Estonian Information Society

Yearbook 2010

Estonian Information Society Yearbook 2010

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Estonian Information Society

Yearbook 2010

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Preface

Juhan Parts
Minister of Economic Affairs and Communications

Looking at the developments of information and communications technology (ICT), it seems as if the Earth is rotating around its axis at an ever-increasing speed. That is why keeping up with the pace is becoming a challenge. Flexibility is a great advantage for Estonia as a small country; we are able to employ new possibilities quickly and be innovative in their development.

Extensive use of ICT in all areas of life is just about our only option, but it requires a lot more resources for data communications networking. The number of network devices and the resources needed for their functioning have grown explosively. Today's economy needs a new infrastructure supporting the economy.

Looking into the future, with a view of securing development opportunities for Estonia, we have launched an ambitious project called EstWIN. Its goal is to provide access to 100 Mbit/s high-speed Internet all over Estonia. In order to build the network, the all-time biggest joint project between the public and private sector has been initiated in the field. It is the state's duty, also in the future information society, to ensure equal opportunity to all people, including entrepreneurs, regardless of where in Estonia they are located.

Alongside thr development of the communications network, we must also work on the quality of services. It is in the interests of the state as well as of all people to create good services that promote education and research, provide entertainment, promote tourism, and develop real estate, in a more deliberate way. The keyword here is making public data more accessible and machine-processable, which is one of the preconditions for creating good e-services.

Designing the e-governance, we want people to feel safe and be aware of opportunities and risks appearing already today as well as in the future. In that respect, the Estonian e-governance has a good reputation worldwide. To a large extent, that can be regarded as credit given and marketing done in advance. Our enterprises still need to fill that with actual substance on the world market. The state can be of support and assistance here, but much depends on the ambition and the bold initiative of our IT enterprises.

We do our best to create the preconditions and opportunities of the ICT field of today's world at a national level. We need to remember that all parties have to use their advantages and keep up with the pace.

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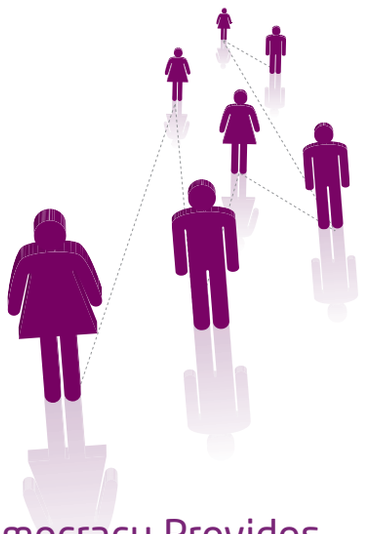
Developing a Citizen-Centred and Inclusive Society

Increasing Participation Possibilities



1.1.1 e-Democracy Provides a Chance to Innovate Democracy

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There have been significant shifts in the approach to e-governance in recent years. The current policy, oriented to the development of e-services, is about to benefit from the understanding that the potential of new technology must be employed purposefully to support the democratic processes in the country. The fact that e-democracy has emerged from the initial period of tentative testing and garnered the attention of public authorities is confirmed by the recommendations on e-democracy adopted by the 47 member states of the Council of Europe in February 2009[1]. Among other European countries, Estonia has also been given the task to implement the principles agreed upon jointly. In this regard, the key idea is to approach e-democracy as any other field of politics, where it is important to set clear objectives and specify the activities and the institutions responsible for achieving these. Moreover, e-democracy is an integral part of the general goals of democracy-development, providing further possibilities to accomplish these aims.

This article examines the situation of developing the e-democracy policy in Estonia on the basis of strategic development plans and the documents specifying the activities arising from these development plans. The reference system here is the situation in other European countries, which could be observed thanks to the Finnish-Swedish-Estonian collective project EPACE[2] concluded last year.

International Background

As information society is a global phenomenon, it is important to have good knowledge of international practices and analyse the experiences of other countries in developing e-democracy. In 2010, the possiblity arose within the Finnish-Swedish-Estonian collective project "EPACE" (Exchanging good practices for the promotion of an active citizenship in the European Union). Within this the e-Governance Academy partnered up with the Government Office to collect and analyse practices related to democracy and e-democracy. As a result, two publications, which review the policy-making and administration of democracy and e-democracy in European countries, were prepared by Ivar Tallo[3] and Kristina Reinsalu[4].

The question whether there was an institution coordinating the issues of democracy/e-democracy in the country, got from most respondents a negative answer. This may be mostly caused by the fact that traditional public administration sees democracy as a prescribed framework for the functioning of the public authority that does not need extra attention. This does not mean that no individual ministry keeps the issues of democracy and e-democracy of their administrative field on the agenda, but there is no specific mechanism for building a common vision of

1 https://wcd.coe.int/ViewDoc.jsp?id=1410627&Site=CM&BackColorInternet=9999CC&BackColorIntranet=FFBB55&BackColorLogged=FFAC75
2 http://www.kansanvalta.fi/en/Etusivu/Tutkimusjakehitys/EPACE
3 http://www.ega.ee/files/demokraatia_haldamine.pdf (in Estonian only)
4 http://www.ega.ee/files/eDem_kasiraamat.pdf (in Estonian only)

development and coordinating the activities of different agencies.

Two different models can be observed in the European countries where coordination is in place – an institutional and a network-based model. In the case of the institutional model, the country has a central ministry responsible for designing and coordinating the democracy policy, including e-democracy. This model has been adopted in Sweden, where the democracy policy lies with the administrative field of the Ministry of Integration and Gender Equality. In recent years, Finland has also taken the direction of developing one central coordinating agency, which is a division of the Ministry of Justice handling the issues related to democracy. In Slovenia, the policy of democracy is coordinated by the Ministry of Public Administration, which is also responsible for the development of the e-government.

A good example of network-based democracy policy comes from Great Britain, where the National Democracy Renewal Council was established in 2009. The task of coordinating the activities related to the development of democracy in different agencies was given them. The Council has the status of a government committee and is operating with the support of the Cabinet Office. In Austria, there is a special inter-agency committee at the Federal Office, established within the framework of the general platform "Digital Austria" and responsible for planning the e-democracy policy of the country.

e-Democracy is reaching the political agendas of countries in two ways – either through democracy or an e-government policy.

All in all, it can be concluded on the basis of the examples gathered in the course of the project EPACE that e-democracy is reaching the political agendas of countries in two ways – either through democracy or an e-government policy. Attention should be paid, above all, to the experience of the countries which have been able to develop mechanisms for purposeful policy-making and coordinating the activities of different agencies.

Situation in Estonia

When comparing Estonia to other European countries, it is obvious that according to the data collected in the course of the project EPACE, we are in the group of quite a few countries which have no central coordination or an institution responsible for democracy or e-democracy. However, taking a closer look at the situation of Estonia, it can be stated that in principle, a central coordination mechanism for handling the issues relating to democracy is in place here – at least partly.

As in several other countries liberated from a totalitarian system, promoting the development of civil society has also been seen as a key for the development of democracy in Estonia. This policy is based on the Estonian Civil Society Concept[5] adopted by the Riigikogu in late 2002. The implementation of the concept has become the responsibility of the Ministry of the Interior, or more specifically, the Minister of Regional Affairs. The mechanism of inter-agency cooperation is a relevant development plan for the field, establishing specific objectives and mea-sures for the next few years. On the 10th of February the session of the "Government of the Republic adopted the Civil Society Development Plan for 2011–2014"[6] which sets the objective of creating favourable conditions in the country for citizens' initiative and the development of civil society as a whole. The development plan is focused on strengthening the mutual partnership and cooperation between the public sector and civil society organisations in five key areas: citizens' education, capability of civil society organisations, civil society organisations as partners in providing public services, inclusion and charity and philanthropy. As it appears from this list, one of the important courses of action is inclusion, which is seen as a practical measure for sound administration and participatory democracy.

Since inclusion is based on providing information and communicating, this area is expected to benefit significantly from the implementation of ICT or e-inclusion. It is stressed in the development plan that the public must have access to the information regarding the decisions being prepared and how it is possible to have a say in compiling these decisions. This process is expected to be assisted by an integrated information system involving the processing of legal regulations and policy documents that would link the environments functioning separately so far, including the Participation Web[7]. The implementation of the integrated information system is the duty of the Government Office and was launched in the 2nd quarter of 2010. The implementation plan of the development plan also prescribes activities for raising awareness about the e-inclusion and e-participation channels. This line of action is coordinated by the Government Office, which involves all ministries in the work.

Since inclusion is based on providing information and communicating, this area is expected to benefit significantly from the implementation of ICT or e-inclusion.

5 http://www.siseministeerium.ee/30410/ (in Estonian only)

6 http://www.siseministeerium.ee/public/KODAR_VV_.pdf (in Estonian only)

7 www.osale.ee (in Estonian only)

Another important document directly connected to the development of e-governance is the "Estonian Information Society Strategy 2013"[8] prepared on the initiative of the Ministry of Economic Affairs and Communications. The strategy describes Estonia's general development vision, which takes into consideration the influence of ICT on the different sectors of public life and attempts to direct their development. Examining the social dimension of an information society and the influence of ICT on public administration, the strategy also sets objectives for the field of e-democracy and e-inclusion. The document stresses the need to develop Internet-based environments to provide citizens with possibilities to participate, and draws attention to the need to raise the awareness of people with respect of the new possibilities as well as risks involved in the development of information society. The strategy sets out more specific objectives for the development of e-government, where the focus is on the introduction of transparent and user-centred public services.

The objectives set with the Information Society Strategy are specified in detail in the 2-year implementation plans. One of the recurrent priorities of these plans has so far been increasing people's knowledge, skills and possibilities to participate. The current implementation plan for the years 2010–2011[9] provides the expansion of the possibilities to participate in the decision-making processes of the state through e-democracy. The implementation of this course of action is funded from the European Union Structural Funds programme "Raising Public Awareness about the Information Society," implemented by the Estonian Informatics Centre. In 2010, the first e-democracy public procurement of this programme, "Expansion of the possibilities for participation and involvement in the decision-making processes of the country with the possibilities provided by information and communication technology (ICT)," was carried out. As a result, the e-Governance Academy was given the obligation to conduct a number of analysis and development activities for the purposeful implementation of the possibilities of e-democracy in Estonia within two years. An overview of the planned and ongoing activities is available on the website of the e-Governance Academy[10].

Conclusion

It is clear from the abovementioned that e-democracy has reached the agenda of Estonian public authorities both in terms of the objectives of the development of democracy and the development of information society and e-governance. The central coordinating role is played by the "Civil Society Development Plan for 2011–2014"[11] prepared under the direction of the Minister of Regional Affairs and the "Estonian Information Society Strategy 2013"[12] prepared on the initiative of the Ministry of Economic Affairs and Communications. The activities of different ministries are specified in the implementation plans of the development plans which prescribe the parties responsible for various measures and activities. The duties arising from the development plans of different fields should, in principle, also be described in the annual organisation-specific development plans of ministries. As revealed by the analysis[13] conducted by the e-Governance Academy within the framework of the e-democracy contract, the association of activities, at least in the examined area, is often weak. This gap needs to be filled, because the rapid spread of the Internet in the Estonian society and the increasing preparedness to participate in the shaping of policies seriously challenges the public authority to renew democracy.

8 http://www.riso.ee/et/files/IY_arengukava_2013_terviktekst_2009.pdf (in Estonian only)
9 http://www.riso.ee/et/files/IYA_2013_RAK_2010_2011.pdf (in Estonian only)
10 http://www.ega.ee
11 http://www.siseministeerium.ee/public/KODAR_VV_.pdf (in Estonian only)
12 http://www.riso.ee/et/files/IY_arengukava_2013_terviktekst_2009.pdf (in Estonian only)
13 http://www.ega.ee/files/e-Demokrratia%20poliitika.pdf (in Estonian only)

1.1.2

Grassroots Democracy on the Internet – petitsioon.ee

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Why Was the Portal petitsioon.ee Created?

During the past years, Estonian civil society has become more active, which is especially noticeable at the grassroots level. Collecting signatures on the Internet with the aim of supporting various initiatives or protests has turned out to be a popular way of voicing one's attitudes. However, collective activities supported by signatures are often disregarded with the claim that the authenticity of signatures has not been proven. Due to the loss of credibility shadowing signature campaigns, signature-collecting activities have also lost in value. In order to avoid the possibility that essentially important citizens' initiatives are not discussed the way they deserve to be, the non-profit association Estonian Homeowners' Confederation created the Internet portal www.petitsioon.ee.

What Does petitsioon.ee Include?

Petitsioon.ee is a portal for expressing common attitudes and creating initiatives. People can create and sign three types of petitions in three different ways:

- signing with an ID-card;
- identifying via e-mail address;
- identifying via Facebook.

These personal identification methods make sure that a person cannot sign a petition multiple times or pretend to be someone else (fictional). At the same time, people who sign a petition also have the opportunity of remaining anonymous. As mentioned before, petitsioon.ee does not merely support petitions or oppose to them – people can sign three types of initiatives.

Supporting a petition or giving one's signature to support the suggested cause. The supporter's signature is included in a list with other supporters. When the petition ends, the person who initiated it has the chance to use the force of a large group of supporters to change or influence the situation**.**

Conditional participation or binding people together by promises. The aim is to collect promises to support a certain activity so that collective forces could accomplish something larger in comparison to what a single person could achieve. For example: "I will participate in a working bee for charity if 20 more people join me." By joining in on a promise, people bind themselves to the moral obligation of fulfilling it.

Opinion polls are meant for gathering the opinions prevalent in society. This is a very simple questionnaire with "yes" or "no" answers conducted to carry out a referendum.

Preparing and publishing actions in the portal petitsioon.ee is easy – all you need is an idea and an ID-card.

Which are the Results of petitsioon.ee?

Petition "Harness monopolies with the law!" created by the non-profit association Estonian Homeowners' Confederation collected 33,733 votes and as a result, a set of laws was prepared.

Petitsioon.ee has had a great influence on Estonian participative democracy. First and foremost, it has given thousands of common people the chance to take part in issues related to the society. During the 1.5 years the portal petitsioon.ee has existed, nearly 70 petitions, conditional participation events and opinion polls have been created. In addition, tens of thousands of people have expressed their attitudes by signing a petition. For example, the petition "Harness monopolies with the law!" created by the non-profit association Estonian Homeowners' Confederation collected 33,733 votes and as a result, a set of laws was prepared. The set of laws was approved by the parliament of Estonia (Riigikogu) and has by now also entered into force.

The Future of petitsioon.ee

The Estonian Homeowners' Confederation has ideas of upgrading petitsioon.ee. The improvement plan consists of creating a new platform so that the existing functions of the portal could be connected to the Population Register and specific geographic locations. Simply said, it would mean that only the citizens of the local government chosen by the initiator could sign a petition. The fact that ▸

people would be identified on the basis of local governments gives legal power to the suggestions initiated, so that they would have to be discussed in a city council or a city / rural municipality government.

Another development foresees creating the certain kind of functionality in the portal that would allow people to sign with the increasingly popular mobile-ID[14].

14 http://www.id.ee/?id=10995

1.1.3

Market Failure and Public Interest in Developing Next-Generation Broadband Networks

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A lot has been said about developing next-generation broadband networks – both on the public arena and on the level of agencies. However, it is just as vital to wonder why should the state use public finances to support the profit-oriented telecom business. What becomes important here is identifying the need for public finance contributions, i.e. state aid. In addition, questions are raised about what to support, whom to support and to which extent to support. In the following, I will try to shed light on the background of Estonian policy-making principles in regards to developing next-generation broadband networks.

Market Failure and Target Area

Estonia's success in developing the information society is remarkable in the field of e-government and in the case of some e-business indicators, incl. enterprises' Internet connections. However, rural areas are generally in a disadvantageous position in terms of fast broadband Internet access and e-commerce. It could be claimed that Internet connection that satisfies at least people's basic needs is available in almost all corners of Estonia and the rate of using a broadband connection in Estonian households and enterprises is 24.6%. 38.9% of connections that use broadband are faster than 2MB/s. Yet, the technology exploited fails to keep up with the development of services and needs.

The existing basic network is largely unable to support fast broadband services in rural areas, e.g. between small towns. The basic network is the part of network remaining between the main network and end-user connections (local access network). There are two main fibre-optic networks in Estonia. The creation of next-generation local access networks and fast broadband services based on fibre-optic networks has commenced in larger cities, but establishing fast Internet connections is generally speaking still unprofitable for service providers. Due to the prediction of low demand, operators have decided against investing in the establishment of fast broadband services in these areas and the result is a "digital divide" between urban and rural areas.

So as to prove the aforementioned claims factually, a detailed mapping was carried out in Estonia. Information on all the operators' fibre-optic networks outside cities with over 10,000 citizens was gathered to map existing networks. In addition, information was collected on the connection points of all the operators' networks.

This is why Estonia planned to implement national measures for the employment of a fast broadband connection in rural areas. The availability of the necessary broadband infrastructure is undoubtedly important for local governments in terms of luring enterprises into the area, enabling remote working, providing health care services and improving education and public services.

Creating a fast basic network in areas currently not serviced is expected to decrease market failures for operators.

Thus, creating a fast basic network in areas currently not serviced is expected to decrease market failures for operators and encourage them to expand the coverage of fast broadband in rural areas.

In identifying more specific target areas, Estonia is guided by three principles mainly stemming from the guidelines of the European Commission:

- state aid is only provided to areas where the infrastructure of the next-generation broadband connection is currently lacking and in the case of which it is unlikely that private investors would establish complete ready-for-use networks in the next three years;
- cities and urban areas with more than 10,000 inhabitants are excluded;
- areas already covered by a fibre-optic basic network and with the capacity of offering fast Internet services to end-users are not included in the project.

To sum up, the areas eligible for state aid are the "white-space" areas of local access networks.

Planning the Project According to the Identification of a Market Failure

State aid is only granted for establishing a passive basic network. This network must be accessible to a number of operators. The future network owners will not install the data communications equipment themselves – they only offer electronic communications enterprises a wholesale-trade-level access on **equal conditions** and in an open and non-discriminatory way. That is to say that all operators renting fibre-optic cabling have the chance to use the space dedicated for equipment in the so-called cabling cabinets and install their equipment in these. Electronic communications enterprises are free to decide which technology (e.g. ADSL, cables, wireless connection or mobile networks) they are going to use to offer a connection to the end-user. This in turn gives operators quite a lot of freedom in investing into equipment. However, it is clear that investments must be made on a fairly large scale in order to reach retail clients.

Since the financial instruments at granting state aid are of the open application type, Estonia decided to use the financial scheme of supporting small-scale subprojects and thus eliminate market failure in target areas. To be exact, the whole basic network will be established over time by conducting single subprojects, each of which will cover a certain area. 30–60 km of new network will be built in the course of each subproject. Such a financial scheme will ensure a stage-by-stage and dynamic development and decision-making process, i.e. market failure is eliminated by building hundreds of separate segments, which can also be monitored and assessed separately.

Public Interest

In areas of Estonia where establishment of fast internet connection is not private sector's priority, it is considered to fall under public interest.

Establishing a fast Internet connection and offering access to this network in areas where private investors have no intentions of launching the provision of such services in the near future is considered to fall under public interest in Estonia. The non-profit organisations of Estonia have been given the task of establishing this infrastructure and offering it to operators as a service of general public interest, as defined in Article 106 Clause 2 of the Treaty on the Functioning of the European Union. An alternative would have been to create a national structure or support specific communications enterprises – in the context of Estonia, this would essentially mean supporting a monopoly. The task of providing a service of general economic interest is entrusted to a non-profit organisation with an official act in the form of a financing decision made on the subproject concerned. The act specifies the nature and duration of the obligation to provide a public service, the territory, compensation, control, avoiding excess compensation payments of any kind, and the procedure of refunds.

In the context of the internal market and competition policy of the European Union as well as according to the practice of the European Court of Justice, the national funding of the provision of a service of general economic interest may remain outside the scope of application defined in Article 107 Clause 1 of the Treaty on the Functioning of the European Union, if four basic conditions, generally known as the Altmark criteria, are met. Of these four, the most important here is the first, which sets out that **the beneficiary of the state funding of services in general economic interest must be officially entrusted with the obligation of providing services of general economic interest, and that obligation must be clearly defined.** Therefore, paying compensation to non-profit organisations (in this case the Estonian Broadband Development Foundation) that have been given the task of establishing and maintaining broadband networks is in principle allowed.

Thus, Estonia finds itself in a situation where the financing of the ministries that grant support, i.e. state aid, is given with a task-determining act, which describes in detail the obligations put on the provider of a service of general economic interest. That means that first and foremost, the universal nature of the service has been defined – a state-funded network must be open to all interested communications operators, who must have an open, non-discriminatory access to the infrastructure created, offer all different types of network access to access applicants and enable actual competition on the level of retail sale, making sure that end-users are offered competitive and affordable services.

