE (share 6.5%).

The 69 administered agencies that submitted reports had more than 3,660 workstation computers at the end of 2005, 11.2% of which were portable computers and 4.4%, i.e., approximately 160 computers, were leased.

Compared with PAAs, the administered agencies received a higher percentage of new computers (28% of the total number), the prevailing operation system is MS Windows XP (49.9%).

## Usage of software

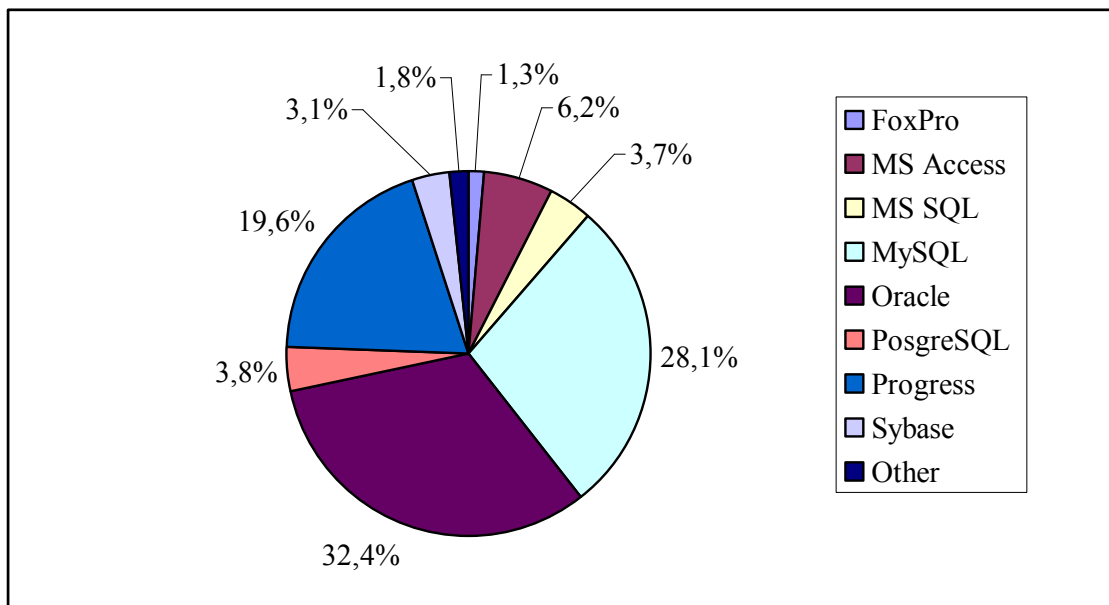
The 2005 transition to web-based data collection narrowed the range of software types under review. The products of nine software groups received the most attention, whereas the used products were studied proceeding from the brand and irrespective of the different versions used. Integrated office software, in case of which it was necessary to submit data by product versions, constituted an exception.

The development of using *general-purpose integrated office software* is still strongly inclined towards using and updating the different versions of Microsoft Office, which has practically ousted the products of all other software developers. At the same time, the share of MS Office users has slightly declined on 2004 (by 4.7 %), mainly due to the successful application of the freeware *OpenOffice.org* in several PAAs. However, all PAAs still use *MS Office*; even those who have started using freeware keep it as a back-up option. Other products, which also used to be widespread, now account for only 1%.

As regards the versions of *MS Office*, the share of *MS Office 2000* was 52% and that of *MS Office XP* 29%. Older versions of *MS Office* are no longer very widely used by PAAs.

Compared to PAAs, the share of using freeware (*OpenOffice.org* and *StarOffice*) is bigger in the administered agencies, amounting to 19.5%. As to the versions of the software, both *MS Office 97* (14.3%) and *MS Office 2003* (21.7%) are more used compared with PAAs.

The range of **database software** used at PAAs is still very varied with several solutions being used by only a few agencies. Figure 6.4.2 provides an overview of the most widely used software solutions. At this point, it should be mentioned that the shares of software users have undergone remarkable changes on 2004. The most widely used database management systems are *Oracle* products (share 32.4%) and the freeware system *MySQL* (share 28.1%). Compared with 2004, the number of users of *Progress* has declined from 30.3% to 19.6%. The share of the people using the freeware system *PosgreSQL* has fallen as well (6.2 % in 2004). However, the freeware users of this software group accounted for almost a third of the entire group of software users.



**Figure 6.4.2.** Usage of database software at public administration agencies in 2005

Out of the database software users of the administered agencies, 26% of the software product group users preferred *PostgreSQL* and 25.5% *MSSQL*.

When speaking about **integrated groupwork software**, *Lotus Notes* was still the most popular in PAAs in 2005, accounting for 42.2%. In the administered agencies, both *Novell GroupWise* (30%) and *Lotus Notes* (28.7%) were widely used.

For the first time since its launch, the survey also inquired about the usage of **communication software** (excluding e-mail). It appeared the user group of the latter comprises around a quarter of the users of computer workstations with Internet connection in both PAAs and administered agencies. The users in PAAs preferred the *MSN Messenger* (81%) and *Skype* (17%). In the administered agencies, the share of *Skype* users is 20.6% and *Yahoo* is preferred by 9%.

**Geographic information system (GIS) software** usage in PAAs showed that the share of the users of the *MapInfo* package rose to 84% in 2005 (compared to 55.9% in 2004), and as for **records management software**, the Estonian *Postipoiss* was the most popular with 61.1% (62.5 in 2004) of the software group users preferring it. The range of the tools used by both of the above-mentioned software groups is varied.

As to **specialised software groups**, **accounting software** should be relatively standardised at PAAs and use only a small group of software products supporting state accounting. Unfortunately, the actual situation is absolutely opposite, with over 20 different trade designations simultaneously in use. *VERP* (share 26.6%) was the most widely used software in PAAs, and *PMEN* (share 32.2%) in the administered agencies. In the field of **personnel management software**, the local product *Persona* is prevailing in both PAAs (share 79.9%) and administered agencies (share 90.6%).

The range of **antivirus software** used consists of approximately ten products with *F-Secure* (51%) being the most extensively used by both PAAs and administered agencies. In recent years, *TrendMicro* (18.9 %) has been gaining popularity in PAAs, and *McAfee* (18.3%) in the administered agencies.