Price Formation

One of the aims of granting state aid is to enable access to broadband retail services in the target areas at a price level comparable to prices in urban areas and as such, wholesale access prices must be based on average prices in the urban areas that do not benefit from state aid. Among other things, the Estonian Competition Authority will ensure that the price formation of wholesale access in the network to be subsidised would be reasonable. In order to do that, the Authority shall collect information on the next-generation access network wholesale access prices and the owner of the network shall be obligated to prove that the requested wholesale price is reasonable and non-discriminatory. In addition, there are plans to prepare a comparative investigation concept at the guidance of the Estonian Competition Authority.

Summary

Thus, it can be concluded that the network to be created will be sustainable, built according to actual demand and with consideration for public interest, and the balance between different communications operators willing to cooperate extensively in the name of state aid will be ensured.

In the few following years, the greatest attention should be paid to the price level of end-users' fast Internet connection. According to expectations, the price should stay at a level comparable to urban areas or be even cheaper than expected.

1.1.4

International Experiences of Developing an e-Governance in 2010

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The activities of the e-Governance Academy in 2010 were mainly directed at two wider areas:

› planning and conducting the analysis and activities of e-democracy;

› organising trainings and giving advice on different aspects of e-government.

The following gives an overview of the most important international experiences gained in 2010.

The year 2010 was a complicated financial year in the whole world. State budget funds decreased and international development assistance organisations had fewer resources for new initiatives. At the same time, e-governance activities in many developing countries gained momentum. The motivation was to increase the efficiency of governments: in Turkmenistan, Armenia, Albania, and many other countries, this was made evident in the fact that the records management system was developed above all else. The second option was to create services for citizens and the business sector (Moldova, Albania, Palestine etc) and develop the ICT infrastructure. In addition, the development of a central state portal became pertinent in several countries (e.g. Montenegro, Serbia).

The activities of the e-Governance Academy developed in two directions. First, activities mainly oriented towards Estonia in the field of e-democracy, which is introduced in this collection in the article "e-Democracy Provides a Chance to Innovate Democracy" by Liia Hänni. The second important line of action, which was largely directed at foreign countries, was giving advice on the e-government inter-operability framework and architecture. In the latter, we also wished to introduce Estonia's long-term experiences in creating and implementing a service-oriented e-government. Creating business contacts between IT companies that were involved in developing the e-government and operate both in Estonia and foreign countries has become more efficient.

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An example of that could be two major projects conducted in 2010 and aimed at developing the e-government interoperability framework in Albania and Palestine. In the first case, activities were directed at the feasibility study of the Albanian e-government interoperability framework. During the study, data was collected on the technological, organisational and legal situation of the information systems existing in Albania. In addition, the European Union e-service assessment structure was described, the rules and activity principles of the Albanian e-government architecture were planned, and a series of suggestions were made to create the technological organisational and legal framework. Project materials formed the basis for announcing a technology procurement financed from the European Union Instrument for "Pre-Accession Assistance" (IPA) funds[15]. In Albania, the issue is also important due to the fact that the subject of an e-government is held in very high political level. Recently, the National Agency for Information Society (NAIS) was created and Estonia has been a role model for this in many ways. In addition to the project mentioned, there are long-term close ties with the developers of the Albanian e-government and a series of advisory and training projects have been carried out since 2005. An overview of the e-government developments of Albania can be found on the address http://www.e-albania.al. An interesting experience in Albania is the pilot installation of a data exchange layer, where a test solution resembling the Estonian X-Road was launched in such a way that some of the system components were functioning in Estonia and some in Albania. The aim was to introduce the possibilities of similar technological solutions in the flexible creation of e-services.

The most important aim of the Palestinian interoperability framework was to assist in the creation of an applicable organisational, legal and technical

15 http://europa.eu/legislation_summaries/agriculture/enlargement/e50020_en.htm

Considering Palestine's complicated political and territorial situation, it is especially significant to create e-services suitable for the population, the business sector and other state institutions.

framework. Various technology experts and people familiar with different fields from other public sector institutions in Estonia were also included in the project. What is interesting about Palestine is that considering their complicated political and territorial situation, it is especially significant to create e-services suitable for the population, the business sector and other state institutions. Several discussion seminars were organised, suggestions for the interoperability framework were prepared, two training visits to Tallinn were organised, a test environment similar to the Albanian project was installed to create e-services, a group of local experts were trained to create the necessary software upgrades and much more was done. Another important form of output in the project as the drafts of terms of references – on the basis of these, Palestine plans to announce an international tender. In addition, a great many experiences were gained in terms of communicating with the Arab world and carrying out projects in the area.

Apart from the abovementioned, several training visits took place, seminars were organised and the governments of different countries were advised. Some examples of the latter are: Serbia, Macedonia, Croatia, Kosovo, Ukraine, Moldova, Japan, India etc.

Many significant experiences were gained from international projects. The more important aspects hindering the development of an e-government in developing countries can be highlighted here. Firstly, as countries like these generally use foreign development assistance means, a large part of developments are project-based. Finances are found for investments and often for training and counselling, but not for supporting sustainable and process-based activities. Thus, it has often happened that a whole technological system created ceases to function at the end of (rather expensive) projects, since even the smallest funds could not be found from the state budget to cover the operating costs of the system. Another issue is that the state's e-government coordinating and implementing institutions are inefficient or do not exist at all. Because of that, the e-Governance Academy has in particular tried to support the creation of state organisations coordinating the issues related to e-government (in Albania, Palestine, Macedonia, Moldova, Serbia, Ukraine and elsewhere). Another funding-related issue is that the technology of the donor country is comes along with donor funds, which makes the integration of different systems complicated on both organisational and technical levels.

The second problem is connected to the fact that attempts are made to create different electronic solutions quickly – without thinking about the need to create common integration architectures through interoperability frameworks and distributed services. Therefore, from the point of view of system architecture, the resulting situation is a difficult one. A so-called spaghetti solution (i.e. lack of a unitary architecture among a number of e-services created separately) needs to be detangled in the course of future development work.

In conclusion, it can be pointed out that the onetime development of state information systems in Estonia, where a minimum amount of systematically planned and coordinated financial resources of the Estonian state budget were used, still gave us great development advantages compared to the e-government projects financed with the help of external instruments and donors.

Although we are sometimes critical of our own coordination mechanisms, Estonia has still much to teach to other countries in this matter.

The third observation regarding the international developments of an e-government is that the technological aspect is still stressed too highly, while the need to establish a stable and politically supported organisation to coordinate the e-government is not paid enough attention to. Supported by extensive international experience, the weaknesses in planning and the inefficiency of the public organisations coordinating the e-government can be pointed out as reasons for the inadequacy of e-government developments and the failure of many projects. Although we are sometimes even critical of our own coordination mechanisms, Estonia has still much to teach to other countries in this matter. At the same time, the need mentioned above is also introduced to Estonia. Contacts required in the business sector are created and opportunities are offered for the faster development of the e-governments of different countries.

Raising Awareness and Developing Skills

1.2.1 EU Structural Funds Programme "Raising Public Awareness about the Information Society"

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The aim of the programme "Raising Public Awareness about the Information Society" launched in 2007 is to introduce the possibilities of the information society and thus assist in developing an e-governance supporting the lives and activities of people. The more significant target groups of the programme are the public sector and public undertakings – raising their awareness of the information society enables achieving a high level of motivation to start using existing and new infotechnological solutions. Many of the programme's activities are targeted at Estonian citizens and their goal is to increase people's awareness about e-services and safe Internet use. The budget of the programme for the years 2007–2013 is a little over 3 million euros.

A study conducted in January 2010 by Emor AS to explore citizens' satisfaction with public e-services refers directly to the necessity of constantly raising public awareness about the possibilities of the information society. If in 2007 57% of Estonian population failed to name a single public e-service, the current situation is much better: only 41% do not know any e-services provided by the state. The number of people using the electronic possibilities of their ID-card has also increased considerably – at the end of 2007, ca. 10% of ID-card owners used the card electronically, but by the end of 2010, the number had reached 35%. The increase can be considered remarkable, as no new e-services that would require authentication or digital signing and would be directed at the larger part of the population have been created in Estonia (however, e-health has gradually started to play a bigger role). The key positions are still firmly held by the online submission of the income tax return, Internet banks and the eKool. It is clear that in addition to state agencies, enterprises need to be motivated to become more active in terms of offering their services in an interactive environment. The amount of new consumers will only grow with the addition of new user-friendly e-solutions that would help people to simplify their everyday errands with a computer or a mobile phone.

If at the end of 2007, ca. 10% of ID-card owners used the card electronically, the number had reached 35% by the end of 2010.

The year 2010 can be regarded as the programme's most successful year yet: the training series "Smart e-governance" has become a known brand in the IT sector community. Last year, the awareness of over 1,500 people was raised during trainings that focussed on issues related to the state's information system. There were specific class trainings aimed at a small target group, such as an introduction into information security, compiling semantic interoperability assets, and ISKE audits. But there were also more innovative and efficient ways of gathering, such as an event series for experts and specialists where the open room or world cafe method was used to allow the specialists and experts to exchange experiences and find more efficient solutions to interdisciplinary problems together. E-governance theatre performances were organised throughout the year, with audience numbers reaching up

to 400. The e-governance theatre can be defined as a symbiosis of management skills and directed performance pieces, presented by professional actors. Thanks to the popularity of the performances, the management theatre trainings are planned to continue in 2011 as well.

Eesti.ee in Pärnu with Tanel Padar.

One of the most important awareness-raising activities could be introducing the possibilities of the state portal eesti.ee, an information portal between citizen and state. The 2nd stage of the state portal campaign took place in January 2010. During that month, the visual identity of eesti.ee was created and attention was paid to notifying the inhabitants of rural areas, since they are the ones that need the e-services of the state portal the most. As the state portal is an organic and ever-developing part of the communication between citizen and state, the brand values are supported by a graphic leaf motif that represents strength, continued growth and constant development. By autumn 2011, the state portal should reach the next important stage in its development, where the more content-laden page for entrepreneurs would be completed, the navigation system of the portal would be redesigned, and the functioning logic of the page would have become noticeably user-friendlier. Thus, the environment would better meet the expectations of users – both those who have logged in and those not been authenticated. The plans include informing all the current and future users of the portal about reaching a new milestone and introducing the new possibilities added.

One of the aims of developing the e-governance and information technology is to increase the usage rate of existing electronic solutions and to promote the birth of new e-services. Redesigning administrative actions according to ICT possibilities plays a key role in changing the transparent and effectively functioning public sector. The year 2010 saw the beginning of an important study that should chart the current situation of the provision and use of e-services, explore the extent to which state institutions use electronic workflows and how are the workflows connected to e-services. An analysis provides policy suggestions as per how to improve the availability of public services and thus, the general quality of life.

In 2010, a study was launched to explore the use of electronic workflows in state agencies.

In 2010, work began on updating the basic document of the state's information system – the interoperability framework. The state's IT interoperability framework is a set of standards and guidelines that ensures the functioning of the public sector's information systems both inside the country and in the pan-European context. The framework acts as guidelines for the developers of state information system concepts and IT project managers from public sector institutions. At the renewal of the framework, attention will this time be paid to cross-border service provision, the interoperability of web pages and the more widespread employment of the free software model.

Although a large part of the population may by now be taking them for granted, computers and the Internet still represent new opportunities, and using them with various additional devices may seem complicated at times. So, to raise awareness about the different possibilities and dangers entailed in computer use, work started on the development of the first Estonian IT series, both educational and humorous at the same time. The 10-episode TV series that reached the screens in spring of 2011 takes a look at the activities of aliens in a vast and opportunity-rich cyber world, giving an overview of the major issues that a daily computer user may come into contact with. Sharing knowledge about safe internet use will continue to be one of the priorities of the programme, since it is not easy to drive without being aware of the traffic rules.

The competition "Best Estonian e-Service 2011" was announced within the programme and November was declared Excellent e-Service Month – its aim was to invite the public to notice and praise excellent e-services. The competition received 71 applications, which is the highest result of all times. The winners of eight categories were selected in March 2011 and given the chance to take part in the international e-service contest World Summit Award. There are plans to continue this tradition in the coming years in order to raise the awareness of the creators and users of e-services, but also of the public. Instead of making reproachful remarks about the sleeping tiger, ▶

There are many areas where the third sector and the communities themselves can improve the environment surrounding by making use of our small size and interoperability with the aid of IT possibilities.

it is necessary to highlight simple and convenient e-solutions that could shape positive attitudes and encourage and motivate people to create new innovative technologies. The initiation does not always have to originate from the public sector. There are many fields and subjects where the third sector and the communities themselves can improve the environment surrounding by making use of our small size and interoperability with the aid of IT possibilities.

The programme "Raising Public Awareness about the Information Society" contributes to shaping the "paper-based" Estonia into a more efficient, better and nicer, human-oriented e-governance in every way. The fact that everyone must wish to experience the advantages of the information society is of no little significance, since positive attitudes and willingness are the things that can improve existing capabilities and create new ones.

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1.2.2

The Best Estonian e-Services

The IT solutions created in Estonia have participated in the international contest World Summit Award (WSA), organised under the auspices of the UN, since 2003. In previous years, Estonia has achieved one title and one place in the finals among the 168 countries and their solutions taking part in the World Summit Award. In 2003, the patient monitoring system Doc@Home was declared one of the world's best e-services in the field of e-health. In 2007, the vehicle tracking system Navirec made it among the eight finalists in the category of e-business. This year's World Summit Award proved to be a great success to Estonians – our e-reporting environment was voted the winner in the e-government category. The finalists in the contest were Histrodamus, an information bank on Estonian history, and the social banking platform isepankur.ee – in the e-culture and heritage category and in the e-business and commerce category, respectively.

World Summit Award

WSA was launched in 2003 at the United Nations' World Summit on the Information Society (WSIS) to decrease the digital divide in the world.

The WSA[16] is a global activity for selecting and promoting the world's best e-content and most innovative information and communications technology (ICT) applications. The WSA was established in 2003 at the United Nations' World Summit on the Information Society (WSIS) to decrease the digital divide in the world, increase the population's awareness of smart e-solutions and applications and thus help to form a better world. WSA has cooperation partners among governmental authorities, private enterprises and non-governmental organisations from 168 UN member states.

The world's best e-solutions are selected in eight categories:

1. e-government & institutions;
2. e-health &environment;
3. e-learning & education;
4. e-entertainment & games;
5. e-culture & heritage;
6. e-science & technology;
7. e-business & commerce;
8. e-inclusion & participation.

The wide range of categories means that almost all e-service developers have the chance to participate in the contest and gain international recognition. In addition to traditional e-services that can be used via a computer and the Internet, all types of other solutions and applications used in the e-environment are encouraged to enter the contest.

The contest to determine the best e-solutions takes place after every two years. At first are held the national preselection contests, where expert juries select national winners. The best in each category goes on to compete against the other e-solutions found to be best all over the world.

First and foremost, the quality, comprehensiveness and influence of the service are judged. Second-important is the ease of use and thirdly, the value added through interactivity and multimedia is assessed.

The same evaluation criteria is applied at the WSA contest and national preselection contests. First and foremost, the quality, comprehensiveness and influence of the service are judged. Second, the ease of use (functionality, navigation and orientation of the service) is evaluated. Third, the value added through interactivity and multimedia is assessed. In addition, design (graphics and/or music) is appraised, and the quality of the craftsmanship that has gone into the technical realisation is also important. As additional criteria, the strategic importance for the global development of the Information Society and the accessibility of the services according to the W3C standards are considered.

In June 2010, a new competition titled WSA-mobile[17] was launched. Similarly to the e-solution contest, the ▶

16 http://www.wsis-award.org

17 http://www.wsa-mobile.org

WSA-mobile will also take place every two years (national preselection contests will be held in 2011 and the international finale in 2012). The goal is to give deserved international recognition to remarkable m-services and mobile solutions in eight categories:

1. m-business & commerce;
2. m-government & participation;
3. m-learning & education;
4. m-entertainment & lifestyle;
5. m-tourism & culture;
6. m-media & news;
7. m-environment & health;
8. m-inclusion & empowerment.

There are over 4.4 billion registered mobile service users, which means that mobile use exceeds Internet use almost by three times. Mobile phones are getting smarter and smarter and they have become relatively ordinary items of necessity for users of all ages. As the scope of content and the services that can be used via mobile phones is expanding all the time, the competition at the m-solution contest is expected to be equal to that of the e-solution contest.

WSA Estonia Preselection Stages in Previous Years

Estonian e-services have participated in competitions meant for the world's best e-solutions from as early as 2003, when we were represented by the patient monitoring system Doc@Home[18], which was declared one of the best e-services in the world. That year, it was the only e-service participating in the contest from Estonia.

In 2005, eight projects in four categories competed in the Estonian preselection. In the WSA, Estonia was represented by the virtual ABC-book "Virbits", an e-voting system[19], a web-based doctors' reception system and mobile payments[20].

In 2007, the preselection jury could already choose between 19 projects. The best e-services in Estonia were "Firm owner in 12 minutes"[21] by the Centre of Registers and Information Systems, Mobi Solutions project the m-teacher[22], the portal Estonian Manors[23] prepared by Valdo Praust, the University of Tartu library digital text repository EEVA[24] for older Estonian literature and the vehicle tracking system Navirec[25], which was also selected to be one of the eight WSA finalists.

27 projects in eight categories competed for the title in the 2009 preselection. Estonia was represented at the WSA by the following: the nature calendar[26], which has gained followers from all over the world with its boar and eagle cameras, in the e-learning category; Mudila[27], which has garnered a cult following among children with the Jänku-Juss (Bunny Peter) cartoons, in the e-entertainment category; the entrepreneur portal with cross-border digital signing[28], which set the new world record for establishing a new company within 18 minutes, in the e-government category; the large-scale e-health information system[29] in the e-health category; the national digital archive Saaga[30] in the e-culture category; the trading environment for local produce laat.ee in the e-business category; and TID+ and the participation web in the e-inclusion category[31].

The Competition "Best e-Service 2011"

If in previous years, the Estonian national WSA preselection competition was held under the name "Best Content Service"[32], then in 2010 the name of the competition was changed and it became "Best e-Service", since "e-service" is more widespread and "content service", derived in Estonian from an English expression, was on occasion confounding. The competition was organised in cooperation between the Ministry of Economic Affairs and Communications, the Estonian Informatics Centre and the representative of the World Summit Award in the framework of the EU Structural Funds programme "Raising Public Awareness about the Information Society".

As national projects reach the international contest in spring 2011, the national preselection stage that began in autumn 2010 and ended in February 2011 was named "Best Estonian e-Service 2011". A record-breaking number of enterprises and projects entered the

18 http://www.docobo.co.uk
19 http://www.vvk.ee/vvk.html
20 http://fortumo.ee/?affiliate_code=mari&utm_source=affiliate&utm_medium=banner&utm_campaign=mari
21 https://ettevotjaportaal.rik.ee
22 http://www.tartu.ee/?lang_id=1&menu_id=6&page_id=2686 (in Estonian only)
23 http://www.mois.ee
24 http://www.utlib.ee/ekollekt/eeva/index.php?lang=et&do=index
25 http://www.navirec.ee
26 http://www.looduskalender.ee
27 http://mudila.lastekas.ee (in Estonian only)
28 https://ettevotjaportaal.rik.ee (in Estonian only)
29 http://www.e-tervis.ee
30 http://www.ra.ee
31 http://www.tidplus.net
32 http://www.e-konkurss.net (in Estonian only)

A record-breaking number of enterprises and projects entered the competition – a total of 71 e-solutions from 58 enterprises, institutions and private persons.

competition – a total of 71 e-solutions from 58 enterprises, institutions and private persons. In its work, the jury reached an important conclusion: a good service alone is not enough, it must also be presented in a comprehensible way, and in addition to the technological side, marketing aspects matter as well. The same can also be said about the competition itself. Compared to previous years, the greater number of participants was surely a result of a more extensive competition-related campaigning, which was carried out with the assistance of Hamburg & Partners communications bureau.

The competition laid a foundation for the Excellent e-Service Month[33], which, similarly to the Excellent Service Month, organised in Estonia for years, encourages consumers to praise excellent e-services. November was named Excellent e-Service Month so as to call on people to notice the e-solutions that make everyday life easier and give praise to their creators.

We are glad to see on www.e-konkurss.net, that Estonian Internet users gave recognition to almost 50 e-services from very different walks of life, from e-business to health care and from entertainment to the e-governance. The solutions that were given praise were invited to compete for the title of the "Best Estonian e-Service 2011".

The inspiration seminar of the best e-service competition[34] was held at the end of the year. There, experiences were shared by e-service providers successful in previous competitions as well as e-marketing and investment gurus.

Although the number of e-solutions submitted was greater than it had ever been, the expert jury had to state that quantity does not always mean quality.

Although the number of e-solutions submitted was many times greater than it had ever been, the expert jury had to state that quantity does not always mean quality. The level of the contest was quite uneven – there were categories that saw fierce competition, but at the same time, some categories were represented rather weakly. The decision was made to give out the title "Best Estonian e-Service 2011" in five categories instead of eight. It was found that e-solutions have the most shortcomings and potential for improvement in terms of shaping them into services and making them accessible to users.

In addition to coming up with ideas for solutions and making them work, more attention needs to be paid to design and the user's point of view. From the database-focused approach prevalent now, developers should move towards a user-focused approach, and build up the environments around data. The services need to be more user-friendly; people need to be able to navigate in them intuitively; and the services must also be available to users with a weaker Internet connection and limited opportunities. This is especially important if the aim is to include a wider audience, e.g. in case of services provided by the public sector. The solutions should be created for users, not programmers or officials.

The greatest weakness of public services was their high-level of technicality - explanations, user-friendliness and design were often lacking.

When the standardisation, accessibility and technical execution of the e-services of this year's competition were evaluated, the services created by state institutions stood out clearly and in a positive way. They were mostly compatible with the general W3C requirements and often compatible with WCAG criteria on accessibility to people with disabilities. At the same time, however, a large part of the services disregarded the standards – many ingenious solutions with valuable content were executed poorly in this respect.

The jury noted that the greatest shortcoming in case of public sector services was a high level of technicality – there was very little in the way of explanations, user-friendliness and design. In the private sector this was not much better, although the providers looking to foreign markets have paid more attention to ease of use than service providers focused on the domestic market.

An ergonomic, calculated and comprehensive design is added value that is becoming more and more important as a competitive edge in the field of e-solutions. The abstract notion "user experience design" should find its local interpretation and place in every solution executed on a larger scale. Our technical expertise has never been as good as it is now. It would be nice if we could say the same about the design level of Estonian solutions on the next competition.

When solutions are created, their international competitive strength and scalability should also be thought about. Services which use requires a certain software platform should definitely be avoided. In addition, service creators and providers should think about how the name of the service sounds in other languages. This year some projects were given a name that shadowed their content, made the jury unanimously roar with laughter and could have been awarded a special prize in the humour category. ▶

33 http://www.heateenindus.ee (in Estonian only)

34 http://www.e-konkurss.net/2010/12/kamaluga-inspiratsiooni-uuteks-e.html (in Estonian only)

Best Estonian e-Services in 2011

The competition was fiercest in the e-business and commerce category, where the social banking platform isepankur.ee was chosen to represent Estonia among 33 new e-services. In the case of this service, which mediates loans between private persons and enterprises, the jury valued the integrity of the concept and its international potential – according to jury members it could bring global success to Estonia, something akin to the success of the web-based auction house eBay. Platform isePankur faced serious competition from the virtual engineering office GrabCAD[35], which has already achieved success in several international contests.

It was decided that in the e-government category, the best out of 15 e-solutions was the electronic financial year reporting environment[36]. The scope of the service became the deciding factor – as the project has influenced more than 120,000 Estonian entrepreneurs, it also has a good chance of success at the international contest. Although the ease of use and the visual side of the financial year reporting environment has been criticised, the solution has potential to make the reporting of all Estonian enterprises electronic in only a few years. Serious competition was provided by the visualised Business Register[37]. However, a significant disadvantage in the case of the latter was that using the register requires Microsoft Silverlight. Another contestant to be considered was the Estonian Land Board's Geoportal, which was given a positive evaluation for a very thorough content of dozens of map layers. The somewhat old-fashioned design, however, was seen as a drawback.

The traditional prize of the contest – a glass book by Tiina Sarapuu symbolising a connection between the virtual and the intangible worlds – is held by Piret Meelind, vice director of the Centre of Registers and Information Systems (RIK), which won the title in the e-government category for the financial year reporting environment. Photo by Viktor Vesterinen.

In the category of e-health, the winner was the Digital Prescription Centre[38] by the Ministry of Social Affairs and the Estonian Health Insurance Fund. Despite serious problems encountered upon launching the system during the first months of 2010, the service has made the life of both patients and doctors easier a year later. The extensive influence of the solution on the Estonian healthcare system was seen as a significant aspect. The main competitor for the prescription centre was the healthcare workers' catalogue TerviseTrend[39], which is based on patients' feedback.

The Minister of Economic Affairs and Communications Juhan Parts presents the Estonian Health Insurance Fund's digital prescription project manager Erki Laidmäe with the prize for winning in the e-health category. Photo by Viktor Vesterinen.

In the category of e-entertainment and games, the winner was Elion's myTV[40]. The service enables the watchers of digital TV to set reminders for programmes in the electronic programme guide via their computers or smartphones and to record shows. In addition, users can order reminders on their iPhone.

In the category of e-culture and heritage, the best e-service in Estonia was the history information bank Histrodamus, which offers opportunities to learn about Estonian history in an interactive and visually attractive way. The jury pointed out that Histrodamus[41] is unique in terms of structure. It is an environment dealing with history that allows people to study Estonian history in English and Russian as well.

No prizes were awarded in the categories of e-learning, e-inclusion and e-science and technology, as the jury found that this year, there were not enough projects with a sufficient level in these categories and could not give the title of the best Estonian e-service to anyone. The jury based their evaluations on the criteria of the international WSA

35 http://grabcad.com
36 https://ettevotjaportaal.rik.ee
37 http://www.rik.ee/uus/visualiseeritud_ariregister.html (in Estonian only)
38 https://svn.eesti.ee/projektid/som_er (in Estonian only)
39 http://www.tervisetrend.ee/ (in Estonian only)
40 http://www.minutv.ee/ (in Estonian only)
41 http://www.histrodamus.ee

contest. Upon judging, the members of the jury also considered the image of Estonia that the winning projects of a relevant category would present at the global contest. Considering the rules of the WSA contest and the descriptions of the categories, the jury moved some projects into another category that suited them better.

World's Best e-Government Solution comes from Estonia

The World Summit Award 2011 proved to be highly successful for Estonians. The Estonian e-reporting environment won the title of the world's best e-solution in the category of e-government. In the e-culture and heritage category, one of the finalists was the Estonian history website Histrodamus. The social banking platform isepankur.ee, which was developed in Estonia, reached the finals in the e-business category.

The e-reporting environment gained the support of the international jury owing to the fact that the solution has made the reporting of all Estonian enterprises electronic within only a few years. The environment is also a key player in the light of the European Digital Agenda 2020 and ensuring a functioning European Union Common Market. Compared to the e-government services of other countries, the e-governance solutions created in Estonia are role models for the whole world due to their simplicity and transparency.

Histrodamus, which made it among the six best e-services in the e-culture and heritage category, garnered the experts' attention largely because of its visual clarity. The solution enables combining space and time and connecting and comparing different eras, events and geographic maps, understanding the causes behind events and the links between them. Histrodamus has taken a gigantic step forward in introducing Estonia's complicated history, making a dull history lesson interactive and visually attractive.

The social banking platform isepankur.ee, which competed in the e-business category, divided the jury into two opposing parties. Some international experts saw the website, which facilitates loans between individuals and companies, as a significant motivator for entrepreneurship. Others, however, were extremely sceptical regarding the sustainability of such a business model. In the end, isePankur took its place among the best 15 projects.

Participating in the WSA international contest offers e-service developers excellent opportunities for gaining international recognition and getting useful contacts from abroad. So far experiences of Estonian entrepreneurs have shown that participating in both the national preselection competition and the international contest has been of great help in finding international cooperation partners and investors, but also in endeavouring to succeed on foreign markets. Just like it is important to focus on the user while developing services, the ability to describe one's service is also a great challenge. However, considering the international market and potential investors, this is one of the most necessary skills.

Just like it is important to focus on the user while developing services, the ability to describe one's service is also a great challenge.

Nonetheless, the people who gain most from the comparison and evaluation of e-services are the users. The more attention is being paid to the needs, wishes and convenience of the user in creating and providing e-services, the easier it will become to find necessary services and to use them.

1.2.3

Promoting the Safer Internet Use of Estonian Children – the Project "Targalt internetis"

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Targalt internetis

In the comparison of European countries, the Estonian children are, similarly to other Northern countries, some of the youngest using the Internet – the average age first to go online is just eight years (EU Kids Online 2010)[42]. Estonian children are also at the top when it comes to frequency of use: 82% of all children using the Internet do so every day. This sets us in the third place among European countries – right behind Sweden and Bulgaria. Estonian children have some of the best skills in Europe as regards digital literacy, but due to frequent Internet use, they have also more often come into contact with risks related to Internet use: every seventh Estonian child using the Internet has experienced cyber bullying and 30% of children have seen images with sexual content in web environments during the past year. At the coordination of the non-profit organisation Estonian Union for Child Welfare[43], the project "Targalt internetis"[44] was launched on 1 September 2010 to promote safer internet use in Estonia. The project is carried out by the non-profit organisation Estonian Union for Child Welfare, the Police and Border Guard Board[45], the Tiger Leap Foundation[46], the Ministry of Social Affairs[47] and the non-profit organisation Estonian Advice Centre[48]. The aim of the project is to promote the smarter internet use by both children and parents and to prevent online distribution of material containing illegal content. There are three main lines of action in the project: training sessions and awareness-raising events, giving advice via the kids' helpline 116 111 and preventing the distribution of illegal material by the activities of a web-based hotline. Here is presented the overview of what is done in the framework of the project's main lines of action to promote the safer Internet use by children in Estonia.

In terms of frequency of using Internet, Estonian children are on the third place among European countries – right behind Sweden and Bulgaria.

The goal of the training and awareness-raising work is to increase the knowledge children and parents have in connection with Internet safety. These events are carried out at the coordination of the Tiger Leap Foundation. During the first four months of the project, qualifications were given to nine trainers, spending the year 2011 carrying out interactive lectures to teachers and parents and workshops for basic school children in 45 general education schools all over Estonia. In addition to trainings, the Tiger Leap Foundation will organise various awareness-raising events for wider audiences during the Safer Internet Day[49] – both in 2011 and 2012. In 2011, the Safer Internet Day was celebrated on February 8 and the motto of the day was "It's more than a game, it's your life!". Over the course of the day, teachers and pupils were called on to discuss the theme of safer Internet use in schools and take part in different events dedicated to the day. A two-week media campaign was launched on the Safer Internet Day on social networking sites and other web pages popular among children. The aim of the campaign was to use a quiz to inform young people of ways of using the Internet safely. An international conference for teachers and other specialists working with children was held on the Safer Internet Day at the Meriton Grand Conference & Spa Hotel to discuss what could adults do so that the privacy, reputation and health of children would not be endangered in the virtual world.

The goal of the training and awareness-raising work is to increase the knowledge of children and parents about Internet safety.

42 http://www2.lse.ac.uk/media@lse/research/EUKidsOnline/EUKidsII%20(2009-11)/EUKidsOnlineIIReports/D4FullFindings.pdf

43 http://www.lastekaitseliit.ee

44 The name of the project "Smartly on the Internet" is a shorter version of the original title of the project "Raising Awareness to Promote Safer Internet Use in Estonia". www.targaltinternetis.ee

45 http://politsei.ee

46 http://www.tiigrihype.ee

47 http://www.sm.ee

48 http://www.abikeskused.ee

49 Safer Internet Day is celebrated every year all over Europe on the second Tuesday of February

The Tiger Leap Foundation will organise a competition for pupils of upper secondary schools and vocational educational institutions both in 2011 and 2012 to collect interesting thoughts and solutions on communicating the subject of safer Internet use to younger pupils. Various materials on Internet safety will be prepared for children, parents and teachers at the initiation of the Tiger Leap Foundation. The project's website will display the materials: study sheets for pupils, an e-learning course for teachers, information for parents and a web-based game for children.

In the course of the second line of action of the project, the capability of the kids' helpline 116 111 will be developed as of 1 March 2011. Its objective is to give information and advice about the safe use of the Internet both on the web and via telephone to children and parents. Anyone can ask for advice about issues and concerns that have arisen in connection to Internet use. The helpline is mainly meant for advice related to emotional issues and on solving certain situations. If necessary, the call is directed to a relevant specialist. Parents can call the kids' helpline to ask how they could support their children in Internet use and get advice on various issues, e.g. what to do if a child/youngster has become a victim of cyber bullying, has received unsuitable or inappropriate proposals etc. Apart from phone counselling, advice and information is also available online[50]. The activities are coordinated by the Ministry of Social Affairs and carried out by the non-profit organisation Estonian Advice Centre.

The project's third field of activity is the hotline, which is operated by the Estonian Union for Child Welfare in cooperation with the Police and Border Guard Board. The goal of the hotline's activity is to prevent the online distribution of materials that violate children's rights, reputation, dignity and bodily integrity. A web environment[51] created by the Estonian Union for Child Welfare started working in January 2011. The site enables Internet users to report about illegal content (sexual abuse of children, child trading etc) noticed. Information about other material unsuitable for minors is also welcome on the hotline. Information can be given via a simple form found on the website and there is no obligation to give out his/her personal data to forward the message.

As the project is first and foremost meant to promote awareness of children's' Internet safety, then a Youth Panel has been created within the project. The panel is an expert group on organising events and preparing materials directed at children. In November 2010, the members of the Youth Panel underwent a training session during which, they gained knowledge on how to carry out Internet safety workshops aimed at younger pupils. The Youth Panel comprises of 14 young people aged 14–17. They represent the following Estonian upper secondary schools: Tallinna Pelgulinna Gümnaasium, Tallinna Lilleküla Gümnaasium, Tallinna Ühisgümnaasium, Ehte Humanitaargümnaasium, Kohtla-Järve Gümnaasium, Valga Gümnaasium, Pärnu Sütevaka Humanitaargümnaasium, Kuressaare Gümnaasium and Põlva Ühisgümnaasium.

To promote awareness of children's Internet safety, a Youth Panel has been created within the project.

So that the actions of the project could be carried out with quality and the information could reach different interest groups, an Advisory Board is also active within the project in addition to the project team and the Youth Panel. The board's members are representatives of the Ministry of Education and Research, the Ministry of Justice, the University of Tartu, Microsoft Estonia, the Estonian Informatics Centre, EMT, rate.ee, Estonian Association of Parents, Tallinn Informatics, Association of School Psychologists, the Estonian Association of Information Technology and Telecommunications, the project's Youth Panel and the project's partner organisations. In addition to cooperation within the state, the board takes part in the work of international networks INSAFE and INHOPE.

The project is supported by the European Commission Safer Internet Programme. 27 European Union member states and Norway, Iceland and Russia have joined the programme.

Training sessions, awareness-raising events and the activities of the hotline and kids' helpline 116 111 will also continue in 2011. The training and information materials created over the course of the project will be uploaded to the project's website, where we will also give information on relevant events and studies and offer children, parents and teachers advice on how to use the Internet successfully. More knowledgeable Internet use enables us all to take advantage of the positive features of the Internet and be more efficient in avoiding contact with risks.

50 www.lasteabi.ee

51 www.vihjeliin.ee

1.2.4

Presence and Future of e-Commerce in Estonia

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According to estimations, there are a thousand e-stores in Estonia – only according to estimated data, because many e-stores are not available in the register of economic activities, which is why it is extremely difficult to get a precise overview. Creating a new e-store is also an extremely simple and quick procedure and tens of new traders may appear within a week. The market was tidied up to a certain extent as a result of the Estonian domain reform, while many inactive domains with the extension .ee were deleted. Such a "clearing up" of the market is very important both from the viewpoint of customers and also supervision, as an inactive e-store causes confusion among customers and additional work for the officials whose duty is to inspect the conformity of e-stores to the established requirements.

According to Eurostat, the convenient opportunity to buy from e-stores is used by 17% of the residents of Estonia. It is appropriate to mention for comparison that in the Nordic countries the reliability of e-commerce is much higher – in some states, approximately 70% of residents or 90% of Internet users make at least one purchase from an e-store per year[52]. Thus, the reliability of e-commerce in Estonia is still at a relatively low level. Increasing the quality and reliability of e-commerce is important for both the traders and the state. Thus there have been cooperation projects launched on several levels to chart the possibilities and implement the ideas which would enable more efficient supervision and increase the awareness of customers and traders.

Domestic Cooperation

In 2010, the Consumer Protection Board signed a cooperation contract with the Estonian Association of e-Commerce. The aims of the contract are to increase in the reliability of e-commerce, to educate customers and traders and to rise their awareness. The priority of the cooperation contract entered into by the Consumer Protection Board and the Association of e-Commerce is to improve cooperation pursuant to the legislation relating to consumer protection and the EU directives related to consumer protection. In addition the desire to find solutions, which would satisfy both parties, to the problems arising between consumers and e-traders. An important part of the contract is exchanging information and finding solutions to issues, training and advising e-traders, if necessary, and distributing information about consumer rights in the field of e-commerce. The Association of e-Commerce is also giving out badges of reliability called "Safe Place to Buy from". One of the criteria for being awarded the badge is at least one year of active operation.

In the end of the year 2010, the Consumer Protection Board and the Association of e-Commerce organised a meeting with the representatives of the Tax and Customs Board, the Ministry of Economic Affairs and Communications and the Police and Border Guard. Their goal was to map the problems of the e-commerce shadow economy in Estonia, find cooperation possibilities in the fight against it and improve the supervision of e-commerce. The term "shadow economy" is used to describe the private persons who trade on the Internet actively but do not register their business. Thus, they are also not paying the required taxes to the state and often fail to perform their obligations arising from consumer rights. The possibilities of supervisory institutions to close such websites quickly are relatively limited. Therefore, situations may arise where an e-store keeps operating even during the course of a misdemeanour or criminal procedure, and causes even more damage. It is very important to make consumers understand that a purchase and sale contract entered into between two private persons is not regulated with acts of law to the same extent as it does in case of legal persons. The protection guaranteed by law and on the basis of which the Consumer Protection Board could help consumers does not extend to it. It is thus vital that prior to concluding a transaction, the consumer finds out

A purchase and sale contract entered into between two private persons is not regulated with acts of law on the extent that could enable the Consumer Protection Board help consumers.

52 Eurostat: Information society statistics. e-Commerce by individuals and enterprises. Data as at 09.02.2011

whether the seller is a legal or a natural person and what are the consumer's rights before and after entering into the contract.

Most Interesting Challenges

From time to time, the Consumer Protection Board has to admit that new technologies, ideas and business models outpace the legal framework in force. This, however, makes the work of supervisory agencies more difficult. Several business models exploit the so-called gray area of the regulation in force – everything that is not illegal must be legal. For example, many complaints related to periodical mobile content services have been received from consumers in recent years. Consumers are lured in with attractive tests (IQ tests, time of death and love tests) on the Internet or are asked to enter their telephone numbers to participate in a lottery. A PIN code is sent to the telephone number, and entering the code should grant access to the result of the test or enable to participate in the lottery. However, the code often involves subscribing to a fee-charging service. This usually includes receiving paid messages like new ringtones, wallpapers, games or news, after certain periods. Since the terms and conditions of the service are written in small print and often remain unnoticed by the consumer among all the information, the subscription is frequently discovered only after receiving the telephone bill.

New technologies, ideas and business models outpace the legal framework in force. This, however, makes the work of supervisory agencies more difficult.

The situation is further complicated by the fact that the providers of such services are not located in Estonia, but often outside of the European Union. Customer services in Estonia are provided through Estonian agents, but they do not accept responsibility for the misleading advertisements published on the websites of the service providers.

Following the experiences of our Norwegian and Finnish colleagues in the same field, the Customer Protection Board and agents from service and communications companies prepared recommended guidelines for offering periodic content services. Among other things, the guidelines contain requirements for the website and the advertisements of the service to enable consumers to clearly understand what the service is about. The recommended guidelines are just the first actual step towards regulating the situation. The next one should be renewing legislation and signing compulsory codes of conduct between the parties to prevent the use of trading techniques which are misleading to consumers.

International Cooperation

On the international level, the Consumer Protection Board is participating in the work of committees handling consumer rights and the work groups of the European Commission. For the last five years, the European Commission has been organising joint campaigns for supervisory institutions in the field of e-commerce (Sweep Days). In the course of these events all member states inspect their websites related to certain fields, and check their conformity to acts of law. This is usually accomplished within one week. In previous years, for example, such "sweeps" have been used to inspect the websites of service providers that offer various mobile content on the Internet, sell tickets for air travel and entertainment events or electronic equipment.

The Consumer Protection Board is also a member of the international organisation named International Consumer Protection and Enforcement Network (ICPEN). The organisation was launched in the year 1992 and includes supervisory institutions from almost 40 countries, including the United States, Australia and China. Participating in the ICPEN network provides an excellent opportunity for cooperation at a significantly larger stage than the European Union. In addition to other subjects related to consumer rights, one of the aims of the ICPEN is to use joint projects to increase the reliability of e-commerce worldwide and to actively exchange information concerning the spread of scam schemes and other issues that have become apparent. Similarly to the European Commission, the ICPEN also organises extensive annual campaigns within the framework of the Sweep Day to map the websites trading in various services or goods. For example, the subject for the 2010 inspection was mobile phone content – ringtones, games, wallpapers, etc. In the course of the Sweep Day, the member countries inspected whether or not the e-stores directed at their markets were in compliance with different compulsory requirements, e.g. did the websites contained the contact information of the trader and were the terms and conditions of ordering services described clearly and in sufficient details.