### Development of data communication

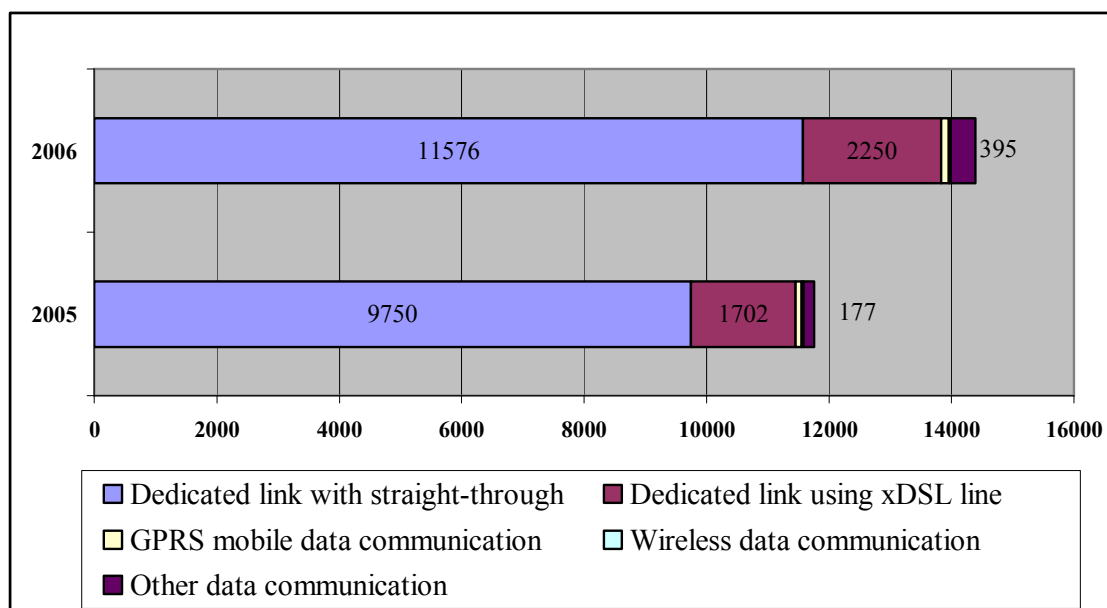
The data group “Data communication” was added to the questionnaire on using ICT tools in the course of the survey conducted in 2005, but not all PAAs submitted their data at the time. Thus, the following development comparison (see Figure 6.4.3.) only reflects developments in these agencies that submitted their data in both years (55 agencies). As it can be seen from the chart, in the period spring 2005 – spring 2006, the total number of data communication users increased in these agencies by all types of data communication by 22.4%.

By types of data communication connection, 85% of PAAs used dedicated link with straight-through cable and 11% used dedicated link with xDSN cable, whereas 94% of connections use the data transmission speed (broadband) of over 1Mbit/s. All other data communication types, including wireless connection, data communication via GPRS mobile communication, etc were used by only 3% of the users in PAAs.

In the administered agencies, the share of dial-up dedicated link was 59.4%, that of dedicated link with xDSL cable 29.8 %, and the share of wireless data communication 4.4%. Dial-up Internet connection accounted for 0.3% in the administered agencies. Connections with data transmission speed over 256 kbit/s amounted to only 1% in the administered agencies and 92.1% of the users were equipped with data transmission speed of over 1 Mbit/s.

82% of the data communication users in PAAs receive their data communication connection via the state backbone network *PeaTee* (ASONet), which is administered by the Estonian Informatics Centre (RIA), and 10% of the users from *AS Elion*, the private-sector incumbent operator.





**Figure 6.4.3 Comparative development of data communication usage in 2005 - 2006**

Out of the administered agencies, 34.5% used the services of RIA. AS Elion was used by 52.2%. The share of all other service providers was 13.3%.

As it can be concluded, the survey enables to see general trends in the usage of main ICT tools.

## 6.5. Information society related developments in local governments

In spring 2006, the National Audit Office undertook an audit to evaluate the following aspects: support provided by the state to local authorities for the development of the information society, performance of local governments in carrying out tasks imposed on them by legislation, their opportunities to apply IT in internal management of business and for the provision of e-services to citizens. In addition, citizen expectations and the actual service provision were analysed.

The audit sought to find answers to the following questions:

- Whether and how have the relations between the state and local authorities been regulated for the development of the information society and provision of e-services?
- What is the level of development in local authorities? Whether and how they use the benefits of the information society and offer them to their residents?
- What are citizen expectations and the actual possibilities to use the benefits of the information society in urban and rural areas?
- Who should do what and when in order to improve the situation?

Six ministries, five local governments and local government associations were evaluated in the course of the audit. In addition, a survey on local governments was commissioned from the eGovernance Academy.

The survey consisted of several independent parts, the most important ones of them being a survey on local government websites, a survey on ICT potential in local authorities, and self-evaluation surveys carried out by local authorities.

### Survey on local government websites

The objective of the survey was to analyse the performance of local governments in meeting the requirements imposed on them by legislation to maintain a website and disseminate information via the Internet. Based on this, the survey sought to assess the capability of local authorities to apply ICT for improved service delivery and enhanced engagement of citizens in decision-making processes.

An analysis was carried out about the principles and requirements on the maintenance of websites and publication of information set out in the Public Information Act (PIA), Local Government Organisation Act (LGOA) and the Digital Signatures Act (DSA). In order to determine whether or not the requirements imposed by these acts have been met, a list of features to be analysed was compiled. The list allowed to check the existence or absence of a particular feature on a local government's website.

The survey results revealed that by May 2006, most Estonian local authorities – all 33 cities and 187 rural municipalities of the total of 194 – had an operational website. New websites were under development in two rural municipalities that had come into being as an outcome of the merger of several local governments in the local government elections of 2005. However, five rural municipalities had not yet found the possibility to develop a website<sup>25</sup>.

Updating information on the website – a critical aspect from the viewpoint of ensuring that the website would serve as a communication channel between local authorities and the public – causes difficulties for approximately one-fourth of all rural municipalities. The situation is better in towns, though here too significant differences can be noted in terms of volume of topical information offered to citizens. Non-Estonian versions of websites tend to contain minimum content, being limited to a short description of the local government and its contact data in English and/or Russian. The websites of towns are considerably more likely to offer non-Estonian information than rural municipalities. Harju county is the only exception, where the number of websites in Russian almost equals that of towns.