Development of e-Commerce

The European Union has started to regulate the area of e-commerce further and began to actively eliminate the cross-border obstacles restricting e-traders. The creation of an integrated digital market is considered to be one of the priorities at this point. Statistics show that the trendline of offering cross-border services in the market of ▶

The trendline of offering cross-border services in the market of e-commerce is even descending and people prefer to trade in their country of location. 30% of those making purchases over the Internet would like to order goods from the e-stores of other countries.

e-commerce is even descending and people prefer to trade in their country of location. However, there certainly is potential for cross-border e-commerce, as 30% of those making purchases over the Internet would like to order goods from the e-stores of other countries. A test ordered by the European Commission to be carried out in the comparison of the e-stores of EU member states showed that in 13 member states (including Estonia), approximately half of the products in the e-stores were at least 10% more expensive than the same products with delivery costs from an e-store of another member state[53]. Consumers would also have a significantly larger selection of goods from the e-stores of all member states.

The reason why cross-border e-commerce is still not on the level hoped is quite simple – people do not trust companies located in other countries. It is often impossible for buyers to pay with credit cards, the delivery of the goods takes a lot of time and is expensive. The countries of the EU also implement different value added tax rates and consumer rights, which makes grasping the legal framework even more complicated for both consumers and traders. Thus, many traders have not directed their activities to other states.

This year, the greatest challenge for the Consumer Protection Board is to increase the awareness of traders and consumers, because they are often not aware of their obligations and rights. Increasing awareness would enable moving from the current situation of eliminating consequences to a more proactive model of operation. Considering the unused potential of Estonian e-commerce and the strategy of the European Union to actively promote the spread of cross-border e-commerce. The Consumer Protection Board must be prepared for greater challenges in the near future, so that the development, quality and reliability of our e-commerce could also set an example and be a success story.

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53 "Mystery shopping evaluation of cross-border e-commerce in the EU", YouGovPsychonomics, data gathered on behalf of the European Commission, 2009. Available: http://www.eurocontrol.int

1.2.5.

Use of Social Media by the Ministry of Foreign Affairs: Digital Battle with a Volcano

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On April 15 2010, news began to reach the public that the ash cloud originating from the volcano eruptions in Iceland was causing disruptions in air traffic. A chaos that had never been seen before developed over the following days. In the period from April 15–21, there were approximately 100,000 fewer flights in European airspace than the week before the ash cloud formed. On Sunday, April 18, approximately 80% of flights were cancelled[54].

The Ministry of Foreign Affairs began to receive more and more calls from citizens who were concerned about themselves or their loved ones reaching home. On Sunday, April 18, we delivered the first buses filled with people returning from France and the Netherlands, but it was clear that we would not be able to bring all citizens home by ourselves.

This evening we were discussing the matter over Skype and decided to direct the communication to the Facebook page of the Ministry of Foreign Affairs[55]. This enabled us to immediately notify those needing and offering transport about the information received via other channels. Those involved were also able to post information and search for contacts on our page. Apart from people who needed help, there were also the ones providing information about vacancies in their vehicles and even some who were prepared to travel in Europe and pick up those interested. Some even offered accommodation to their compatriots in the "ash trap".

We always tried to direct people to Facebook – it was the quickest way of asking and offering help.

Of course, we distributed information via other channels, but were always trying to direct people to Facebook – it was the quickest way of asking and offering help. We also forwarded the information from our Facebook wall on the website of the ministry and replicated it in our Twitter account[56] to make the information available for those who did not use Facebook.

The total number of people visiting the Facebook page of the Ministry of Foreign Affairs during the period of crisis was close to 3,000. Approximately 300 entries were published in the course of five days and the number of the page's followers doubled. It is difficult to count those who received help, as people were also posting their wishes and offers on the page themselves and communicated with one another directly. Our signal, however, that the state is there to support its citizens in a modern and quick way, was strongly perceived.

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Through the operation "Ash Trap" – as we called it among ourselves – the social media-related activities of the Ministry of Foreign Affairs reached wider public awareness. Many people expressed their gratitude and praised us; our activities received positive coverage in both Estonian and international media. However, we were successful primarily because we had been using the abovementioned channels actively for several years: we had our followers and the skills to integrate social media environments into our communication activities.

Changes in the landscape of communication have affected the expectations of citizens towards the state and we are happy to acknowledge that the discussion between government officials is also moving from the question "whether" to the question "how". There is interest in finding the most effective ways of communicating with people through social media.

The social network of Facebook is used by more than 400,000 Estonians – this is a remarkable number of people whom to communicate with, whom inform and listen to (how many visitors does a website of an average public sector institution have?). The presumption that citizens always turn to the state in search of information is somewhat outdated. In a time where the borders between personal and mass media are becoming ▶

54 http://www.eurocontrol.int
55 http://www.facebook.com/valismin (in Estonian only)
56 http://twitter.com/valismin (in Estonian only)

The social network of Facebook is used by more than 400,000 Estonians – this is a remarkable number of people whom to communicate with, whom inform and listen to.

hazier and where all people have equal opportunities to be visible in social media, the official e-channels (websites of institutions, news feeds of press releases) may not always turn out to be the most valuable ones. In the overflow of information, the sources that prevail are easy to access, operative and reliable. The open and friendly communication activities of an institution should thus also expand to informal environments – the state must go to the citizen.

In order to be able to employ social media in a potential situation of crisis, steps should be taken in this direction now. Having a presence in social media as an institution requires the officials to be able to use various environments themselves and compare the effectiveness. Since no institution is able to participate in all social media channels, the selection of environments must be based on the time and human resources available, the features, target group and purposefulness of the environment.

The number of followers of the Facebook page of the Ministry of Foreign Affairs increased seven times in 2010; a third of it was the result of the ash crisis. We are consistently offering reliable information, a convenient possibility to communicate with the state and perhaps even most importantly – the feeling of security that the state will come to people in the case of emergencies.

Cultural Heritage Conservation

1.3.1 New Usage Environment for the Digital Archive of Estonian Publications

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Most of the institutions where information is produced or processed are widely using IT measures both for producing information and loading it up on the web. In most cases, they are not interested in the further life and long-term preservation of the information. There is even less willingness to take responsibility for this long-term preservation. One of the institutions responsible for the collection and preservation of information content according to the law is the National Library of Estonia. The digital archive DIGAR[57] was created at the National Library to preserve the digital information of cultural and scientific importance.

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In order to create the software adjusted to enable a more modern and convenient archive search and browsing and displaying various digital objects, the National Library launched the project "Citizens' gate to the Archive of Estonian Digital Cultural Heritage" with the support of the EU Structural Funds in 2009. The public procurement organised for the implementation of the project and the creation of the software was won by AS Datel. The new user interface of the digital archive is an effective tool for searching, browsing and comfortable reading of different types of digital materials included in the archive. The more readily accessible digital cultural heritage as a whole, however, enriches the high-quality, verified national information content that can be found on the web.

Organisation of Digital Archival Processing

We began the systematic collection and preservation of digital information in the National Library of Estonia in 2004, when the first working version of the digital archive DIGAR was created within the project reUSE of the European Union. At first, our aim was to collect and preserve the printed files of public sector institutions' publications and make them more widely available. But in the situation where more and more information was published in digital form, the pressure increased for the archival processing of information that came in different types and forms (periodicals, books, large maps, picture-based documents, postcards, etc). Furthermore – the amendment to the Legal Deposit Act that entered into force on 01.06.2006 places the National Library under the obligation to collect and preserve web publications in addition to paper publications.

All this forms an archive consisting of different types of publications in many different file formats and including high-quality and large digital files. The archive also contains the XML files of metadata created upon the ▸

57 http://digar.nlib.ee

description of these objects. DIGAR is administered on the basis of the digital archive software Fedora 3.3 with open source code, which enables to administer XML objects through APIs.

In addition to the archival processing of the digital objects deposited by publishing houses and those downloaded from the web, the National Library's DIGAR is also used to organise the digitisation and long-term preservation of the material which is in danger of perishing or is used intensively. The National Library digitises newspapers and magazines, calendars, charts and maps, graphics and photo collections. The digitisation of old books in danger of perishing (the so-called candidates to the Red Book of Estonian Publications) has also begun. In late 2010, DIGAR included 1,387,370 files with a total capacity of 5.82 TB.

The work performed in the first few years primarily involved the archival processing of a narrow range of digital material. There were no user-friendly web interfaces archiving and displaying different types of digital objects and different formats. The interface of DIGAR was clumsy and unstructured, and large digital files were difficult to download. Therefore, we set the goal of creating a versatile and effective search system and handling digital objects in a way that would correspond to the wishes of various user groups.

Administration of User Rights in DIGAR

Creating access to digital information must be based on the rights and restrictions applied to publications. Users are divided into groups with different rights. Depositors and publishers have special rights to the original files sent to the archive by them. Employees of the National Library have rights and obligations related to the processing, converting and backing up of the files. Registered readers have more rights in accessing the materials acquired by the library. Regular Internet users do not have to register in order to view the content of the archive and browse the material with no usage restrictions.

Depositors of digital material have the right to set usage restrictions pursuant to the Copyright Act and the business interests proceeding from ownership interest. The system for administrating the users of the National Library's e-services created in the course of the project enables to verify the users' identities (authentication). Offered is also variety of services according to their rights, pursuant to the restrictions set by publishers and the Copyright Act. Authentication is carried out similarly to the state portal: by identifying persons based on their ID-cards or mobile-IDs[58]. Since all readers of the National Library may not have an ID-card or a mobile-ID, it is also possible to identify readers by the numbers of their library cards and passwords. The authentication system created in the course of the project spread from the administration of user rights in DIGAR to the use of the whole e-library. The new environment offers the option of registering as a user of the National e-Library on the web in the form of self-service.

The new role-based system for the administration of the e-library users rules out the duplication of data in the library's different information systems (DIGAR, ESTER, ISE, search portal, licensed databases, etc) and enables to administer all users from one place. Thus, different e-services can be used and it is possible to switch from one e-collection to another using one single authentication process. The new system enables publishers and other content producers to operatively apply usage restrictions on their publications and be sure that the restrictions are monitored by the library.

Handling Digital Files

The main aim of the archive of digital information is the long-term preservation of the information placed there. The original files given to the archive are stored in file formats suitable for the preservation process. It is obvious that it is not rational and in many cases also not permitted to grant access to large archive files. Thus, separate files are created for users for easier and quicker viewing. By creating a user interface for the digital archives, we set the aim to create an effective, attractive and convenient solution which would ensure its simple and widespread use.

It is possible to search information from archived materials by either a simple or a complex search. There exists also a possibility to search from full texts or metadata. Searches can be made and results can be sorted by the types and collections of publications. Depending on the type of publication, search results can be viewed as thumbnails, by fail data, metadata or as parts of objects. Digital objects are handled depending on their type. Books and magazines can, for example, be browsed by pages. Collections of postcards, photos or maps can be viewed as collections or by single objects (example on page 35).

There are possibilities to zoom in and out, rotate and shift

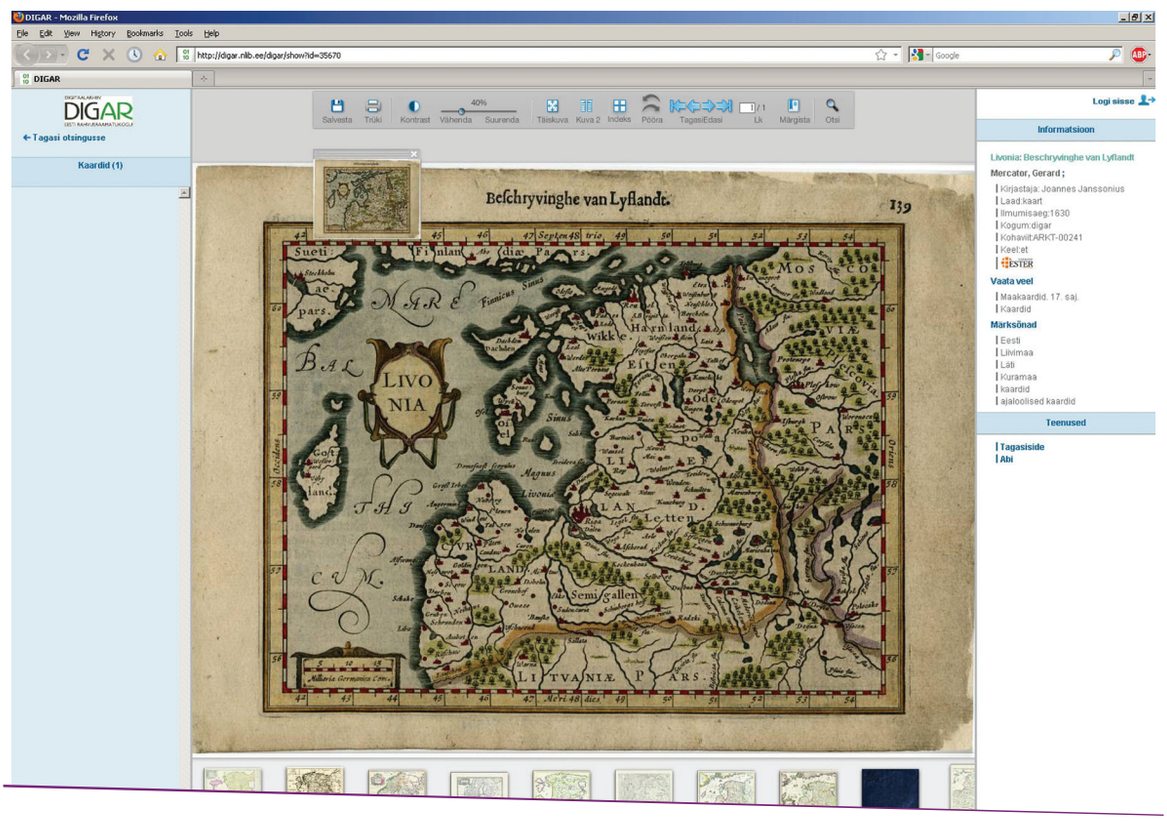
58 http://www.id.ee/?id=10995

files to ensure a better display. In addition to displaying files, it is also possible to store, copy or print them. All these services are connected to the system which checks the usage restrictions set by publishers and the rights of users. An authorised computer workstation has been established at the National Library for copyrighted publications – there, all the options of copying or printing publications are removed and it is only possible to read documents on the spot.

Future of the Digital Archive

The results of the project have a great influence on the information society of Estonia, since the accessibility of digital cultural heritage has improved significantly. The convenience of using and administrating such information over the Internet has also improved. All users of information benefit from the results of the project – thanks to the modern possibilities of information technology, they are now able to use the collections and services of the National Library around the clock without coming to the library. Producers of digital information also benefit significantly, since it is possible to assign a reliable digital archive to archive their production.

The further development of the digital archive DIGAR will now primarily be focused on improving the functionality of archive administration. It is necessary to develop a system for monitoring the correspondence of metadata to the digital objects required to ensure long-term preservation, for checking the correspondence of different file formats in the file handling software and the effects of different converting programmes on the authenticity of the presentation of digital files, for measuring such effects etc. The back-up capacity of the digital archive and its technical preparedness to ensure the availability of information also require developing.



Example of how a collection of maps is displayed.

1.3.2

National Register of Cultural Monuments at the Crossroads of X-Road

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CENTRAL BALTIC INTERREG IV A PROGRAMME 2007–2013

The National Register of Cultural Monuments[59] contains information about all national monuments under the protection of the state and brings all different types of monuments – archaeological, architectural, historical, artistic, technological monuments and cultural heritage conservation areas – together in one database. The register, administered by the National Heritage Board, was founded in 1994, and the digital database was created already next year. The database became Internet-based in 2002 and is partly accessible for the public.

Since the Register of Cultural Monuments became Internet-based, various databases have been added to it. Several X-Road services for citizens and public sector institutions have also been created. The services make it more convenient to get information from the register. It also means that it is now easier for the employees of the National Heritage Board to concentrate on their main duties, as the required data from different databases is available in one environment. One example here is the need for the names and contact details of the owners of cultural monuments – to fulfil that need, services between several different databases were created via the X-Road in the years 2009-2010. In addition to new X-Road services, several new thematic databases are now linked to the register. We will be discussing these in further detail below.

Monument Owners

Information has been exchanged between the Register of Cultural Monuments and the cadastral map of the Land Board since 2003. All immovable monuments have been marked on the cadastral map. Work is now being done on creating and marking the map in terms of limited management zones and determining the borders of territorial monuments. An X-Road service was created next for this layer of cultural monuments of the Land Board, which provides the register of monuments with Cadastral Register numbers. The automatic renewal of cadastral units also enables connecting cadastral units with either monuments or protected zones of monuments (limited management zones) in the register.

After the automatic renewal of Cadastral Register numbers, an X-Road service was created with the Land Register, which releases the data of registered immovables and owners. This kind of data was already exchanged before (2005), but the service was semi-automatic. The new X-Road service is, however, automatic and enables importing the data required.

In order to get the contact details of monument owners, we also needed an X-Road service with the Population Register and the Commercial Register, because the owners include both legal and natural persons. The X-Road service created makes regular inquiries for contact details on the basis of personal identification codes and registration numbers. The names and contact details of owners are stored in the Register of Cultural Monuments to enable the employees of the National Heritage Board to contact monument owners quickly and operatively – this is a much more convenient solution than the one used before, in the case of which the data from four databases and the X-Road services connecting them was required to receive the owners' data.

X-Road Services

In 2010, the national Address Data System (ADS), which also works on the basis of Cadastral Register numbers, was launched in the Register of Cultural Monuments. After the creation of an X-Road service with ADS, the addresses of immovable monuments (13.156 monuments) are renewed in the register automatically. With the help

59 http://register.muinas.ee/ (in Estonian only)

of Cadastral Register numbers and ADS, it is possible to display the addresses related to protected zones and territorial objects (such as cultural heritage conservation areas), if necessary.

In the same year, an X-Road service was created with the portal eesti.ee, providing the portal with the data of monuments on the basis of personal identification codes. Thus, all citizens who own monuments are able to view which monuments they own and be aware of the restrictions established by the state.

Customs officials do need access to the National Register of Cultural Monuments as well.

In the course of cooperation with the Tax and Customs Board, it appeared that customs officials need access to the permits and notices concerning the export of cultural objects, located in the National Register of Cultural Monuments. The aim was to provide customs officials with a possibility to check which permits have been issued by the Natural Heritage Board at the state border and thus reduce the amount of work with paper documents.

The Cultural Heritage Conservation Act has also established duties related to the protection of cultural monuments for local governments. For this purpose was created an authorisation service, through which the employees of local governments have access to the Register of Cultural Monuments and are able to see more detailed information than regular public users of the register.

Several cemeteries and graves in cemeteries are protected under cultural heritage conservation. The linking of the Cemetery Register with the Register of Cultural Monuments was accomplished with the cemeteries of Tallinn. The linking was not made automatic, because the status of cemeteries and graves under protection is stable. Thus, the registers were linked via URL links, for example[60]. Next to each grave, there is a link "Added to database", which takes directly to the information about the grave in the Cemetery Register. The linking is bilateral; the Cemetery Register also includes a link "Grave of cultural history", which takes directly to the data of the grave registered in the Register of Cultural Monuments. Another positive feature is that the location of graves is displayed on the map in the Cemetery Register. The service can also be accessed on the public level.

Register is Being Updated

In 2010, a separate section for emergency support was created to the Register of Cultural Monuments as its new part[61]. The state is allocating special-purpose emergency support for monuments to enable owners to fix and maintain them. All support payments are linked to the data of monuments and can be seen on the public level. Now, the number of emergency payments can be viewed next to the monuments, as can the amount of the supported and for which works the support was meant.

In 2010, the National Heritage Board received support from the Central Baltic Programme of the European Regional Development Fund for the international project "Shipwreck Heritage: Digitising and Opening Access to Maritime History Sources".

The archive of the National Heritage Board contains interesting and valuable photographs about current and former cultural monuments. The Board got the chance to digitise some of the photos and make them publicly available in the register under the name "Photo Library"[62]. The Photo Library consists of photos taken by Veljo Ranniku (born 1934) and Jaan Vali (born 1948), two meritorious heritage conservers.

There are photos that are taken of Estonian manor-houses, ancillary buildings of manor houses, a selection of churches and church-yards, cemeteries, chapels and headstones. There are also many photos of natural objects and the repair and restoration processes of monuments. Several of the objects photographed back then have perished and some of them are about to perish and the negatives and photos stored at the National Heritage Board are the only materials that can be proceeded from and compared with what exists now.