Finding necessary information on websites is a rather creative task, since headings in the navigation bar seldom reflect their actual content. In addition, different headings are used for guiding towards similar information. At times it seems that more attention has been paid to the attractiveness of the design than to the simplicity and user-friendliness of the website index. Fortunately, every county has a website that sets a good example for others.

Meeting the requirements imposed by the Public Information Act causes problems for many local authorities. The analysis revealed that only four towns out of 33 and six rural municipalities of 194 meet the requirements of the law to the letter.

More attention needs to be attached to issues related to document registers. The current PIA is clearly insufficient for ensuring the maintenance of a comprehensive document register. The experience of using different document management systems needs a thorough analysis and, based on that, recommendations should be given for further development work. To this end, a joint working group bringing together representatives from both local authorities and the central government should be established. Such a group would contribute to an enhanced understanding of modern document management in the public sector and bring along saving of resources as a result of common development work.

<sup>25</sup> By the end of 2006, all municipalities, except Piiressaare, had a website. In fact, the latter too had an unofficial website developed by a local enthusiast (*Compiler's note*).

In the course of the survey, no website was found to contain instructions on the use of digital signature in a particular rural municipality or town. At best, the websites contained a column “e-services”, which included a link to the e-service environment of the X-Road.

At the time the survey was carried out, 46 local governments enlisted in the Citizen Portal accepted digitally signed letters and documents. As to towns, only the city governments of Tallinn and Tartu recognize digitally signed documents. The Tallinn City Government also accepts digital advertisement tax declarations. The City Government of Tartu offered 14 different administrative services in the digital form, being thus an indisputable leader among Estonian local governments. Unfortunately, neither website contained information on services provided over the Internet. It is obvious that the development of web-based services must be accompanied by awareness-raising activities to the public.

Information services are offered by all local authorities with a website, yet the quantity of information provided varies significantly. The possibility to submit requests for information over the Internet deserves special attention in this context. This service is used by 47% of rural municipalities and 63% of towns.

Though pursuant to the Public Information Act, administrative forms used for the management of business in local governments need to be published on their websites, this requirement is complied with to a varying degree or not met at all. Thus, no administrative forms were found on 43% of rural municipalities’ and 27% of towns’ websites. The publication of one or two forms on the website cannot be considered to be of particular significance either.

In order to use web-based forms, digital signing of documents as well as their web-based submission into the information system of a local government must be ensured. As mentioned above, only the city of Tartu currently makes use of such service provision with the city of Tallinn having started to follow suit recently.

Thus, the city of Tartu excluded, the provision of fully electronic services at local level has been very modest. The situation needs to be changed fast since real gains for citizens do not come from the publication of forms on a website, but from the possibility to submit documents for proceeding without the need to physically visit local authorities and make any expenses in terms of time or travelling. To accelerate the use of digital signature and web-based services in rural municipalities and towns state support is definitely needed.

To increase citizen participation in the formulation of public policies, information on problems and possible solutions currently debated in local governments must be published on their websites in a systematic and timely manner. In this respect, the development of websites in local governments is only in its infancy. Though nearly one-fourth of local authorities possess tools for giving feedback, their use is only occasional and not directly linked to ongoing decision-making processes. Increasing the interactivity of local government websites could probably be accelerated by raising the issue in local government councils as well as following the good practice of local governments in other countries.

In conclusion, the survey results indicate that the development of the information society on local level needs clearer goal-setting, resources to accelerate the development, and provision of state support.

### Survey on ICT potential in local authorities

The objective of the survey commissioned by the National Audit Office from the eGovernance Academy was to analyse the ICT potential in local authorities so as to assess their level of computerisation, technical and psychological readiness for the provision of e-services to citizens, co-operative ability, and the actual co-operation with state institutions.

For the realisation of the survey, all local authorities in Estonia were asked to complete a questionnaire.

By 1 June 2006, 115 responses had been submitted, representing 50% of local governments in Estonia.

In addition to the questionnaire, interviews were carried out with IT managers of county governments and those of the cities of Tallinn and Tartu. eGA representatives participated in discussions held in the framework of information days for central and local level government IT managers. Furthermore, additional information was asked from local government IT managers through phone interviews and e-mails on the results and judgements expressed in questionnaires.

### ***Computerisation level of local governments***

It appeared that practically all local government officials, whose work requires the use of a computer are equipped with them. Only a few small rural municipality governments admitted the need for one or two computers, the acquisition of which took place in 2006.

In larger local authorities the number of computers exceeds that of officials, since computers are installed also in meeting rooms for the use of presentation technology. Furthermore, in case of some local authorities, the statistics also reflects computers maintained in local government PIAPs for public use.

The share of laptops in workplace computers has reached 11%. The interviews revealed an intention to increase the number of laptops in the future for the following reasons:

- growth of mobility;
- increasing availability of wireless data communications;
- growing willingness among employees to work from home.

It is a pleasure to admit that all the existing computer workplaces are connected to the Internet.

The questionnaire did not directly explore the share of broadband connections in local governments. The comments and interviews revealed, however, that theoretically all local governments have broadband Internet availability though the quality of data communications sometimes leaves to be desired.

### ***Hardware and software***

Practically all workplace computers are equipped with different versions of Windows operating system, while only 1% of workplace computers run on Linux. In terms of servers, the division of operation systems is the following: Windows 49%, Linux 39% and others 12%.

Not all local authorities possess servers. It appeared from the interviews that some rural municipalities share their servers with local schools. Similarly, there is no pressing need to own servers in case hosting service can be outsourced. Here the question primarily lies in making or not making back-ups.

Unfortunately, hardware in local authorities shows aging signs and unevenness of computer park can be noted. Though software requirements for the hardware of computers have remained quite the same during the last years, take-up of solutions with higher requirements for hardware performance can be envisaged in the near future. Besides, the need for audio and video recording and respective processing, particularly in the field of web development, is about to increase also in local authorities. This too calls for ensuring the sustainability of hardware.

Some bigger local authorities have opted for hardware renting models, whereby equipment is rented for 3-4 years after which its residual value is 7-10%. The renting model includes the buy-out option or the re-sale of hardware to third parties designated by local authorities (e.g. NGOs, sport clubs, employees of a local government itself in order to boost motivation). This is one of the possibilities to constantly upgrade hardware and turn a considerable share of ICT expenses into equal annual fixed costs.

Similar terms are offered through software renting schemes for the use of office software, operating systems and several accountancy software solutions. This allows to standardise the entire software platform of a local authority reducing, in turn, compatibility problems between different software versions. Use of open source solutions is also possible. This, however, may bring along increased administration costs, absence of IT support and uncertainty in terms of development and software sustainability.

As regards **software** packages, *MS Office* with its different versions is the most popular. The share of *OpenOffice.org* accounts to approximately 11%.

The survey revealed that in many local authorities different versions of *MS Office* are used. This is probably due to differences in the age of computers and software that has been purchased with them. In addition, some local authorities use both *MS Office* and *OpenOffice*. A closer look at the phenomenon revealed, however, that these are the cases of either a transition period or testing of interoperability.

The choice of **database software** used in local governments is large with *MySQL* and *Sybase* being the most common ones. *FoxPro* and *Progress* are also rather extensively used.

As to **accountancy software** products, *PMEN* is the most popular one. However, the range of accountancy software products used is extremely diverse.

With regard to **document management software**, local products such as *Postipoiss* and *Amphora* are the most widespread and used in most local authorities. The success of these solutions can be explained by local development and support as well as low implementation costs. Unfortunately, a number of local authorities (24% of respondents) do not use any document management solutions. According to the interviews, the reasons behind that lie in the lack of need for such software in small local governments, high costs of integral software solutions and their implementation, and lack of interest.

The range of **antivirus software** products used is also wide with most popular among them being *AVG*, *F-Secure*, *Norton Antivirus*, *McAfee*, and *Kaspersky*. Unfortunately, there are still local authorities that do not use any antivirus software (or do not report it).

As regards **GIS software**, diverse products are used, the most common ones of them being *MapInfo* and *AutoCAD*. The interviews revealed that the use of GIS software is limited, since only bigger local authorities maintain map applications and process, for instance, building designs electronically. Internet-based solutions of the Land Board are also used.

### ***ICT organisation and IT specialists***

Special ICT units only exist in towns and in some larger rural municipalities. Having a special ICT unit presupposes the existence of a critical number of computer workplaces.

The share of salaried ICT personnel in local governments is low with only larger towns being able to keep several hired ICT specialists. Many rural municipalities make use of contractual relations with ICT specialists, who often work also at a school or a private enterprise. In addition, outsourcing of computer and software maintenance from local ICT companies is also used. The interviews revealed that outsourcing is also used in the following fields: web administration, organisation of data communications, and maintenance of accountancy

software. In some larger towns (Tartu and Tallinn), contractual relations have been established for renting hardware and software.

Considering the ever-lasting shortage of ICT professionals, such an approach seems reasonable. One of the conclusions of the survey suggests that local authorities would benefit from increased co-operation in hiring ICT personnel. One person providing ICT support can easily serve several closely situated local authorities allowing, thus, to ensure a competitive salary to him or her. Having a common service agreement with several local governments would also benefit local ICT companies, as this would allow them to hire qualified specialists and apply necessary resources (remote maintenance, transport).

There are practically no ICT councils in local authorities. As to towns, such a council only exists in the city of Tallinn.

Another conclusion of the survey suggests the establishment of regional ICT working groups or councils that would bring together a county government and all local governments in its territory. Such a model would contribute to the co-operation between local authorities, facilitate the development of common solutions, and lead, thus, to considerable savings in terms of money and energy.

### ***Web administration***

As the survey on local government websites proved, it is not the technical accessibility but content generation and updating it that pose problems in terms of web administration. Thus, problems are not of technological but organisational nature. Though web management includes activities of technological nature, an IT specialist alone cannot be made responsible for its form and content.

As a rule, local authorities have assigned the task of web administration to a certain person. Only few local authorities admit doing this collectively. In many local authorities responsibility for the web content has been given to the rural municipality secretary. This is rather logical, since it is namely the municipality secretary – the highest-ranking administrative official in a municipality – who is responsible for the accuracy of documents as well as for their publication.

### ***ICT development plan***

Virtually all local authorities have a development plan, but ICT development plans have been elaborated only in few, mainly larger local authorities (10% of respondents). Elaboration of ICT development plans reveals, however, that larger local authorities still do long-term planning in the field of ICT. The survey suggests that local authorities should seriously consider the elaboration of ICT, or even wider, information society development plans, since the computerisation level of the population is about to skyrocket in the coming years. Thus, local authorities need to make plans on how to increase the inclusion of the residents of their municipality in the information society.

### ***ICT funding***

In the questionnaire, local authorities were asked about their ICT expenses and budgets. Due to the lack of a common ICT classification (covering ICT acquisition and fixed costs, as well as expenses made on ICT personnel), the submitted data is rather uneven. According to the submitted data, ICT expenses in local authorities accounted for 6% - 0.2% of their budgets in 2005 and 2006. The average ICT budget of a local government remains between 100,000-150,000 kroons (6395 - 9590 euros). At the same time, there are rural municipalities where the respective figure only amounts to 10,000-20,000 kroons per year (640 - 1280 euros).

Analysts are of opinion that the ICT expenses of an average-sized local government should account for 1% of its total budget. This, however, cannot be absolutized.

### ***Internet availability in the administrative territories of local governments***

Although the legislation imposes no requirements on local governments to improve Internet availability in their administrative territory, 82% of them have still taken steps in order to improve the situation. Increased activity in this respect could be discerned before the 2005 local government elections.

The main activities for improving Internet availability have been the following:

- establishment of public internet access points (PIAPs) in libraries, community centres, day centres, information points, and schools. PIAPs have been created in virtually all rural municipalities;
- development of Internet connections in rural areas, including the instalment of additional masts in problematic areas, within the Village Road programme;
- supporting the Look@World project (finding rooms to be used as computer classes etc.);
- acquisition of Internet-sharing equipment in co-operation with local IT companies;
- establishment of public WiFi areas, development of the so-called municipal Internet.

At least one free WiFi area has been developed in administrative territories of half of local authorities (54%). Local governments have developed WiFi spots in community houses, libraries or at settlement centres, whereas companies have created them in their cafes, accommodation establishments, ports or other places convenient for their customers. WiFi hotspots are primarily targeted at visitors/guests.

The availability of the Internet does not generally pose problems for local authorities. However, the quality and the price of the service sometimes do.

Nearly all local authorities have established PIAPs, which will probably maintain their significant role for years, since there are still people without a home PC and the Internet connection.

### ***Making public business and provision of services electronic***

79% of local governments consider it necessary to increase the share of electronic public business and provision of services. However, there are still people opposing this with arguments such as “things can be done the way they have always been done”, “electronic communication will alienate people from power”, etc.