In 2010, the National Heritage Board received support from the Central Baltic Programme of the European Regional Development Fund for the international project "Shipwreck Heritage: Digitising and Opening Access to Maritime History Sources" or SHIPWHER[63]. One part of this project saw the creation of the Shipwreck Register, where information about sunken ships found in the ar-chive would be entered and to which information gathered in the course of field work would be added. The Shipwreck Register is not viewable by the public for the time being and will only be opened in the second half of the project, when the gathered material has been checked and the data has been entered into the register. This part of the register will be the first to be made available in both Estonian and English.

Required Links

From the viewpoint of the Register of Cultural Monuments, we are mostly the ones who need data ▶

60 http://register.muinas.ee/?menuID=monument&action=view&id=1111 (in Estonian only)
61 http://register.muinas.ee/?menuID=emergencysupport (in Estonian only)
62 http://register.muinas.ee/?menuID=photolibrary (in Estonian only)
63 http://www.muinas.ee/shipwher

from the databases of others. Only the Land Board's map layer of the objects evoking restrictions oand the Register of Construction Works are interested in the data in our database due to the obligations established by law. In other cases, our database of cultural monuments has had to ask for information from other databases, e.g. for displaying a monument on the map or to get information about the owners and registered immovables of monuments.

In 2010, the Register of Construction Works was linked to the National Register of Cultural Monuments. The data from the Register of Construction Works arrives to the register on the basis of Cadastral Register numbers and basic data from the Register of Construction Works is added to all monuments. The link was made bilateral to make it possible to see from the Register of Construction Works whether an object in question is a cultural monument.

Conclusion

Every year, a large number of changes are made in the Register of Cultural Monuments to modernise its user level. In 2011, developments continue with the new X-Road services required for cultural heritage conservation works and the database is complemented with thematic databases related to cultural monuments and cultural heritage.

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1.3.3

Digital Storage of Audio-Visual Cultural Heritage and Information

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People grasp the world with their senses: we see, hear, smell, taste and feel. For centuries, mankind has been storing its knowledge and vision of the world in different ways, be it cave drawings, clay boards or books. The heritage gathered over time is stored in libraries, museums and archives. Cave drawings and pyramids are some of the few which have not been brought together and hidden in basements. A touch over a hundred years ago, mankind discovered how to record moving pictures and sound recordings are not much older either. Eesti Raadio (the Estonian Radio) and later also Eesti Televisioon (the Estonian Television) have recorded a huge amount of historical memory related to Estonia from the beginning of last century to today. The current Estonian Public Broadcasting (ERR) is responsible for the preservation of this heritage. In addition to preservation, ERR also feels obliged to share this heritage with everyone who has created these valuable materials or whose forefathers have created it.

The main aims of creating the digital storage were to create a possibility for the digital storing of the cultural heritage preserved in the archives of the ERR, to organise the administration of the metadata of archival documents and to form a synthesis of the two abovementioned for the wider public.

In 2008, ERR submitted the project "The Development of Stage I of the Digital Storage of Audio-Visual Cultural Heritage and Information and Creating an ID-card Based Public Access to It" (hereinafter the digital storage) in the open round of appli-cations "Improving the Accessibility of Information" of a programme financed from the Structural Funds. The main aims of creating the digital storage were to create a possibility for the digital storing of the cultural heritage preserved in the archives of the ERR, to organise the administration of the metadata of archival documents and to form a synthesis of the two abovementioned for the wider public. The digital storage system is a tool for pupils, students, historians and filmmakers, enabling to view and hear the content of the archives of the Public Broadcasting and order a user's copy of the material on a medium or as a file of one's preference, if necessary.

Overture – from Analogue to Digital

The archives of ERR reflect the technological triumph of its whole time in existence. The archival documents are scattered on the ruling mediums of various times from film-strips to Betacam video cassettes or from gramophone records to CD discs. The handling of such an archive has physical limitations even in satisfying the internal demand of Public Broadcasting, not to mention granting access to the public. There is also a race against time, because quite a few media are becoming obsolete or deteriorating.

ERR was already developing its ability to digitise before 2008. Several units have been created for digitising Betacam SP and two-inch magnet tapes; a shop for re-recording and restoring films was established next to the project of digital storage. The audio archives had already raced miles ahead and work was being done at full pace. A tape robot and its administration software had been purchased previously for the storage and handling of LTO-4 digital magnet tapes. The existing physical storage was expanded significantly in the course of the project: from the former 727 tape slots to 2,047. The amount of operatively available data was increased to approximately 1.6 petabytes (the capacity of one LTO-4 tape is 800 GB). In addition to operative copies, files are also stored on single-use tapes, which are kept separately. Since the LTO-technology is developing fast, it was already possible to switch to the fifth generation tapes with the capacity of 1.5 terabytes in 2010. The tapes can be stored in the same physical frame and via migration it is possible to double the amount of data to three petabytes. To give an idea of what these numbers mean, it should be mentioned that currently, the Standard Definition television picture is digitised and stored at 50 megabits per second, which means that the volume of one hour of material is 23 gigabytes. The volume of the whole tape robot at modern technology is 72,000 hours. The estimated volumes of the analogue archival documents of ERR are comparable with the number or even higher. ▶

As mentioned above, the chosen digital storing technologies are sustainable. The continuous migrating ensures the efficiency of the availability of archival documents for handling for decades.

Conductor

The second part of the digital storage concentrates on the management of digital archival documents. Digitising and production units are continuously producing new audio and video files, which have to be placed in the tape robot in some cases, sent to code changing in other cases or have to be cut to pieces, packaged and sent to the person who ordered the product. Different databases gather or create metadata. Storing audio and video files on hard discs or magnet tapes alone does not allow doing something reasonable with them if we do not know what is hidden in the archive. The physical file and metadata have to be linked with one another somehow. Managing this traffic is the task of the media and metadata management system. It is basically the heart and nervous system of the whole digital storage.

Metaphorically, this nervous system can be likened to a standard information system, even warehouse administration software. All information related to materials is stored in databases. These items have names, serial numbers, ingredients, expiry dates. Media files also have names; someone has noted down who participated in creating the work, who was in the cast… They have even taken the trouble of describing what is happening in the film frame by frame – reading in succession, the whole story would be retold. The database also contains links between entries and files and the locations of different versions. Describers of the archive are able to view moving pictures through the web interface at their work computers and fill in the fields of content description frame by frame.

Describers of the archive are able to view moving pictures through the web interface at their work computers and fill in the fields of content description frame by frame.

Some fancier storage systems are also able to move products automatically in addition to managing data. This is what the "heart" does – pumping bits and bytes from one place to another on the basis of orders received from corresponding nervous systems.

While the complicacy of managing metadata lies in binding the information gathered from different sources into one whole, handling media files is difficult due to their size. In addition to burdening data communication networks with transport, large files also require high computing power to be transcoded into different output formats. In the framework of the project, a coding farm was purchased to perform the single task of generating different viewing copies for the describers of the archive and the web interface.

On the Stage

Everything described above, however, only creates preconditions for fulfilling the main objective of the project. When analogue mediums have been given new outfits, when archival workers have recorded the way they came to be, their life story and nature, the last step must still be taken. By pushing a button, all metadata is collected, packed with a transcoded viewing or listening copy suitable for the web, and transmitted to the public web interface. The public web interface of the digital storage is the third and final part of the project, which can be browsed by the wider public. At the address arhiiv.err.ee, it is possible to search for the material one is interested in from the archival documents of ERR on the basis of metadata. In addition to seeing metadata, it is also possible to view and listen to copies of lower quality.

While viewing and listening is enough to satisfy the curiosity of most visitors, it is also possible to order copies of what was viewed and listened to right there on the web. The possible legal restrictions must be taken into consideration. Further information about it can be found on the website or by consulting archival workers.

In order to become a user of the public web interface, authentication is required with an ID-card or a mobile-ID[64]. The website arhiiv.err.ee can also be accessed through the information portal eesti.ee, which offers more options for authentication, such as via an online bank. The orders placed on the web must, however, be digitally signed either with an ID-card or a mobile-ID.

More than One Star on the Stage

The project was planned and executed by appreciating various cooperation possibilities.

The functionality of a public web interface is, in addition to being viewable by people, also available through the protocols known to computers. It is possible to launch various web services. The web interface of the digital storage is connected with the X-Road – at the moment, only

64 http://www.id.ee/?id=10995

for ensuring one-way authentication, but why not also for creating a significantly wider functionality.

ERR is also aiming to connect itself with international information storehouses.

The digital storage project also enables to accommodate the archival documents of other interested storage institutions in addition to the archives of ERR and to introduce them to the wider public.

Such an option was created according to the knowledge that all storage institutions may not have the power and ability to build similar systems. The web interface created in the course of the project can also be installed in other storage institutions.

ERR can be approached to discuss cooperation possibilities in more detail.

Quo Vadis?

Even in the application, the name of the project included "stage I", indicating that there was something more to come. By now, the skeleton has been constructed and meat is being added to the bones step by step. Quite a significant amount of the archives of radio shows has been put up on the web. Publishing video material has been a bit slower, but is also well underway. It is now possible to listen to fragments from the parade of the 20th anniversary of the Republic of Estonia and, parallel to that, view the parade held in celebration of the 93rd anniversary. Digitisation of media files is again restricted by volume. In addition to turning analogue signals into zeros and ones, they sometimes also need to be restored and organised. Considering the volume of the analogue archive, work is likely to last for years. The mass digitising project launched in 2011 should alleviate the situation somewhat.

It is now possible to listen to fragments from the parade of the 20th anniversary of the Republic of Estonia and, at the same time, view the parade held in celebration of the 93rd anniversary.

It was not possible to know and foresee all the smart ideas concerning the functionality of a public web interface during initial planning. ERR is continuing to develop the system created.

There are plans for several cooperation projects with other collections of information, for example with Estonian Film Information System. Others are waiting for their turn as well.

The public web interface of the digital storage: http://arhiiv.err.ee (in Estonian only).

1.3.4

Founding the Estonian Film Information System (EFIS) to Preserve the National Film Heritage and Make it Accessible to the Public

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2012 is the year of film – we will be celebrating the 100th anniversary of Estonian film. One of the most significant undertakings planned for this occasion is the creation of the Estonian film database (electronic national filmography). Performing this large-scale task was undertaken by the MTÜ Eesti Filmi Andmebaas (the non-profit association Estonian Film Database, hereinafter MTÜ EFA) which was founded in the late autumn of 2007. The main objective of the undertaking is to form the complete Estonian national filmography within ten years (2007–2017) and make it available in a web environment to everyone interested, both in Estonia and abroad.

Rich Cultural Heritage

More than 10,000 films have been made in Estonia in nearly one hundred years. Together with newsreels, this number reaches over 17 thousand. Feature films, documentaries and popular films, anima, television, educational programmes, advertising films and newsreels form a rich collection of the life, history, culture and people of Estonia. Nearly 3,000 filmmakers and most of Estonian actors and actresses have participated in creating the Estonian film heritage. Several thousands of people, events, places, offices and institutions in Estonia participate in or are mentioned in the films. The information about the films that we have for now is, however, unfortunately incomplete, partly unsynchronised, lacking, scattered in different places and mostly limited to the content on paper mediums. The planned electronic database will open the film treasury in a summarised way, employing all possibilities offered by modern electronic databases. A list of data will be prepared for each film, person and institution in the extensive space of attributes with search options, which will combine the interactive features of a film directory and bibliographical, biographical and audiovisual databases.

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The creation of such a voluminous collection of information and gathering the data is a laborious and expensive undertaking, which has been supported by all key organisations associated with our film industry – the Ministry of Culture, the Estonian Film Foundation, the Cultural Endowment of Estonia, the Estonian Public Broadcasting, AS Tallinnfilm, the National Archives of Estonia, the Estonian Filmmakers' Union, the Baltic Film and Media School, the Estonian Film Journalists Association, Estonian Film 100 and MTÜ Eesti Filmi Andmebaas. On January 20, 2009, they all entered into a common intentions agreement to support the founding of the national filmography.

Founding the Electronic National Filmography

The coding instructions of the electronic database have been prepared. Each film is described as thoroughly as possible. The attributes of films contain data about the subject, genre, authors, cast, production team, locations, producers, copyrights and distributors of films and about the technical parameters of films, as well as the bibliography of films, references to the reviews, articles, books published about films and the makers of films, digitised frames and pictures from films, trailers and promotional clips, scripts, memories of the makers and other interesting details. The content of films is coded in a way which would enable to search films by content, people, time, events and locations in the web. All films are thoroughly equipped with keywords, which enable thorough content and subject searches. All filmmakers will be given their personal websites, which will provide an overview of their creative careers and filomographies.

The computer software of the Estonian Film Information System (EFIS) and the web environment based on it will be ready in the midsummer of 2011 with the financial support of the European Regional Development Fund (implementing unit Estonian Informatics Centre – RIA). The work will be carried out by Mindware OÜ, who won the public procurement among the seven companies that participated.

The electronic film database will be interfaced with other similar databases at the Estonian Public Broadcasting, at the film archive of the National Archives, at the National Library, at the Baltic Film and Media School of the Tallinn University, etc. The web interface will offer the possibility to enter with an ID-card and will allow advancing into the digital storage of the Estonian Public Broadcasting, where it is possible to view the films produced by EPB and purchase them for downloading. We are planning to offer a similar service in the database to be created. The filmography web will be interfaced with modern social networks (Facebook, Twitter, etc). The database will be created while keeping in mind the possibility to interlink it with the European Film Gateway in the future, thus offering access to a digitised film treasury through Europeana.

While creating the database, was kept in mind the possibility to interlink it with the European Film Gateway in the future, thus offering access to a digitised film treasury through Europeana.

In order to prepare the employees required to create the information system, in cooperation with the implementing unit INNOVE MTÜ EFA organised a training that lasted four and a half months, from September 2010 to the end of January 2011. The training was meant for the content editors/coders of the database and 27 students took part in it. 13 of them started working on entering film data in February 2011.

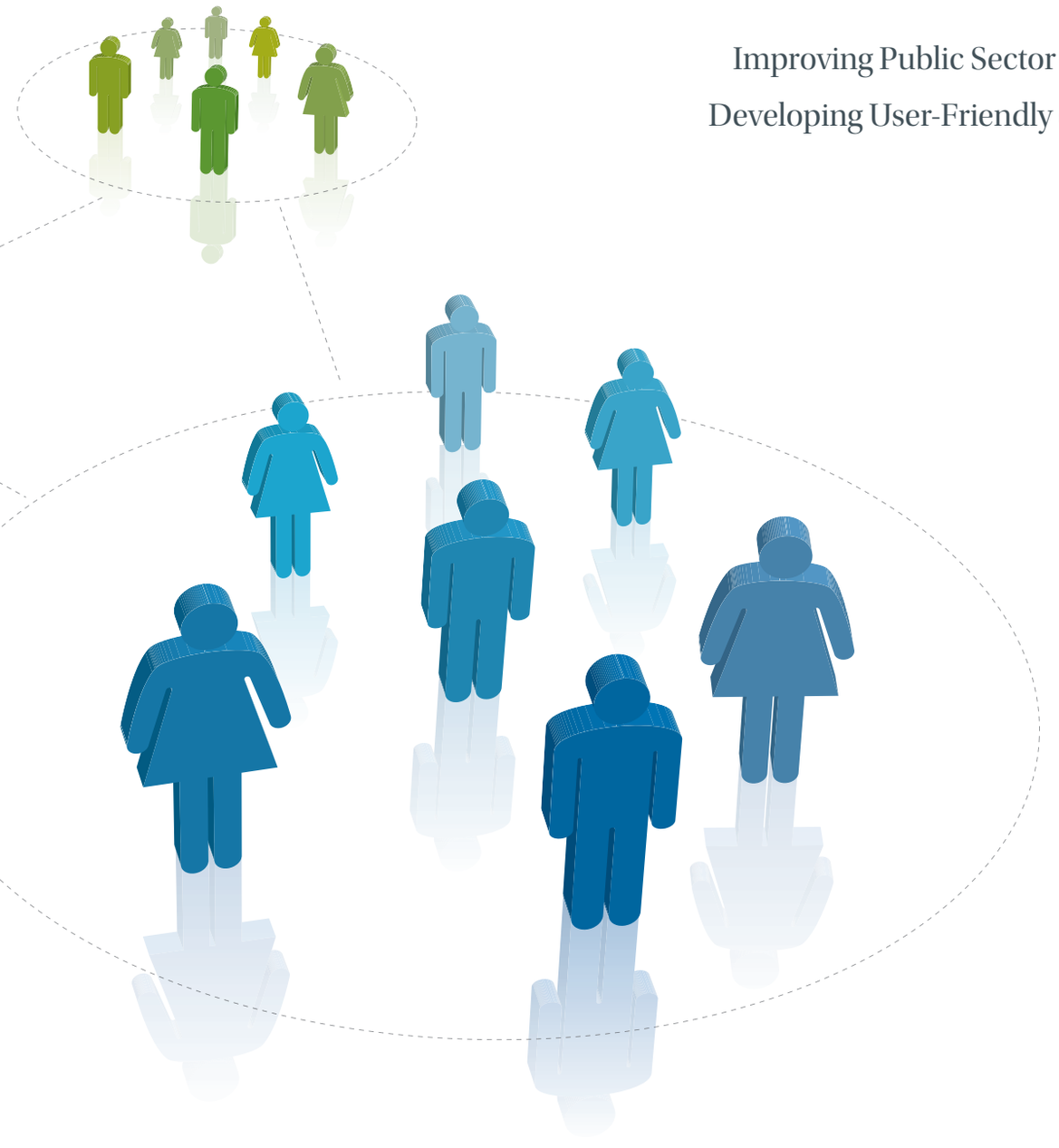
The electronic national filmography will be prepared stage by stage in the period from 2009–2017. According to the plans, the first part of the database and the web interface should be launched by the time of celebrating the 100th anniversary of Estonian film in the year 2012. Then, data about the approximately 700 feature films produced in Estonia throughout the times and the complete list of data about the newsreels and documentaries made between 1912–1940 (a total of approximately 110) will become available.

MTÜ EFA is managed by Reet Sokmann, film producer at F-Seitse, as a project manager, and Hagi Šein, the Deputy Director of the Baltic Film and Media School, as the editor-in-chief. The IT specialist is Jaanus Loitmaa.

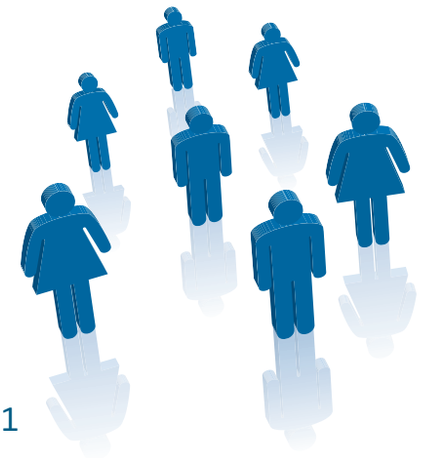
Film producers and creators, and those interested in films can contribute to the creation of the database and the reliability of its content. The same goes for other people interested in cooperating with us and helping us and with whom MTÜ EFA is already in close cooperation.

II

Development of a Citizen-Centred, Transparent and Efficient Public Administration



Improving Public Sector Efficiency



2.1.1 Implementation Plan of the Estonian Information Society Strategy

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The implementation plan is directed to achieving the general aims of the development program and thus contributes indirectly to the increase of welfare in Estonian society. The development program and its implementation plan help, above all, to improve the functioning of public administration and support achieving new challenges set with the coalition contract upon the progression of the information society.

In order to achieve the goals set with the implementation plan, resources are planned for creating or acquiring and implementing ICT solutions.

Since ICT is a supporting technology, the demand for a certain kind of ICT service, e.g. in the public sector arises directly from developing public services or public administration. ICT projects cannot therefore be targets on their own. The offered ICT possibilities do, however, enable taking public services and the quality of providing public services to a new level.

Thus, the function of the implementation plan may, among other things, be viewed as a horizontal policy-shaping instrument, the actual effect of which will appear in the development plans and implementation plans of various fields.

Preparation

Pursuant to § 63 of the Government of the Republic Act, the area of government of the Ministry of Economic Affairs and Communications (MEAC) involves preparing the economic policy and development plans of the state's economy in the field of informatics and telecommunication and the coordinating the development of information systems.

At the same time, all institutions are responsible for the preparation and management of the supporting ICT solutions required for performing their duties arising from acts of law. The responsibility lies in the sustainable management of acquired systems and the planning of the development of new required solutions, incl. planning the required and sufficient means in the institution's budget.

It is clear that the obligation to coordinate is the reason why the MEAC is organising the creation of interoperability of the state's information system's components and the preparation and management of central components. On the other hand, the implementation plan is a document approved by the Government of the Republic, and its task is to highlight the priority activities and developments of developing information society in the **short perspective**, which is taken into consideration while preparing the state budget and planning the use of other resources for financing.