24% of local governments used digital signature in their communication with citizens. Though the results of the survey showed that there were practically no instructions on the use of digital signature on local government websites, it is still used. The survey did not, however, explore the scope of its use.

24% of local governments used digital signature in correspondence with officials. It was mainly used in letters sent to and received from other authorities. 18% of local authorities used digital signature in their communication with companies, mainly when concluding contracts.

### ***Evaluation of co-operation between county governments and local authorities in the field of ICT***

Local governments consider the co-operation with county governments rather positive – the co-operation is considered “good” by 29% and “satisfactory” by 42% of local authorities.

Opinions on co-operation, however, vary rather considerably by counties. Satisfaction or lack thereof probably reflects the strength or weakness of IT leadership in a respective county. The interviews reveal that in reality the co-operation lacks systematization.

In several counties, county government also provides technical support (servers, common software administration solutions). Though many local governments find that common projects have been realised only due the initiative and leadership on the country government's side, there are also those claiming that the county government has not participated in the leadership of IT projects at all. As county governments are the only state units in constant communication with local governments, expectations for the co-operation with them are high.

### ***Evaluation of state support for local governments in the field of ICT***

Local governments consider state support for them low, with 54% of correspondents considering it insufficient. The state support is deemed "good" only by 3% of local governments (including towns, which frequently communicate directly with state institutions, such the Department of State Information Systems and the Estonian Informatics Centre). The support was ranked as "satisfactory" by 36% of local authorities.

The evaluation given to state support by counties is unstable, yet it is difficult to bring out a clear trend (except dissatisfaction). Appreciated are the following developments:

- the X-Road and its system of enquiries;
- the Tiger Leap programme (support for the infrastructure);
- the Village Road 3 programme.

All in all, local authorities consider state-level activities in the field of information society somewhat chaotic and non-consistent.

### ***Evaluation of national ICT programmes***

National ICT programmes were ranked as "good" by 31%, "satisfactory" by 55% and "insufficient" by 9% of those having responded to the question. 5% of the respondents to the questionnaire left this question unanswered.

### **In conclusion**

Though the survey showed that the provision of ICT equipment in local authorities is good, co-operation with the state in the development of information society services has still been inadequate. If Estonia is to maintain its success as an eState, co-operation between the state and local governments must be intensified without delay.

According to the National Audit Office, the state has not paid enough attention to the involvement of local authorities in the development of the information society. The provision of state support or the co-ordination of the field has not been assigned to any ministry. The Ministry of Economic Affairs and Communications is responsible for the co-ordination of the development of state information systems and giving direction on the development of information society on a broader scale. The Ministry of Internal Affairs has been assigned the task of co-ordinating the development of local governments. There is a missing link: no one is responsible for planning and co-ordinating the development of the information society on local level. This is necessary in order to ensure balanced regional development as well as to help the tired Estonian eTiger back to its feet.



## 7. Contacts and links

### 7.1 IT contacts in public administration agencies

Agency	Contact	Phone/mobile	E-mail
Office of the President	Ivo Vellend	(+372) 631 6238	<a href="mailto:Ivo.Vellend@vpk.ee">Ivo.Vellend@vpk.ee</a>
Chancellery of the Riigikogu	Raul Volter	(+372) 631 6400	<a href="mailto:raul.volter@riigikogu.ee">raul.volter@riigikogu.ee</a>
Chancellery of the Legal Chancellor	Kertti Päeva	(+372) 693 8434	<a href="mailto:kertti.paeva@oiguskantsler.ee">kertti.paeva@oiguskantsler.ee</a>
Public Prosecutor's Office	Raul Meriloo	(+372) 613 9413	<a href="mailto:raul.meriloo@prokuratuur.ee">raul.meriloo@prokuratuur.ee</a>
Supreme Court	Jaak Sitska	(+372) 730 9047; (+372) 51 29 417	<a href="mailto:jaak.sitska@nc.ee">jaak.sitska@nc.ee</a>
State Audit Office	Markko-Raul Esop	(+372) 640 0794; (+372) 50 74 755	<a href="mailto:markko-raul.esop@riigikontroll.ee">markko-raul.esop@riigikontroll.ee</a>
State Chancellery	Ülle Laur	(+372) 693 5 844; (+372) 51 09 949	<a href="mailto:ulle.laur@rk.ee">ulle.laur@rk.ee</a>
<b>Ministries</b>			
Ministry of Education and Research	Jaanus Christoffel	(+372) 735 0172	<a href="mailto:jaanus.christoffel@hm.ee">jaanus.christoffel@hm.ee</a>
Ministry of Justice	Kaili Katmann	(+372) 620 8179	<a href="mailto:kaili.katmann@just.ee">kaili.katmann@just.ee</a>
Ministry of Defence	Mihkel Tammet	(+372) 717 0189	<a href="mailto:mihkel.tammet@kmin.ee">mihkel.tammet@kmin.ee</a>
Ministry of the Environment	Vahur Eenmaa	(+372) 626 2830; (+372) 50 11 486	<a href="mailto:vahur.eenmaa@envir.ee">vahur.eenmaa@envir.ee</a>
Ministry of Culture	Indrek Eensaar	(+372) 628 2280; (+372) 51 14 930	<a href="mailto:indrek.eensaar@kul.ee">indrek.eensaar@kul.ee</a>
Ministry of Economic Affairs and Communications	Kalev Truusalu	(+372) 625 6363	<a href="mailto:kalev.truusalu@mkm.ee">kalev.truusalu@mkm.ee</a>
Ministry of Agriculture	Jaanus Kuusler	(+372) 625 6111	<a href="mailto:jaanus.kuusler@agri.ee">jaanus.kuusler@agri.ee</a>
Ministry of Finance	Sven Rea	(+372) 611 3070	<a href="mailto:sven.rea@fin.ee">sven.rea@fin.ee</a>
Ministry of Interior	Urmo Kalamees	(+372) 612 5046; (+372) 50 22 733	<a href="mailto:urmo.kalamees@sisemin.gov.ee">urmo.kalamees@sisemin.gov.ee</a>
Ministry of Social Affairs	Allan Poola	(+372) 626 9299	<a href="mailto:allan.poola@sm.ee">allan.poola@sm.ee</a>
Ministry of Foreign Affairs	Malle Ling	(+372) 637 7330	<a href="mailto:malle.ling@mfa.ee">malle.ling@mfa.ee</a>
<b>National Boards</b>			
Security Police Board	Edgar Reindla	(+372) 612 1422	<a href="mailto:edgar@kapo.ee">edgar@kapo.ee</a>
Citizenship and Migration Board	Agu Leinfeld	(+372) 612 6980	<a href="mailto:agu.leinfeld@mig.ee">agu.leinfeld@mig.ee</a>
Competition Board	Jüri Rosenvald	(+372) 680 3963	<a href="mailto:jyri.rosenvald@konkurentsiamet.ee">jyri.rosenvald@konkurentsiamet.ee</a>

Civil Aviation Administration	Anne-Ly Käi	(+372) 610 3582	<a href="mailto:anne-ly.kai@ecaa.ee">anne-ly.kai@ecaa.ee</a>
Land Board	Viljo Roolah	(+372) 665 0650	<a href="mailto:Viljo.Roolah@maaamet.ee">Viljo.Roolah@maaamet.ee</a>
Road Administration	Andrus Kross	(+372) 611 9314; (+372) 56 641 208	<a href="mailto:andrus.kross@mmt.ee">andrus.kross@mmt.ee</a>
Tax and Customs Board	Lauri Laksberg	(+372) 630 3910	<a href="mailto:lauri.laksberg@emta.ee">lauri.laksberg@emta.ee</a>
National Heritage Board	Urve Russow	(+372) 640 3012	<a href="mailto:urve.russow@muinas.ee">urve.russow@muinas.ee</a>
Patent Office	Jaanus Kasper	(+372) 627 7915	<a href="mailto:jaanus.kasper@epa.ee">jaanus.kasper@epa.ee</a>
Border Guard Administration	Jaak Madis	(+372) 614 9089; (+372) 50 83 294	<a href="mailto:jaak.madis@pv.ee">jaak.madis@pv.ee</a>
Police Board	Virgo Riisipapp	(+372) 612 3301	<a href="mailto:virgo.riisipapp@pol.ee">virgo.riisipapp@pol.ee</a>
Agricultural Registers and Information Board	Olaf Laurisson	(+372) 737 1230	<a href="mailto:olaf.laurisson@pria.ee">olaf.laurisson@pria.ee</a>
Rescue Board	Andres Selli	(+372) 628 2016; (+372) 50 16 112	<a href="mailto:andres.selli@rescue.ee">andres.selli@rescue.ee</a>
Public Procurement Office	Toomas Laigna	(+372) 620 1845	<a href="mailto:toomas.laigna@rha.gov.ee">toomas.laigna@rha.gov.ee</a>
State Agency of Medicines	Ly Rootslane	(+372) 737 4140	<a href="mailto:ly.rootslane@sam.ee">ly.rootslane@sam.ee</a>
Communications Board	Maris Terno	(+372) 693 1101	<a href="mailto:maris.terno@sa.ee">maris.terno@sa.ee</a>
Social Insurance Board	Allan Poola	(+372) 626 9299	<a href="mailto:allan.poola@sm.ee">allan.poola@sm.ee</a>
Statistical Office	Allan Randlepp	(+372) 625 9339	<a href="mailto:allan.randlepp@stat.ee">allan.randlepp@stat.ee</a>
Consumer Protection Board	Kristiina Vaksmäa	(+372) 620 1708	<a href="mailto:kristiina.vaksmäa@consumer.ee">kristiina.vaksmäa@consumer.ee</a>
Health Care Board	Allan Poola	(+372) 626 9299	<a href="mailto:allan.poola@sm.ee">allan.poola@sm.ee</a>
Labour Market Board	Allan Poola	(+372) 626 9299	<a href="mailto:allan.poola@sm.ee">allan.poola@sm.ee</a>
Veterinary and Food Board	Mario Peterson	(+372) 605 1747	<a href="mailto:mario.peterson@vet.agri.ee">mario.peterson@vet.agri.ee</a>
Maritime Administration	Alar Siht	(+372) 620 5580; (+372) 50 43 835	<a href="mailto:alar.siht@vta.ee">alar.siht@vta.ee</a>
<b>Inspections / Centres</b>			
Data Protection Inspectorate	Henri-Paul Ariste	(+372) 627 4135; (+372) 52 52 608	<a href="mailto:henri@dp.gov.ee">henri@dp.gov.ee</a>
Estonian Motor Vehicle Registration Centre	Aldo Tatter	(+372) 620 1324	<a href="mailto:aldo.tatter@ark.ee">aldo.tatter@ark.ee</a>
National Examination and Qualification Centre	Aivar Ilves	(+372) 735 0599; (+372) 50 89 599	<a href="mailto:aivar.ilves@ekk.edu.ee">aivar.ilves@ekk.edu.ee</a>
Estonian Informatics Centre	Margus Kreinin	(+372) 663 0220	<a href="mailto:margus.kreinin@ria.ee">margus.kreinin@ria.ee</a>
Energy Market	Margus	(+372) 620 1900	<a href="mailto:margus.kasepalu@eti.gov.ee">margus.kasepalu@eti.gov.ee</a>