The implementation plan is mostly carried out in the form of project-based development work.

The implementation plan is mostly embodied in the form of project-based development work in conformity with the IT architecture and the framework of the state's interoperability. The activities specified in the implementation plan are financed from the state budget, which includes the means from Structural Funds or other foreign means. The expenses of the activities financed from the state budget are planned by the

institutions implementing the activities, but attempts are made to use the means from Structural Funds in order to fund focal and cross-cutting development activities.

The preparation of the implementation plan is led by the Department of State Information Systems of the MEAC in cooperation with the Estonian Informatics Centre (EIC) and the representatives of other ministries.

Thus, in short, the aim of the implementation plan is to determine the priorities, specify the goals and indicators to achieve the goals of the development program within a period of two years. Also, to specify the division of the measures under the priority "Development of the Information Society" of the "Operational Programme for the Development of the Economic Environment" and other foreign means (such as from Norway) to achieve the priorities and goals of the implementation plan.

The aim of the implementation plan is to determine the priorities, specify the goals and indicators to achieve the goals of the development program within a period of two years.

In short, the development plan sets the goals for developing the information society and determines the long-term measures and directions based on the information society as a whole. The implementation plan determines the goals set to achieve the aims of the development plan and plans the use of the Structural Funds means. At the same time, it considers the actual situation and the action programme of the Government of the Republic.

Implementation

The priorities set with the implementation plan can in general be divided into two groups – ongoing priorities and new priorities. We will only be discussing the new priorities here, because the explanatory text is usually covered in the implementation plan itself and in the development plan. The last two priorities are new and interesting:

- increasing people's knowledge, skills and participation possibilities;
- developing the new generation broadband network in Estonia;
- developing the e-business environment;
- developing public services, including information services;
- extensive introduction of the e-ID;
- increasing the interoperability of the state's information systems, including improving systems and organising data;
- implementing ICT for the benefit of sustainable growth, a clean living environment and better quality of life.

The more general goals of the priority are increasing awareness about green economy, including green IT, the smart exploitation of ICT in the optimisation of processes, and a more sustainable use of resources. The key role here is played by the Economic Development Department, who will be leading the development of more specific indicators, which will also be found in the course of the study "The Capability and Potential of the IT Sector in Making Economy and the Functioning of Society More Resource-Efficient".

Implementation of ICT in education

The more general goals of the priority are the use of Internet-based learning environments and solutions in education and the existence of ICT skills and support system in the field. Here, we rely above all on the experience of SA Tiigrihüpe and on cooperation with the Ministry of Education and Research.

Funding

In most cases, a fixed amount, included in the state budget as estimation per one year, is planned as the cost of an implementation plan. Implementation plans are also direct instruments for planning the means from Structural Funds.

The goals of the priority "Development of the Information Society" of the "Operational Programme for the Development of the Economic Environment" cover a part of the goals of the information society development plan. There are three implementation measures used in the implementation of the means from Structural Funds: the programme, open applications and an investment plan.

The general goals of the programme "Raising Public Awareness about the Information Society" are to raise awareness about the possibilities of information society so as to contribute to the development of the information society that supports the lives and activities of people and increase the efficiency of shaping information society policies through higher-quality use of information and data.

The implementing plan determines which projects are financed through the investment plan and which is the amount.

The list of potential development projects (investment plan) is prepared to finance specific, public institution-centred projects of significant effect, which are already prepared in detail. The selection of the implementation plan's development projects is based on the data submitted by ministries, authorities within the area of government of ministries and constitutional institutions as a reply to the letter "Ascertainment of the need for ▸

financing". The implementation plan determines which projects are financed through the investment plan and in what amount.

Open applications are intended for the additional financing of the goals set with the priorities of the implementation plan. The means of Structural Funds are used to support these projects whose goals are directly connected to the goals of the implementation plan's priorities.

Challenges

Conclusively, there are three persistent challenges to be highlighted in preparing the implementation plan:

1. the actual connection of the priorities of the implementation plan to the means planned in the state budget;

2. connections to the implementation plans of other similar fields;

3. understanding the essential goals of the implementation plan, forming a consultation circle, which would have as wide a background as possible, and reaching agreements.

2.1.2

Which are Polite Formats?

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The world is speaking more and more about open states, open specifications, open standards, open data. Openness primarily means that people and machines are able to read, create and exchange data with ease and without additional costs. Data is usually presented and formatted using a markup language or format. A format is a language which enables users to present data in any desired format. The data directed at people should be in a format that can be read, edited and reproduced with freeware products without further conversions. In the case of data directed at machines, there should be a freeware-independent platform which supports the processing of the data. Viewing the websites, document registers and other document storages of the public sector today, we see a very large number of different formats, many of which are closed, product-based. For example, there is a prevalence of files in closed formats in the e-law portal[65], in the document register of the Government Office, in the document register of the Ministry of Economic Affairs and Communications and elsewhere. The abovementioned websites are unfortunately no exceptions. The situation of communication between public sector institutions via e-mails or document exchange environments is sadly no better.

It is recommended in the framework of interoperability that state and local government institutions only use public and standardised file formats in digital communication with each other and the public.

Another issue is the high number of formats. Let us take a look at one of the most successful projects in the world, the multilingual worldwide web encyclopaedia Wikipedia. The ascetic Wikipedia is basically restricted to two formats: XHTML and PNG. It is recommended in the framework of interoperability that state and local government institutions only use public and standardised file formats HTML (XHTML), XML, PNG, SVG, PDF, ODF, BDOC in digital communication with each other and the public. Below, we will give a brief description of them and point out the alternatives that are not recommended. The list is not final. The article does not cover the presentation of video materials, social media, programmes, semantic web, packed files, etc.

ODF – Open Document Format

In digital communication with the public (digital letters, document forms downloaded from the web etc), the ODF format should be used in the case of documents that require editing by several parties. ODF should be preferred in cases where there is public interest towards re-using the files. ODF is an open format, which is formed as the ISO standard[66] ISO/IEC 26300:2006 Open Document Format for Office Applications (OpenDocument). ODF as an open file format is independent of any certain application software, producer or operation system. OpenDocument is used as the default format by office software applications such as OpenOffice.org, Sun StarOffice, Oracle Open Office, IBM Lotus Symphony, Google Docs, KOffice, NeoOffice, Mobile Office. OpenDocument support is available for many other software applications as well: IBM Workplace, IBM Lotus Notes 8, Corel WordPerfect Office, EIOffice, Co-Create Office, Abiword, TextEdit, TextMaker, Gnumeric, Scribus, etc. The usual extensions of ODF files are .odp (presentation), .ods (spreadsheets), .odt (texts). Apart from HTML, ODF could be the main format for documents aimed at the public. The permitted alternatives for presenting data are .txt and .csv. The undesirable alternatives with the same functionality are .doc, .docx, .xls, .xlsx, .ppt, .pptx, .rtf.

PDF – Portable Document Format

In the case of documents that do not require editing and reusing, it is permitted to use the PDF format. PDF is a format of electronic documents based on PostScript independent from the hardware and software platforms ▸

65 http://eoigus.just.ee (in Estonian only)

66 ISO/IEC 26300:2006 Open Document Format for Offi ce Applications (OpenDocument)

of computers. PDF files are primarily used as virtual paper, in preparation for printing and archiving documents. PDF is an approved international ISO standard ISO 32000-1. Furthermore, the international standard PDF/X ISO 15930 determines the PDF files suitable for print preparation, the international standard PDF/A ISO 19005 establishes requirements for the archival processing of documents. PDF should however be used with some caution, as this format makes reusing data difficult or almost impossible.

HTML – Hyper Text Markup Language – XHTML (Extensible HyperText Markup Language)

HTML is a markup language used for websites. Web browsers are required to download HTML documents (files) from the web and view them. HTML separates the attributes of content, view and other objects from one another. HTML only determines the structure of the document, but allows including other scripts on the website, primarily JavaScript and CSS, which describe the design of the website. Public sector websites could be in the XHTML language. XHTML (Extensible HyperText Markup Language) is a language used for creating websites. XHTML is a HTML language which has been realised in XML.

XML – Extensible Markup Language

XML is a markup language for general purposes recommended by the W3C, the aim of which is to share structured information between various information systems, primarily in the web-based applications of the Internet (intranet). XML can be expanded, which means that it is possible to define elements from the setting of a task. XML is the basis for several other languages, such as XHTML, RDF, OWL, RSS, MathML, GraphML, MusicXML, XSIL, SVG, GML, XBRL, SOAP, WSDL and thousands of others. The XML language is used to exchange data in the X-Road environment, the DVK; all forms of the state portal eesti.ee are realised in the XML language. A storage of XML metadata is being created as an extension of RIHA. Legislation is presented as XML on the website of the State Gazette. XML is the main technology of information exchange between information systems. XML documents are transformed into XMTL, ODF or PDF formats for users.

PNG – Portable Network Graphics

PNG is suitable for presenting raster images. It is recommended that the PNG format be used everywhere instead of GIF. In the case of large image files, the JPEG format is also permitted and in the case of applications requiring preservation of quality, the TIFF format.

SVG – Scalable Vector Graphics

SVG is a language based on XML, describing both static and dynamic (i.e. interactive and animated) two-dimensional vector graphics. The SVG specification is an open standard of W3C. The SVG images and their behaviour are determined in a text file based on XML. It means that the texts in them can be searched and indexed. Modern browsers support the SVG markup language without the help of external programmes, only Microsoft's Internet Explorer is going to get SVG support with its 9th version.

BDOC

The BDOC standard determines XML formats for improved electronic signatures, which have long-term verification value, are in conformity with the relevant European directive and include useful additional information for the cases of regular use. This additional material also contains verification material about the validity of the signature, which can be used even if the verifier or person who gave the signature tries to deny the validity of the signa-ture later. The Estonian public sector is currently switching from the DDOC format used until now to BDOC. Files in any formats can be signed.

The public sector's switch to polite formats is coordinated by a software work group established by the Ministry of Economic Affairs and Communications.

2.1.3
How High Does the Stork Fly?

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What could the IT world and the stork have in common? Quite a bit, as it turns out. In addition to storks being responsible for delivering tiny IT men, the pan-European pilot project STORK (Secure identiTy acrOss boRders linKed) has delivered the interoperability of e-identities for Europe.

The owners of Estonian ID-cards, digi-IDs and mobile-IDs are able to log into the e-services of other countries.

What had remained a dream for many long years became reality in 2010. The owners of Estonian ID-cards, digi-IDs and mobile-IDs[67] are able to log into the e-services of other countries. And vice versa – our e-services are open to foreigners. Naturally, we are not talking about all foreigners or all e-services. But more about this below.

The whole system functions on the principle of mutual trust. All countries have their "e-border guards", i.e. PEPSs (Pan-European Proxy Service), which communicate with one another. Domestic e-services, however, only communicate with the domestic PEPS. So those that provide services do not need to know anything about the complexity of foreign systems. If foreigners want to access e-services, they are sent back to their own countries to authenticate themselves through their domestic PEPS. The results of authentication return via the same route and the e-service learns the identity of the user. And nothing more to it.

The consortium of STORK includes 17 countries and 32 organisations, and thus coordinating of all them has been quite a task. Four counties have just joined and connecting them to the network is still underway. AS Sertifitseerimiskeskus (Certification Centre Ltd.) from Estonia is a full member of the consortium, but it is not alone – providers of e-services are also needed!

The project has a total of six implementation pilots, with Estonia participating in five of them. We are one of the most successful – most countries only participate in one or two pilot projects. We also proceed from the principle of allowing users from all countries to participate in the consortium to access our services, even though we are only under the obligation to grant access to the participants in certain pilot projects. But now more about the pilots.

We are able to enter the services of Austria, Belgium, Portugal and Germany; they and several other countries are able to enter eesti.ee.

The first implementation pilot is authentication of a general type, typical in state portals similar to our eesti.ee. We are able to enter the services of Austria, Belgium, Portugal and Germany; they and several other countries are able to enter eesti.ee.

The second implementation pilot deals with a safe communication environment – strong authentication ensures paedophile-free lives for young people communicating online. Estonia does not participate in this, because we do not understand how the youth can be made to prefer one specific communication environment over another...

The third contains university services. We are primarily talking about filing applications forms for admission in an authenticated way. Some universities also offer local services – for example, you can authenticate yourself with an Estonian ID-card and be able to wander in the e-school system of the Technical University of Graz in Austria (of course only if you are a student of the school). From our side, we offer admission to local universities through the admissions information system www.sais.ee.

The name of the fourth pilot is "e-delivery", i.e. we are speaking about a phenomenon resembling registered post in the electronic environment. If you receive a letter, you will have to give a digital signature before it is handed over to you. Such a service has already been used in several countries and it has officially replaced registered post. We have improved our DigiDoc Portal so that it can be accessed by foreigners and created the option of "registered sharing". We have access to the e-delivery environments of Austria and Slovenia.

Registering your place of residence is considered important everywhere, even if you go to live abroad. This is why the fifth implementation pilot of the STORK has ▸

67 http://www.id.ee/?id=10995

E-services are the best way to support the main principle of the EU – the free movement of goods, services and people.

built a system for exchanging address declarations. You move to Portugal, register your address and receive a digitally signed PDF from the Portuguese e-services with the help of your Estonian ID-card. Then you enter the portal eesti.ee and upload the PDF file. This way, the Population Register gets high quality proof about your new place of residence. Portugal, Spain, Sweden and Slovenia also participate in the pilot.

The last and probably the most beneficial implementation pilot is the STORKification of the integrated authentication portal of the e-services of the European Commission – the ECAS. This provides access to several services of significant interest, such as the Internal Market Information System and the European Research Participant Portal (FP7). Instead of the former password-based authentication, it is now possible to use a strong national e-identity, such as an ID-card.

The project STORK will come to an end at the end of 2011. A lot of work is currently being done regarding the sustainability issues of the project. Most partners realise the value of the e-authentication infrastructure created and have declared that they will not finish work and unplug their PEPSs when the project ends. E-services are the best means for supporting the main principle of the European Union – the free movement of goods, services and people – and an integrated identification and authentication system is the backbone of pan-European services.

Have a long flight, stork!

2.1.4

How to Catch Wind on a Field? Introduction of the e-Census in Estonia

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The wish of Estonian people to take care of business precisely at the time convenient for them gave an idea to Statistics Estonia to take the census of the year 2011 into the Internet, where everyone can fill in the questionnaires of the census themselves.

By the final days of the previous census in 2000, it had become apparent that the 11th census could not be conducted the same way that they had been conducted in Estonia since 1881. Even though the details have always been different, Estonian censuses have been organised in two ways: either people have filled in the questionnaires brought to them and the enumerators have come to collect them later, or the enumerators have been going door to door interviewing people. The first approach was used selectively in the case of the censuses of the Republic of Estonia in the years 1920–1930, while the second type was introduced with the establishing of the Soviet regime. Other countries of the world also use very different methods for conducting censuses – from those described to censuses only based on the data available in national registers. The latter is for example used in Nordic countries, but Estonia has also set its sights on using this method by the time of the next census in 2021. This time, 16 countries over the world are known to give people the chance to participate in an e-census, i.e. complete the questionnaire on the Internet (the census of 2010–2011).

Mobile Population

The 10th census of Estonia, which took place in the year 2000, indicated a great mobility among people and difficulties in interviewing them – some work in other cities and arrive home late at night, some have temporarily moved abroad, some can never be found at home even after several visits by an enumerator. However, it is not possible to make compromises, because the whole population has to be interviewed within the determined timeframe of the census. The more the enumerator has to return to the same door, the more expensive the census will be for the taxpayer. If we fail to count a significant part of population, however, the data gathered with the census has no value. We do not learn the actual number of population or the numeral proportions of different age groups, and are also unable to prepare statistics about smaller areas that we do not get with smaller selective inquiries. The mobility of people naturally differs by areas, but the difficulties caused by it in terms of organising traditional censuses have been experienced everywhere in Europe. This pointed out the inevitable need for change in organising an extensive statistical action involving all people in Estonia once a decade.

In the course of the trial census of the Population and Housing Census of the year 2011 (REL2011) conducted at the end of 2009 and in the beginning of 2010, where we tested the methods, IT solutions and general organisation of the work developed, we also had to admit that reaching a significant share of the population was like catching the wind on a field. The trial census was conducted in nine local governments of Estonia, whereat the areas chosen for the census were as different as possible – cities, small settlements, apartment buildings and private houses, new districts and already established settlements. We interviewed a total of more than 10,000 people. The residents of cities and new suburban districts were the most difficult to reach, because mostly younger and very mobile people live there.

Reaching a significant share of the population is like catching the wind on a field.

Enumeration Must be Convenient

Another clear trend is that the residents of Estonia expect and are in the habit of taking care of business over the Internet. This is revealed by the fact that more than 90% of individuals file their income declarations electronically, the participation percentage in e-voting increases each time, online banks are used extensively and people are able to found companies over the Internet in less than a half an hour. Other similar examples can be given, but all of them support the expectation to be able to solve an issue in a preferred and quick way, and choose the most convenient of all possible options. ▸

For the first time in the history of Estonian censuses, the e-census was tested during the trial census of REL 2011.

For the first time in the history of Estonian censuses, the e-census was also used in the course of the trial census of REL 2011, i.e. people were given the chance to fill in the census questionnaire on the Internet in a web environment specially designed for this purpose. The trial census was conducted in such an order that people were first given the option of filling in the census questionnaires on the Internet and those who did not were later visited by an enumerator. The result largely confirmed the results of a market research conducted in 2005–2006, according to which, a significant share of people were ready to participate in an e-census. 21.4% of the trial census sample participated in the e-census. In addition, more than 3,500 interested residents simply tested the online questionnaire and provided feedback for developing the replying environment. The willingness of people to fill in the questionnaires on the Internet has encouraged Statistics Estonia to set a goal for the census of the year 2011 to interview 25% of the population through an e-census.

The lives of the 2,000 enumerators interviewing the people not participating in the e-census will also be easier, because for the first time, the enumerators will be typing the census questionnaires in their laptops and the data will be sent to the servers of Statistics Estonia through secured channels. Under regular circumstances, no paper questionnaires will be filled in. At the same time, the organisers of the census will for the first time have a constant overview of the amount of work done, which will enable them to estimate whether the census is carried out as scheduled. During the last census, this still meant extensive reporting on paper for the 4,600 enumerators.

Results of the Census Matter

The objective of the 2011 census is to interview 25% of the population through e-census.

All census organisers in free societies have been faced with the great mobility of people and the difficulties in reaching them. Since the main value of a census lies in interviewing the whole population, participating in it has mostly been made compulsory by law. In some countries, it is even possible to implement fines in the case of failing to participate (for example, 250–2,500 euros in Luxembourg). Thus, in order to increase the participation rate in censuses, methods fitting with people's daily routines are sought all over the world to ensure that reliable statistics are obtained as a result of the censuses. It is impossible to make compromises in respect to quality, as the statistics received are used in making daily decisions. Thus, the statistics gathered with the census have an effect on the lives of everyone in Estonia. Estonia is such a small country that literally every single person matters.

The Population and Housing Census of the year 2011

Interviewed as at	31.12.2011 at 00.00
Time of the census	31.12.2011–31.03.2012
e-Census	31.12.2011–31.01.2012
Interviews	16.02–31.03.2012

2.1.5

Status of Developing the Digital Archive at the National Archives in 2010

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The main developmental task of the National Archives for the years 2008–2012 is the development of a fully functional digital archive. The creation of the functionality of the digital archive is at least at first primarily directed at public sector institutions so as to provide them with the possibility of transferring digitally received and produced documents in a secure and controlled way. Currently, everyday users of archives mainly examine digitised or paper-based church registers, headcounts, official reports and correspondence in the virtual reading room on the web, but to this day also in the reading rooms of conventional archives. For them, the documents given to the modern digital archives will become significant and interesting perhaps after decades or centuries. But in order to make it possible for us to use the documents electronically created by institutions in the future, to be able to rely on their preservation and authenticity, the National Archives are in the middle of the process of creating a proper digital archive.

Digital Archive Software

Based on the analysis, architecture and procedural model of the digital archive software system carried through in the years 2006–2007, the National Archives organised a public procurement in 2008 to enter into a framework contract for the delivery of software modules for the digital archive. The aim of the procurement was to find the three best software companies who would deliver the software modules for the digital archive to the National Archives within three years. The successful companies were AS Webmedia, AS Helmes and AS TietoEnator Eesti (the name was later changed to AS Tieto Estonia) and in September 2008, the National Archives entered into framework contracts with them. Due to budget cuts, it was impossible to order the software developments of the digital archive within the framework contract in 2008.