Inspectorate	Kasepalu		e
Estonian Environmental Information Centre	Raivo Vadi	(+372) 696 2232	<a href="mailto:raivo.vadi@kki.ee">raivo.vadi@kki.ee</a>
Centre of Forest Protection and Silviculture	Heiki Kivits	(+372) 733 9377; (+372) 52 77 443	<a href="mailto:heiki.kivits@metsad.ee">heiki.kivits@metsad.ee</a>
Railway Inspectorate	Erkki Meius	(+372) 605 7425	<a href="mailto:erkki.meius@rinsp.ee">erkki.meius@rinsp.ee</a>
Centre of Registers and Infosystems (Ministry of Justice)	Marko Lehes	(+372) 620 8170; (+372) 52 51 105	<a href="mailto:marko.lehes@just.ee">marko.lehes@just.ee</a>
Plant Production Inspectorate	Alar Kess	(+372) 671 2696	<a href="mailto:alar.kess@plant.agri.ee">alar.kess@plant.agri.ee</a>
Technical Inspectorate	Kristjan Kuru	(+372) 694 9417; (+372) 50 98 368	<a href="mailto:kristjan.kuru@tji.ee">kristjan.kuru@tji.ee</a>
Health Protection Inspectorate	Maie Otsmann	(+372) 694 3540	<a href="mailto:maie.otsmann@tervisekaitse.ee">maie.otsmann@tervisekaitse.ee</a>
Labour Inspectorate	Allan Poola	(+372) 626 9299	<a href="mailto:allan.poola@sm.ee">allan.poola@sm.ee</a>
<b>County Governments</b>			
Harju County Government	Tarmo Lõo	(+372) 611 8562	<a href="mailto:tarmo.loo@mv.harju.ee">tarmo.loo@mv.harju.ee</a>
Hiiu County Government	Monika Paljasma	(+372) 463 1090; (+372) 50 68 398	<a href="mailto:monika.paljasma@mv.hiiu.ee">monika.paljasma@mv.hiiu.ee</a>
Ida-Viru County Government	Enno Leem	(+372) 332 1255; (+372) 50 31 974	<a href="mailto:enno.leem@ivmv.ee">enno.leem@ivmv.ee</a>
Jõgeva County Government	Nevel Paju	(+372) 776 6311; (+372) 53 483 576	<a href="mailto:nevel.paju@jogevamv.ee">nevel.paju@jogevamv.ee</a>
Järva County Government	Vambola Annilo	(+372) 385 9655; (+372) 55 73 713	<a href="mailto:vambola.annilo@jarvamv.ee">vambola.annilo@jarvamv.ee</a>
Lääne County Government			
Lääne-Viru County Government	Uuno Eiber	(+372) 325 8019; (+372) 50 10 384	<a href="mailto:uuno.eiber@l-virumv.ee">uuno.eiber@l-virumv.ee</a>
Pärnu County Government	Valdor Telve	(+372) 447 9723	<a href="mailto:valdor.telve@mv.parnu.ee">valdor.telve@mv.parnu.ee</a>
Põlva County Government	Siret Rammul	(+372) 799 8942	<a href="mailto:siret.rammul@polvamaa.ee">siret.rammul@polvamaa.ee</a>
Rapla County Government	Jaanus Milistver	(+372) 484 1116	<a href="mailto:Jaanus.Milistver@raplamv.ee">Jaanus.Milistver@raplamv.ee</a>
Saare County Government	Raivo Vanem	(+372) 452 0517; (+372) 50 65 650	<a href="mailto:rvanem@saare.ee">rvanem@saare.ee</a>
Tartu County Government	Indrek Sarapuu	(+372) 730 5238; (+372) 52 19 414	<a href="mailto:indrek.sarapuu@tartumaa.ee">indrek.sarapuu@tartumaa.ee</a>
Valga County Government	Kalev Härk	(+372) 766 6150; (+372) 50 27 768	<a href="mailto:kalev.hark@valgamv.ee">kalev.hark@valgamv.ee</a>
Viljandi County Government	Kaupo Kase	(+372) 433 0413; (+372) 51 52 723	<a href="mailto:kaupo.kase@viljandimaa.ee">kaupo.kase@viljandimaa.ee</a>
Võru County Government	Kalle Jõgeva	(+372) 786 8331	<a href="mailto:it@mv.werro.ee">it@mv.werro.ee</a>

## 7.2. Information society contacts in the public administration

Organisation / Position	Field of Responsibility	Name	Phone	E-mail
Ministry of Economic Affairs and Communications / Head of the Department of State Information Systems	eGovernment (in particular eGovernment's economics and digital document management), information society matters in general	Margus Püüa	(+372) 639 7640	<a href="mailto:margus.pyya@mkm.ee">margus.pyya@mkm.ee</a>
Ministry of Economic Affairs and Communications / Adviser on IT matters	i2010, information security (ENISA)	Mait Heidelberg	(+372) 625 6410	<a href="mailto:mait.heidelberg@mkm.ee">mait.heidelberg@mkm.ee</a>
Ministry of Economic Affairs and Communications / Head of IT Infrastructure Division, Department of State Information Systems	IT architecture and interoperability of information systems (IDABC programme), eIdentity	Uuno Vallner	(+372) 639 7635	<a href="mailto:uuno.vallner@mkm.ee">uuno.vallner@mkm.ee</a>
Ministry of Economic Affairs and Communications / Head of Analysis and Planning Division, Department of State Information Systems	IT budget, EU Structural Funds in the field of information society	Rein Kauber	(+372) 639 7645	<a href="mailto:rein.kauber@mkm.ee">rein.kauber@mkm.ee</a>
Ministry of Economic Affairs and Communications / Executive Officer of the Analysis and Planning Division, Department of State Information Systems	IT budget, contracts	Katrin Edasi	(+372) 639 7643	<a href="mailto:katrin.edasi@mkm.ee">katrin.edasi@mkm.ee</a>
Ministry of Economic Affairs and Communications / Executive Officer of the Analysis and Planning Division, Department of State Information Systems	IT standardisation, eBusiness, eIdentity	Taavi Valdlo	(+372) 639 7644	<a href="mailto:taavi.valdlo@mkm.ee">taavi.valdlo@mkm.ee</a>
Ministry of Economic Affairs and Communications / Head of Information Society Division, Department of	Information society matters in general (including information society surveys and	Karin Rits	(+372) 639 7649	<a href="mailto:karin.rits@mkm.ee">karin.rits@mkm.ee</a>

State Information Systems	benchmarking), i2010, CIP-ICT			
Ministry of Social Affairs / Head of Health Information and Analysis Department	eHealth	Kaja Kuivjõgi	(+372) 626 9160	<a href="mailto:kaja.kuivjogi@sm.ee">kaja.kuivjogi@sm.ee</a>
Ministry of Social Affairs / Chief Specialist of the Social Welfare Department	eInclusion	Gert Schultz	(+372) 626 9222	<a href="mailto:gert.schultz@sm.ee">gert.schultz@sm.ee</a>
Ministry of Education and Research / Adviser on IT matters	eLearning	Jaak Anton	(+372) 735 0135	<a href="mailto:jaak.anton@hm.ee">jaak.anton@hm.ee</a>
Ministry of the Environment / Head of Information Systems Department	eEnvironment	Vahur Eenmaa	(+372) 626 2830	<a href="mailto:vahur.eenmaa@ekm.envir.ee">vahur.eenmaa@ekm.envir.ee</a>
Ministry of Culture / Head of IT Department	Digital cultural heritage, intellectual property	Indrek Eensaar	(+372) 628 2280	<a href="mailto:indrek.eensaar@kul.ee">indrek.eensaar@kul.ee</a>
State Chancellery / Head of Document Management Department	Digital document management	Kädi Riismaa	(+372) 693 5593	<a href="mailto:kadi.riismaa@riigikantselei.ee">kadi.riismaa@riigikantselei.ee</a>
Estonian Informatics Centre / Director	General matters	Epp Joab	(+372) 693 8200	<a href="mailto:epp.joab@ria.ee">epp.joab@ria.ee</a>
Estonian Informatics Centre / Adviser	Co-ordination between state agencies in the field of information society	Riho Oks	(+372) 663 0290	<a href="mailto:riho.oks@ria.ee">riho.oks@ria.ee</a>
Estonian Informatics Centre / Communication Manager	Press contact, co-ordination and management of awareness raising activities	Rica Semjonova	(+372) 663 0233	<a href="mailto:rica.semjonova@ria.ee">rica.semjonova@ria.ee</a>
Estonian Informatics Centre / Department for Handling Information Security Incidents	ISKE (three-level baseline protection system for information systems), ENISA	Toomas Viira	(+372) 663 0243	<a href="mailto:toomas.viira@ria.ee">toomas.viira@ria.ee</a>
Estonian Informatics Centre / Head of the Department for Handling Information Security Incidents	Management of CERT Estonia	Hillar Aarelaid	(+372) 663 0251	<a href="mailto:hillar.aarelaid@ria.ee">hillar.aarelaid@ria.ee</a>
Estonian Informatics Centre / Head of Development Department	Planning and realisation of state IT development projects	Kalle Arula	(+372) 663 0232	<a href="mailto:kalle.arula@ria.ee">kalle.arula@ria.ee</a>

Estonian Informatics Centre / Head of the Department of Infrastructure	Backbone network of the state data communications	Margus Kreinin	(+372) 663 0220	<a href="mailto:margus.kreinin@ria.ee">margus.kreinin@ria.ee</a>
Estonian Informatics Centre / Head of the Administration Department	X-Road administration, maintenance of state portals and information systems	Indrek Kressa	(+372) 663 0280	<a href="mailto:indrek.kressa@ria.ee">indrek.kressa@ria.ee</a>
Estonian Informatics Centre / Area Manager of the Development Department	Administration system for the state information system (RIHA)	Riina Kivi	(+372) 663 0212	<a href="mailto:riina.kivi@ria.ee">riina.kivi@ria.ee</a>
Estonian Informatics Centre / Adviser	EU Structural Funds	Jaak Liivik	(+372) 663 0230	<a href="mailto:jaak.liivik@ria.ee">jaak.liivik@ria.ee</a>
Estonian Informatics Centre / Area Manager	Development of the state portal <a href="http://www.eesti.ee">www.eesti.ee</a>	Rauno Temmer	(+372) 663 0231	<a href="mailto:rauno.temmer@ria.ee">rauno.temmer@ria.ee</a>
Estonian Informatics Centre / Project Manager	X-Road project	Ahto Kalja	(+372) 56 467205	<a href="mailto:ahto.kalja@ria.ee">ahto.kalja@ria.ee</a>
Invent Baltics OÜ	National contact point for the CIP-ICT	Tarmo Pihl	(+372) 50 19 568	<a href="mailto:tarmo.pihl@invent.ee">tarmo.pihl@invent.ee</a>
Tallinn Technical University / Professor of knowledge-based systems	Information security interoperability, ENISA	Jaak Tepandi	(+372) 50 29 028	<a href="mailto:jt@tepinfo.ee">jt@tepinfo.ee</a>
AS Sertifitseerimiskeskus / PKI Business Manager	eIdentity, eVoting	Tarvi Martens	(+372) 610 1896	<a href="mailto:tarvi.martens@sk.ee">tarvi.martens@sk.ee</a>

### 7.3. Useful links

#### Portals

eState portal: <http://www.riik.ee/en/>

Information portal of the Citizen Portal: <http://www.eesti.ee/eng/?style=2>

eDemocracy portal TOM: <https://www.eesti.ee/tom/ideas.py/avaleht> (only in Estonian)

#### Directories, Search

Electronic “Riigi Teataja” (State Gazette) – eRT (legal acts):

<https://www.riigiteataja.ee/ert/intr/en.htm>

Estonian Legal Language Centre (legislation in English): <http://www.legaltext.ee/indexen.htm>

#### Public Administration Agencies

Ministry of Economic Affairs and Communications: <http://www.mkm.ee/index.php?keel=en>

Department of State Information Systems: <http://www.riso.ee/en/>

State Chancellery: <http://www.riigikantselei.ee/?lang=en>

Estonian National Communication Board: <http://www.sa.ee/atp/?keel=en>

Estonian Tax and Customs Board: <http://www.emta.ee/?lang=en>

Estonian Land Board: <http://www.maaamet.ee/>

Estonian Data Protection Inspectorate: <http://www.dp.gov.ee/index.php?id=14>

#### State Agencies and Foundations

Estonian Informatics Centre: <http://www.ria.ee/index.php?lang=en>

Centre of Registers and Infosystems: [http://www.eer.ee/index\\_eng.phtml](http://www.eer.ee/index_eng.phtml)

Estonian Educational and Research Network: [http://www.eenet.ee/EENet/EENet\\_en](http://www.eenet.ee/EENet/EENet_en)

Estonian Environment Information Centre: <http://www.keskkonnainfo.ee/english>

Estonian Information Technology Foundation: <http://www.eitsa.ee/inenglish/index.php>

Archimedes Foundation: <http://www.archimedes.ee/index.php?language=2>

Tiger Leap Foundation: <http://www.tiigrihype.ee/?setlang=eng>

#### ICT Organisations

Certification Centre (AS Sertifitseerimiskeskus): <http://www.sk.ee/pages.php/020302>

Passport and ID card: <http://www.pass.ee/2.html>

Use of ID cards: <http://www.id.ee/pages.php/0303>

eGovernance Academy: <http://www.ega.ee/>

Estonian Information Technology Society: [http://www.eits.ee/index.php?section=ws\\_eits\\_eng](http://www.eits.ee/index.php?section=ws_eits_eng)

Association of Estonian Information Technology and Telecommunication Companies:

<http://www.itl.ee/english/general/index.asp>

IT College: <http://www.itcollege.ee/inenglish/index.php>

Estonian eUniversity: <http://www.e-uni.ee/index.php?main=120>