As a result of the applications filed by the National Archives, the development of the software of the digital archive was approved as one of the priority IT investments of the state, funded with the means from the Structural Funds on the basis of annual decisions. The development project of the digital archive has been divided into three stages and by now, the first two have been approved in the investment plan of the priority "Development of the Information Society" of the "Operational Programme for the Development of Economic Environment" by the Government of the Republic:

- the project of the functionality of ingesting documents to the digital archive of the National Archives approved on 28 May 2009 in the amount of 7 million kroons (period of the project 2009–2010);
- the project of the functionality of long-term preservation in the digital archive of the National Archives approved on 1 July 2010 in the amount of 8 million kroons (period of the project 2010–2011).

The third stage will be the project of the functionality of access to and use of the digital archive in the years 2011–2012.

A procurement for the creation of a reception module of the digital archive was carried though in the summer of 2009 within the framework contract of the digital archive. It appeared from the tenders submitted by the participating companies that AS Helmes and AS Webmedia had proceeded from creating a new software based on freeware components. The tender of AS Tieto Estonia involved the introduction and improvement of the existing digital archive software Tessella Safety Deposit Box 4 (SDB4) according to the needs of the National Archives. The tender of Tieto Estonia turned out to be the best and the contract costing 3.195 million kroons was entered into in September 2009. The work was finished in May 2010.

The software Tessella SDB used in the reception module was developed by the British software company Tessella on the order of the British National Archives and is mainly used by the national archives of the United Kingdom, Switzerland, Malaysia, Holland and the USA, the central digital archive of the public sector of Austria, the British National Library and the library of the ▸

The decision of the National Archives to partly rely on its existing software in developing the digital archive software arose from the wish to involve the information and experience gathered by the countries respected in the field of digital archiving into the development and also have a say in the global creation of the respective know-how.

Wellcome Trust. The decision of the National Archives to partly rely on its existing soft-ware in developing the digital archive software arose from the wish to involve the information and experience gathered by the countries respected in the field of digital archiving into the development and also have a say in the global creation of the respective know-how.

When the ingest module was completed, another software procurement was organised within the framework contract to create the module of technical records of the digital archive. This was also won by AS Tieto Estonia. The implementation and localisation of the software Tessella SDB4 was continued with them. The contract costing 1,848,600 kroons was entered into in June 2010 and the performed works and created software were delivered in December 2010. The task of the module of technical records is to administer the technical metadata of digital and digitised case files and to enable the creation and activation of inquiries and reports about this data.

At the end of 2010, the National Archives were ready to accept digital documents from institutions. In 2011, work will be carried out on the implementation of the storage module of the digital archive. The aim is to ensure the ability of controlled long-term preservation of documents in the digital archive by the end of the year. This will be followed by updating the archival information system and the creation of the access module to the digital archive in the year 2012.

Universal Archiving Module

Apart from the modules of digital archive software running in the servers of the National Archives, important software components are also created at the National Archives. The goal of the development is to assist the archivists of institutions in transferring digital documents and descriptions of documents to the National Archives. The universal archiving module (UAM) is software installed into the computer of a archivist of an institution, where the archivist can import descriptions of documents and document files from the electronic records management system (ERMS) of the institution, organise and describe them, and finally form XML capsules of documents and send them to the National Archives. A precondition for using UAM is that the ERMS of the respective institution has been interfaced with UAM before, synchronising the data exported from the ERMS with the XML import format of UAM. It is also possible to send only the descriptions of documents through UAM, for example in the case of paper documents being registered in the ERMS, which enables making the descriptions of paper documents usable in the AIS without any further need for entering data.

Apart from the modules of digital archive software running in the servers of the National Archives, important software components are also created at the National Archives. The goal of the development is to assist the archivists of institutions in transferring digital documents and descriptions of documents to the National Archives.

The creation of UAM begun in the year 2007 by conducting an analysis and the first software version was created in cooperation with AS Webmedia in 2008. It was updated in 2009 on the basis of the feedback received. The total cost of creating the software amounted to 2.4 million kroons.

UAM was first interfaced with the ERMS GoPro Case of the Tartu City Government in the year 2008 and in the course of the pilot project, digital copies of 660 documents were sent to the National Archives (files on the legislation of the Tartu City Government from the 1990s).

In 2010, UAM was interfaced with the records management system of the Government Office (also GoPro Case, but a markedly different set-up) and the first digital original computer files were transferred. The documents transferred were materials of archival value from the years 1997–2009 of the office of the Minister of Ethnic Affairs, which was terminated in 2009 (both paper-based and digitally produced documents). The National Archives received 302 case files, 192 of which were paper-based case files and 105 digital case files. The digital case files included a total of 232 digital documents and 493 computer files. The archival scheme, descriptions of paper-based case files and digital case files along with their descriptions were transferred through the Document Exchange Center with the help of UAM. The digital documents included computer files in several different formats (DDOC, DOC, PDF, CSV, TXT, XML, RTF). The files which were not in archival formats were migrated into archival formats (as a rule, into PDF) in UAM and both the original and migrated files were sent to the National Archives. The project of transferring proceeded in cooperation of the Digital Preservation Bureau of the National Archives and the Department of Records Management of the Government Office quite smoothly,

although solutions needed to be found in the course of the project for several principle issues arising for the first time and setting a precedent as well as to technical problems arising from the implementation of the software.

The archivists of the National Archives have also begun to use UAM for creating descriptions of archived materials and for making rearrangements in the internal operations of the archive.

UAM is a unique solution among all national archives and digital archive software applications in the world. The software enables to standardise the descriptions of documents and send documents to the central digital archive in a uniform format in the form of XML capsules in a situation where documents are produced in many different records management systems in very different non-standard forms. Other countries mostly use the approach where national archives demand the ERMSs of institutions to issue and send documents in a format established by the national archive, which means that the validation and inspection of the conformity of documents upon transfer is very complicated, time-consuming and probably full of errors for the National Archives. With the help of UAM, however, the digital documents of the National Archives of Estonia are made to conform to the standard one – upon interfacing the ERMS with UAM – and all validation inspections are performed by the archivist of the institution before transfer.

The universal archiving module has been introduced to the representatives of the digital archives of other countries at various meetings and several international conferences, where it has received significant attention.

2.1.6
VOLIS

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For quite a long time, local governments have been searching for software solutions that would support the work of councils and governments. For example, records management software applications have been interfaced with the X-Road, web broadcasts of the sessions of some councils have been made and there are local governments where the drafts of planned legislation are also put up on the web for the public to discuss. A universally usable and modern solution, which would connect these and many other e-services and provide the option of local e-government to all interested parties, irrespective of the financial capacity of the local government to invest in software development, has however been missing so far.

VOLIS enables to involve local residents in the administration of the local government, thus also acting as a public service directed at the residents.

VOLIS (information system of councils) is a new software solution, which follows the best practices of e-governance and facilitates the operations of the local governments of Estonia. The information system enables to involve local residents in the administration of the local government, thus also acting as a public service directed at the residents. VOLIS creates operating environments for the members of councils and local governments and shows the public what is happening at the sessions along with the agenda, voting results and the minutes through the Internet.

The software solution created within the project follows the state's principles for IT architecture and IT interoperability, is secure and conforms to the requirements of personal data protection. VOLIS is compatible with the records management software applications equipped with the X-Road interface and is suitable to function with several other software solutions developed for the state and local governments, such as KOVTP, i.e. the service portal for local governments (automatic renewal of the membership of local councils, entering session materials, etc).

The main testing of VOLIS was carried through and is still happening in the local governments of Jõgeva County, where the software is actually used in the work of governments and councils.

Implementation of VOLIS is Flexible

VOLIS can carry out virtual council sessions.

VOLIS can be adjusted according to local requirements, from introducing a paper-free work environment to carrying trough virtual council sessions. The information system of councils can also be used if not all members of the council approve of the paper-free work method – their participation can be entered into the information system by the clerk. If, however, a local government is not yet ready to carry out digital voting, then the software can still be used to make the session materials and the events of the session public and to direct draft legislation to council members.

VOLIS creates an online operating environment for the members of local councils and governments, enabling to carry out all work processes preceding sessions, including the meetings of committees. The software solution also involves expanded possibilities for using ID-cards and mobile-IDs[68], with the help of which it is possible to conduct the council's sessions and voting. Members of councils and governments are also able to participate in sessions virtually through the Internet, use the options of intra-group messaging and commenting on drafts and communicating with residents directly through a secure e-channel.

Residents are able to watch broadcasts of sessions in the VOLIS environment, read session materials and comment on them, make suggestions and also initiate drafts and the collection of digital signatures to support these drafts.

Including Integral Solutions

The uniqueness of VOLIS lies primarily in it being an integral environment, which covers all work processes of councils completely, including the communication with the residents of the city or parish. Using the functions of VOLIS through separate software programmes,

68 http://www.id.ee/?id=10995

one would need office software, for example software for video- and conference calls, software for conducting conferences or sessions, including software for conducting votes, environment for forums, a data register and a secure solution for authenticating and authorising users. All this has been put together in VOLIS, given a uniform design, convenient method of use and interfaces to other information systems.

Several innovative solutions were created in the course of developing VOLIS.

Voting System

In order to ensure objective voting results, voting must begin simultaneously for all members of the council. That means that the voting signal must arrive from the computer of the session's clerk to the server of VOLIS and then appear as a voting button in the computers of council members. All this happens within a fraction of a second and at the same time for everyone, regardless of the council member's location. By testing various environments, solutions and situations, the developer Smartlink has created a system for voting that conforms to the requirements.

Self-Writing Minutes

Information about the council session taking place reaches the public in real time through a video broadcast and entries into the session's minutes. Depending on which procedures of the session are being carried out at a certain point, the information system of VOLIS prepares the minutes itself. As a result, all procedural acts taking place over the course of a meeting (e.g. attendance check, entries and exits of members, questions and being granted permission to speak, votes and the results of votes, proceedings of amendment propositions, amendments made to documents in real time, etc) are immediately reflected in the minutes of the session displayed to the members of the council and the public. All procedural acts are linked with dates, and on the basis of these it is possible to connect the act with viewing the recording of the video broadcast of the session. Thus, shorthand notes of sessions are no longer needed.

Participating in Sessions in Real Time

In addition to being able to view sessions in the web in the environment of VOLIS in real time, VOLIS also enables participating in sessions virtually – it is possible to show the web camera feed of a council member participating virtually and transmit it to the council session room and the public. So the members who are physically located elsewhere are still fully connected with everything happening at the session and their contribution extends from pushing the voting button to participating in discussions. The only thing one has to consider is the approximately 2-second delay in broadcasting the video coverage to the public.

Documentary Procedures Fully Connected with the Records Management of the Local Government

The records management part of VOLIS is created for interoperation with the records management system used in local governments to avoid the duplication of data. The folders of VOLIS synchronise themselves with folders in the records management software of local governments.

Provision and Cost of the Service

The developer of VOLIS and the company providing this service to local governments is Smartlink OÜ. According to the public procurement, the cost of the service provided to local government is 64 euros per month including value added tax. The service includes software hosting, user support and maintenance of the solution.

Further Developments

Updating VOLIS began when creating the software came to an end and the process is continuous. Changes are naturally made in a separate development environment. From there, they are transferred to the testing environment to receive feedback from users.

Updating VOLIS began when creating the software came to an end and the process is continuous.

The following are the current key directions:

› better multimedia. The developers are working on making it possible to broadcast video images without disruptions even in the case of slow Internet connections;

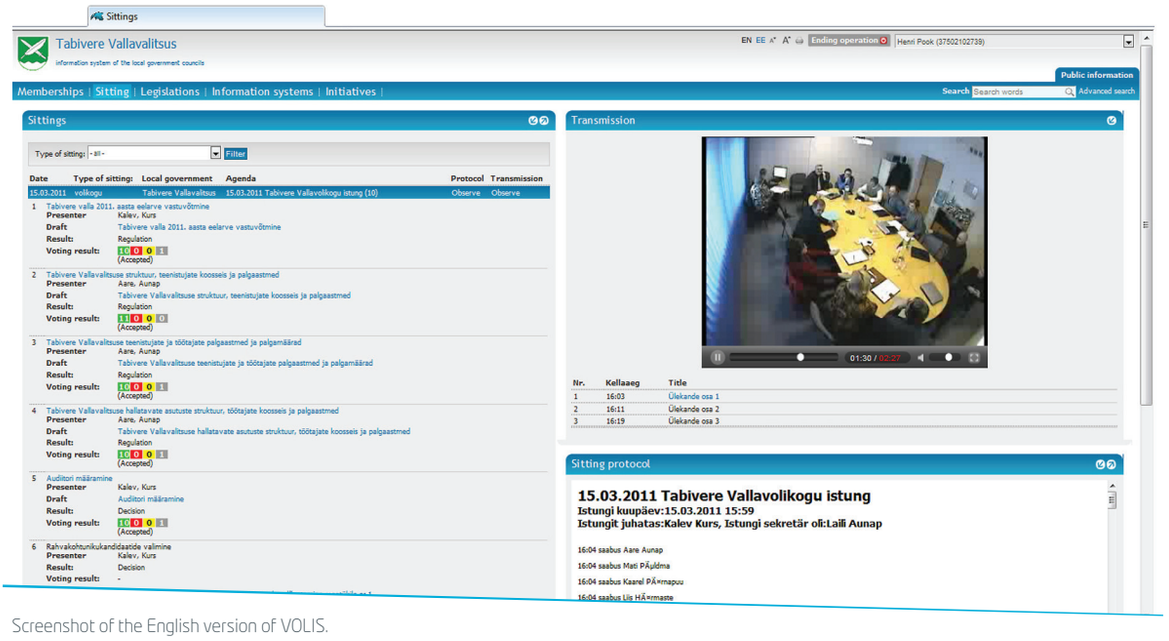
› even more flexible connection with the records management of local governments. The current direction is towards making the process of producing documents as smooth as possible, towards the procedure beginning in the records management of local ▸

governments and moving between different applications automatically;

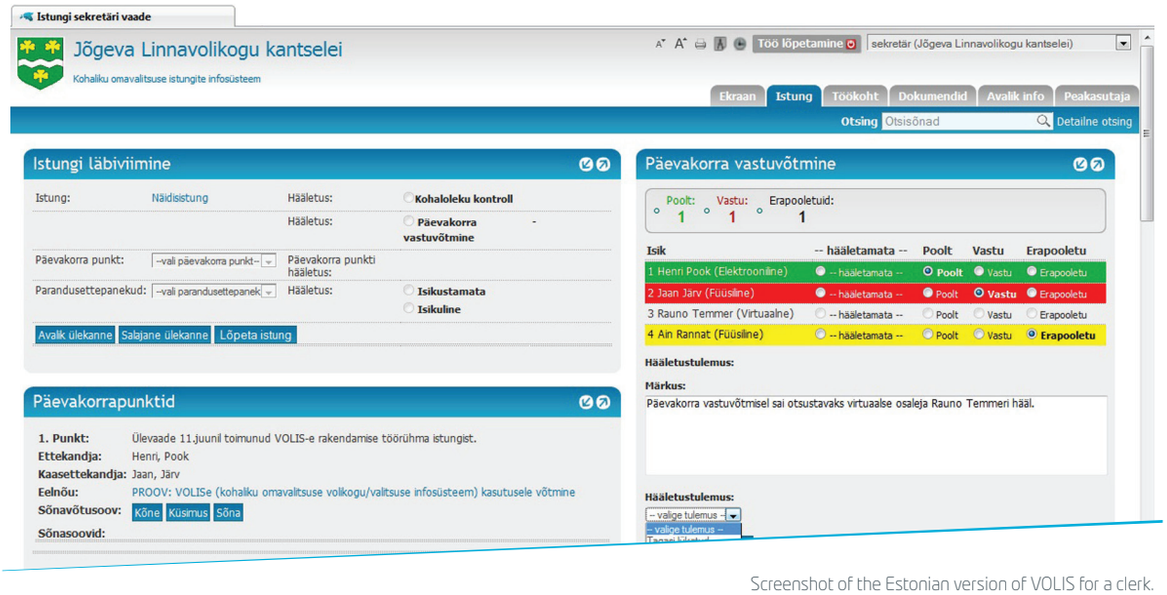
› higher capacity. The developers are working on strengthening the server solution of VOLIS to ensure its ability to endure the load in a situation where the service of VOLIS is being tested and used by more and more local governments.

The testing environment of VOLIS is located at the address https://test.smartlink.ee.

The live environment of VOLIS is located at the address www.volis.ee.



Screenshot of the English version of VOLIS.



Screenshot of the Estonian version of VOLIS for a clerk.

2.1.7

Websites of Local Governments

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Several public sector institutions (the Data Protection Inspectorate, the National Audit Office of Estonia e.g.) and many citizens have pointed out the diverse community of the websites of local governments. Although local governments mainly provide the same public services, both the content and structure of their websites are largely solved in different ways. For citizens, this is inconvenient, as finding information about several different local governments means complicated web surfing and takes up a lot of time.

The aim of the project "Service portal for local governments"[69] initiated by the Ministry of the Interior was to improve the accessibility of the information and services provided by local governments via the Internet. Citizens must find the information published on the websites of local governments easily. However, there is also the underlying principle that a website of a local government is not just an environment for providing services – it must also offer local communities the chance to give feedback and the possibility to participate in decision-making processes.

Plenty of Options

The aim of the solution was to improve the accessibility of services on local government websites.

By now, a modern website administration system has been prepared for local governments. The solution was created with the aim to synchronise the accessibility of services on the websites of local governments and to offer all public services in one singe environment on the same basis to all citizens and in a way that would be as simple and comprehendible as possible.

KOVTP (service portal for local authorities) has many default functions: ID-card support, map application, e-forms, an event calendar, a message board, connections with other public registers. It is also possible to link the websites of divisions, associations, non-profit associations, family physicians etc with the portal. This way, the connection with residents is better: all the important subjects are there in one environment and proceedings are quicker than before.

Information architecture for the websites of local governments was proposed in the course of the project. It is recommended to all local governments joining the system and is essential from the viewpoint of the citizens, since the websites of local governments currently have very different information architectures. This, however, means that finding information is complicated.

The new technical functionality allows citizens to submit applications and declarations to the local government through the website.

In regards to services, a technical option created for local governments has been created to enable citizens to submit applications and petitions to local governments through the website. A large amount of electronic forms was prepared to allow all local governments to offer their citizens the possibility of submitting applications and petitions through the website. For example, an application for a place in a nursery school, application for the enrolment into first grade at school, etc.

The project exploited the already existing functionalities of several public information systems (the X-Road, the Document Exchange System, etc). The information system is also connected to the document register of local governments, ensuring that the electronic forms entered through the websites always arrive in the right place.

The system will cost 31.89 euros per month for one local government, including the hosting of the information system, the administration of the information system and user support.

The project will be funded from the EU Structural Funds and its development cost 2.9 million kroons. The executors of the project were OÜ OK Interactive and OÜ Smartlink.

69 http://www.kovtp.ee

2.1.8

Activities Related to Cyber Security in 2010

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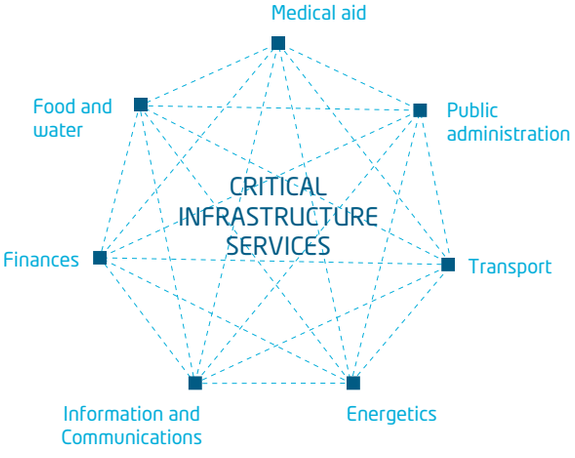
Countries' economies and societies are becoming increasingly dependent on IT solutions. Business enterprises use IT solutions in order to organise business processes as effectively as possible and provide high-quality business solutions. State and local government agencies use IT solutions to manage interagency affairs as effectively as possible and serve citizens in the best possible manner. And citizens use various e-services to handle their everyday affairs as easily and quickly as possible, e.g. to pay bills in Internet banks, submit electricity meter readings, declare taxes in the e-Tax Board, apply for necessary state benefits, pay for parking by phone, e-vote, etc.

In recent years, our reliance on IT solutions has increased considerably. It is unlikely that our dependence on IT solutions will lessen in the coming years – rather, it will continue to increase. Malfunctioning information systems can have a significant effect on the operation of a business enterprise and/or a state agency and thereby also on serving the customers/citizens. From the perspective of the state's functioning, the operation of vital services – at least those services that we need on a daily basis – is especially important.

What is CII in Estonia?

The Emergency Preparedness Act adopted in 2009 lists 41 vital services, many of which require the operation of IT and/or communications solutions in order to function. The manner and extent to which IT solutions support vital services were mapped and determined in the framework of the project for mapping critical information infrastructure (hereinafter CII). In the course of the project, representatives of vital service providers and agencies organising these services were visited and interviewed. That resulted in quite a good overview of how business and/or public services are provided and what IT solutions are used for.

Collecting these data cannot be a one-time activity, given that business processes change and develop over time, technological solutions are advanced, and the way in which IT solutions are used in providing services changes. Accordingly, the providers of vital services will also be renewing these data in the future, i.e. they will be performing sustainability risk analyses, which include descriptions of the abovementioned circumstances, among other things.



CII Risks

Malware is much more widespread, cyber attacks have become increasingly more professional.

Following and analysing the developments that have occurred in cyber space in recent years, it is quite clear that the situation has worsened. Malware is much more widespread, cyber attacks have become increasingly more professional, cyber crime is on the rise, the organisation and management level of attacks is higher, attackers are more specialised in particular activities, etc.

Looking at the events of 2010, it is hard to ignore the discovery of the malware called Stuxnet. Stuxnet[70] is the first known and relatively widespread malware targeted against management and control systems (SCADA[71] – supervisory control and data acquisition). The creation and circulation of such malware was already predicted several years ago, but now it has happened. Those involved in the critical infrastructure protection of states should take it as a major warning sign. The existing security measures must be reviewed critically and it must

70 http://en.wikipedia.org/wiki/Stuxnet

71 http://en.wikipedia.org/wiki/SCADA

be evaluated whether or not they are sufficient for the protection of the systems ensuring the provision of vital services. If a sufficient level of protection is not ensured, additional security measures should be applied to minimise or prevent the spreading of Stuxnet or similar malware.

Providers of vital services must compile a sustainability risk analysis as well as a sustainability plan pursuant to the Emergency Preparedness Act. The evaluation of risks related to IT systems is part of a greater risk analysis. The agencies organising vital services will make summaries of the risk analyses performed by the providers of vital services to submit these to the Ministry of the Interior.

The risk analyses should make clear the risks related to the provision of vital services and whether or not we want to accept those risks.

The risk analyses should make clear the risks related to the provision of vital services and whether or not we want to accept those risks. If not, additional security measures should be developed and applied in order to achieve sufficient protection.

Emergency: Large-Scale Cyber Attack

Pursuant to the Emergency Preparedness Act, a risk analysis and solution plan for the emergency "Large-scale Cyber Attack" must be compiled. In 2010, an emergency solution plan was prepared, explaining in practical terms what is considered a large-scale cyber-attack, what are the roles and duties of various parties in resolving the emergency, how is information exchanged, how is the general public informed, etc. The compilation of the risk analysis for the emergency "Large-scale Cyber Attack" will be commenced in the first half of 2011.

Cyber Exercises

In 2010, two important exercises related to the protection of critical information infrastructure protection were conducted. The first pan-European cyber protection exercise Cyber Europe 2010 took place in November. The exercise was carried out with the participation of the member states of the European Union and EFTA (the European Free Trade Association). The exercise was organised and managed by the ENISA (European Network and Information Security Agency) and technically supported by the European Union Joint Research Centre. The exercise was primarily aimed at testing transnational contacts and communication in the event of a large-scale cyber attack.

In addition, an exercise called Tallinn CIIP 2010, which mostly addressed topics related to critical information infrastructure protection, took place in Estonia. According to the organisers of the exercise, the main emphasis was on testing the process of management level decision-making during a cyber attack. The exercise involved most of the major Estonian state agencies as well as several important private sector agencies. Given that it was the first exercise of its kind, many valuable lessons were learnt in terms of what must be taken into account when organising future exercises.

Many developed countries consider cyber security exercises very important and some have been organising them for several years already. In Estonia, as well, more attention should be paid and resources contributed to the organisation of cyber security exercises on various levels. These can be exercises on the level of agencies providing a vital service, national exercises, or even transnational ones.

In Estonia, as well, more attention should be paid and resources contributed to organize cyber security exercises on various levels.

CII Protection Information Day and Training Programmes

In launching the CII protection system and activities, it is important to share information with each other. Communication between the provider of a vital service and the agency organising the supply of the service is essential, but an exchange of experiences between service providers sounds also like a good plan.

With that in mind, a CII protection information day, targeted mostly at the risk managers of vital service providers, was organised. During the information day, risk managers shared experiences about performing risk analyses as well as information on near-future plans.

In 2010, IT risk analysis training programmes were launched and will no doubt continue also in 2011.

Just as security assurance is a continuous process, CII protection activities are also going to be important in the coming years. Our dependence on IT is quite extensive and continues to increase; the dangers looming in cyber space are also on the rise, and the topics of CII protection must be addressed continually and seriously to protect the systems essential for the state.

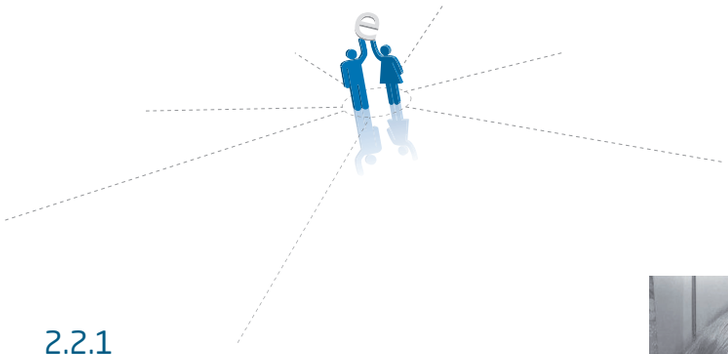
Terms

Critical infrastructure – assets, services and systems or their parts and the interconnections between systems whose destruction, damage or occupation might endanger the life or health of people or lead to the destruction of property, service, system or their parts or extensive economic loss and cause a decline in the public sense of security, reduce the credibility of the state, damage the state's reputation and paralyse its functions.

Critical information infrastructure – components of the information infrastructure that are either critical themselves or essential for the functioning of critical infrastructure.

Critical information infrastructures include several economic sectors, such as banking and finance, transport, energy, utilities, health, provision of food and communications, but also many services provided by government agencies.

Developing User-Friendly e-Services



2.2.1 Information Systems Must Work for the Benefit of the Estonian Unemployment Insurance Fund and for the Unemployed

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Since 2009, several IT-related leaps have been made in providing services and paying benefits to the unemployed. In May 2009, the Unemployment Insurance Fund, which had previously been involved only in managing insurance resources and paying insurance benefits, was given a new important task – to provide services necessary for getting a job to the unemployed. We then decided at once that labour market services can be provided efficiently and properly only with the support of a top-quality information system. By now, that decision has clearly justified itself: thanks to IT solutions, we can spare the time of both customers and employees, save on paper, and are able to provide convenient self-service options to our customers.

Processing System, not a Registry of Operations

We already introduced a new information system, known within the Unemployment Insurance Fund by the abbreviation EMPIS, before the end of 2009. At first, the system only enabled registration, decision-making on unemployment benefits, removal from the registry, and managing individual job-seeking plans. The gains, however, were obvious from the start. Previously, in order to register or apply for the unemployment benefit, the job-seeker first had to fill in an application form on paper and then take it to a consultant, who would check the data provided by the job-seeker and enter them into the information system, whereas now, the job-seeker no longer needs to fill in a paper application. EMPIS takes as much data as possible from other registries through the X-Road, and all other necessary data will be inserted into the application by the consultant on the basis of documents and an interview. The consultant then prints the application from EMPIS, so that the customer would be able to review and sign it. The maximum use of data from other registries naturally ensures the legitimacy of the decision reached about the application better than before and also saves some time for the customer, since he or she needs to submit fewer documents on paper. In hindsight, it seems almost unbelievable that until November 2009, the employment services had no systematic way of checking whether the applicant was a student or received a salary, for instance, and therefore decisions sometimes had to be made in good faith.

In hindsight, it seems almost unbelievable that until November 2009, the employment services had no systematic way of checking whether the applicant was a student or received a salary.

EMPIS also helps the consultant in making decisions – up to creating the text of the decision. Earlier, the consultant had to write the text of the decision in a word processor, whereas the new information system is able to decide whether or not the person has the right to register as unemployed as well as to create the text required for the decision and after digital signing, send it promptly to the e-mail address of the applicant. The new information ▶

system thereby saves a considerable amount time for the customer, who has no need to fill in the paperwork, and the consultant, who has no need to formulate and mail the decisions. Paper-saving is just as important – before, all decisions had to be printed in two copies, while the digitally signed decisions delivered to the customer's e-mail address need not be printed at all. EMPIS automatically sends the data concerning the benefits and subsidies to be paid to the unemployed into the accounting information system. It is no exaggeration to say that the new information system was a very important success factor in helping the Unemployment Insurance Fund to cope with the explosive increase in the number of customers without having to increase the number of consultants in equal measure.

We Taught the Information System to Match an Unemployed Person with a Suitable Job Offer and Create Contracts for the Provision of Service

The second IT-related leap occurred in mid-2010, when the module for employment mediation and payment of wage subsidies was completed in EMPIS. That was followed by modules for job training, start-up assistance and other services in the autumn. The unemployed benefited the most from the new employment mediation module, since EMPIS automatically searches for suitable job offers for them and sends these to their e-mail addresses [71]. If an unemployed person has no e-mail address, EMPIS notifies the consultant of the unemployed, so that the consultant could inform the customer of the job offer by phone or during an appointment. As a result, the unemployed receive information on new job offers much more promptly. The importance of job offers sent directly to the unemployed or of a quick phone call from a consultant is proved by the positive feedback of the unemployed. But in addition to the unemployed, employers are also certain to benefit from a better screening of candidates and the prompt sending of job offers. The increased speed and quality of the service might be some of the reasons why employers trusted a record number of job offers to us to mediate in the previous year[72].

By the summer of 2010, we also taught EMPIS to create the texts of contracts needed for the payment of wage subsidies and to calculate the subsidy. The information system once again helped out the consultants at the last moment. Since the beginning of 2010, the amount of wage subsidy contracts had been growing steadily. Without the support of EMPIS, it would have been impossible to increase the number of the unemployed, who had found a job through wage subsidies, to 10,772 people at the end of the year (in 2009, the corresponding number was just 161). Thereby, an IT-related leap greatly supported the achievement of our essential goals by helping to match the unemployed and the employers more quickly and conclude a wage subsidy contract to support filling a job vacancy when possible.

Modules supporting the supply of different services have been completed one after another in EMPIS, all of them helping to save time. However, EMPIS does not contain the modules of all the services yet[73], because the Unemployment Insurance Fund offers so many different services to the unemployed and each service has its own so-called business logic.

We Created a Self-Service for the New Information System

Once the core of EMPIS had been created, we were ready for the third IT-related leap – establishing the self-service of the Unemployment Insurance Fund. The purpose of developing the self-service was to create an Unemployment Insurance Fund online customer service, where the unemployed, the employers and the partners of the Unemployment Insurance Fund could manage information and use different e-services. As with EMPIS, the first part completed in the self-service was a section concerning the main decisions and employment mediation that has been available for use since January 2011. New options are gradually added to the self-service environment hand-in-hand with developing the information systems within the Unemployment Insurance Fund.

Starting from January 2011, the self-service enables job-seekers to browse job offers, create a CV, apply for jobs, view the applications they have submitted to the Unemployment Insurance Fund and the corresponding decisions, and notify the Unemployment Insurance Fund of changes in their personal details or of starting a job. If a job-seeker is registered in the Unemployment Insurance Fund as unemployed, he or she can easily use the data entered into EMPIS to create a CV. Previously, job offers

71 EMPIS typically sends 14,000–15,000 e-mails a month with suitable job offers

72 The number of job offers mediated by the Unemployment Insurance Fund in 2010 was certainly also influenced by the more favourable rules for paying wage subsidies as well as the active notification of employers of the options offered by the Unemployment Insurance Fund

73 Services of smaller volumes are still provided with the support of the labour market and subsidy information system that was made available to the Unemployment Insurance Fund in 2009 together with the supply of the services

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could be looked up in an Excel table on the website of the Unemployment Insurance Fund. The options of the self-service are much more flexible and user-friendly. Although the self-service can and must still be advanced considerably, the initial feedback of job-seekers has been very positive. Therefore, we are sure of our decision to improve the self-service environment in the near future by adding the option of making an initial appointment at the Unemployment Insurance Fund, submit applications (e.g. applications for unemployment insurance benefit, start-up assistance, transportation benefit etc), manage appointments for repeat visits etc.

At the moment, the self-service enables employers to add and manage job offers, look for suitable candidates among the self-service users, manage the information of the job-seekers who have applied, and apply for redundancy benefits online[74]. In the future, the employer will also be able to sign a wage subsidy or a job training contract prepared by the Unemployment Insurance Fund, manage contracts and submit pay slip data needed for receiving wage subsidies in the self-service environment. The contractual partners of other services will be able to sign and manage their contracts through the self-service in the future as well.

To sum up, the development of both EMPIS and the self-service has justified itself and helped the Unemployment Insurance Fund to achieve its essential goals. We have seen how much the Unemployment Insurance Fund and its customers benefit from smart IT solutions. The development of information systems to this extent and within this time frame has meant an extremely stressful rate of development, but we will continue in the same spirit until all our services and processes have efficient and proper IT support.

74 The e-service of applying for redundancy benefits has already been in use since the beginning of 2009. Now, the same e-service can simply also be used through the new self-service

2.2.2

Charm of the Digital Prescription

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In January 2010, digital prescription was introduced in Estonia, i.e. a national data system – the Digital Prescription Centre – was taken into use for processing prescription medications. As a result, doctors can create prescriptions in their information system or in a relevant web environment, and the prescription is then sent to the Digital Prescription Centre. Pharmacists and chemists working in pharmacies have access to digital prescriptions either via their information system or the web environment of the Digital Prescription Centre, and medicines are dispensed to people presenting an identity document. The application of the project, like the execution of any major change, has been challenging to all parties. In what follows, we will try to give an overview of the technical solution of the information system created and the benefits its introduction has brought along.

Parties and Technical Solution of the Digital Prescription Centre

From the perspective of a prescription as a document, the digital prescription information system is a distributed system that involves the applications of medical institutions as well as pharmacies and interfaces several national databases/ registries. The central place belongs to the Digital Prescription Centre, which manages all created and realised digital prescriptions on the basis of the information provided by various parties.

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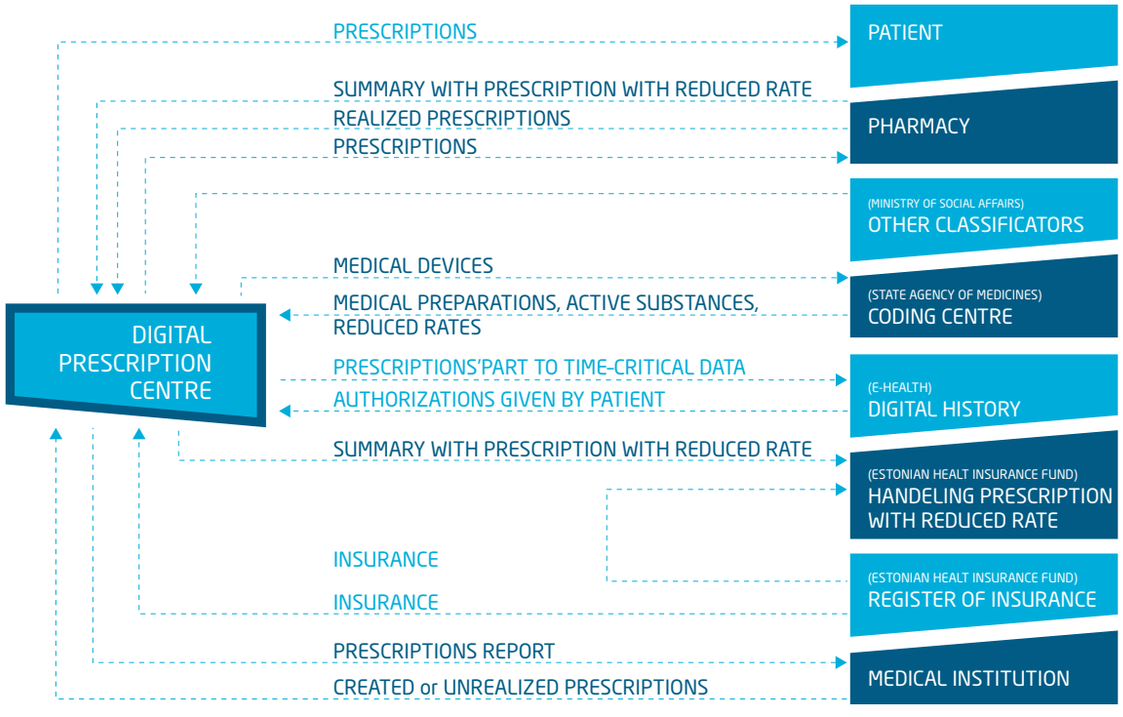

The Digital Prescription Centre, executed on a SAP ERP and PI platform, is directly interfaced with the financial accounting information system of the Estonian Health Insurance Fund. In that system, consolidated invoices are paid to pharmacies. The external information systems that the operation of the Digital Prescription Centre requires for data exchange are the registries for health service licences and health care professionals and pharmacists/chemists that are kept at the Health Board, the Coding Centre of the State Agency of Medicines and the registry for the handlers of medicines, information systems of hospitals and pharmacies. By means of the state portal and the patient portal of the Health Information System, citizens are also offered prescription viewing services.

Data exchange between different parties (providers of health services, pharmacies, patients, national registries) is available through the X-Road. In order to transmit data over the X-Road by means of a secure server of an institution, doctors and pharmacists need to have a specific software solution that meets their needs. They can also use their ID-card to make necessary enquiries through a portal specially set up for that purpose. The latter option makes it possible to avoid installing and administrating a secure server and gives all medical institutions and pharmacies the opportunity to use the services of the Digital Prescription Centre with lower costs.

Five different software products designed for hospitals and two information systems created for family physicians are in used in Estonia.

In their work, most doctors and pharmacies use commercial software designed to meet their needs. An estimated five different software products designed for hospitals and two information systems created for family physicians are in used in Estonia, as well as several software products for medical specialists and three information systems meant for pharmacies.

Introducing Changes

The introduction of the new system was commenced in a more serious fashion in 2005. The first task of the enterprise who had won the public procurement for creating the software solution of the Digital Prescription Centre was to elaborate on the preliminary analysis. The representative organisations of the related parties were also involved in the approval of the detailed analysis to ensure overall comprehension and the creation of a solution fit for all. Software testing, including data exchange between different parties, was launched in 2008. The pilot phase, during which doctors and pharmacists were also able to test the system together with their patients, was carried out from mid-2009 till the end of the year.

In case of need, doctors can always create a paper prescription that is digitised in the pharmacy.

Upon introducing the system, the fact that paper prescriptions would never disappear altogether was taken into account. In the case of objective circumstances, doctors can always create a paper prescription that is digitised in the pharmacy. However, considering that the pharmacy's side could fail, a so-called operator line was also launched to enable pharmacists to dispense medicines on the basis of an electronic prescription, if necessary. Of course, more basic questions are discussed with doctors through that channel as well.

Despite efforts to already involve all parties at the beginning of the introduction, there are greater and smaller setbacks in the application of anything new. On the one hand, changes in people's working habits and the work process must be dealt with by means of informing and training; on the other hand, all technical risks must be managed. The digital prescription was no exception – disturbances experienced in the first half of 2010 quickly pointed out several weak spots in different parts of the overall chain. The problem of load capacity that received a lot of media coverage could be resolved by eliminating the shortcomings during administration work as well as by some software optimisation. Unfortunately, we are by no means protected in the future against situations where, for example, the network of a major service provider fails. Digital prescription needs the proper operation of the whole chain in order to function.

Digital prescription needs the proper operation of the whole chain in order to function.

Why do We Need a Digital Prescription?

Patients, doctors and pharmacists as well as the whole state benefit from digital prescription.

For the patient, the system ensures a more flexible situation. Previously, the patient needed to visit a doctor to get a prescription after a phone consultation (e.g. in the case of well-diagnosed and chronic diseases monitored by the family physician) before going to the pharmacy, while now that is no longer absolutely necessary. To get a medicine from the pharmacy on the basis of a digital prescription, an identity document with a picture and personal identification code must be presented. In case medicine prescribed for another person is purchased, the buyer still needs to produce an identity document, ▶

but also has to know the patient's personal identification code. That way, the actual buyer of the medicine is always recorded in the system as well.

What doctors appreciate most about the system is its ability to find the correct level of reimbursement for the prescription, which is then taken as a basis for the partial compensation of the medicine by the Health Insurance Fund. There used to be frequent errors, and the difference had to be compensated by the medical institution or doctor. Doctors also like the option enabling to get an overview of the medicines prescribed to the patient by other doctors and, even more, information on the actual purchase of the medicine. In the future, the automatic processing of this information will enable assessing the interaction of medicines prescribed by different doctors, the compliance of the patient, the possible abuse of medicines etc that together make it possible to increase the quality of the treatment provided to the patient.

The pharmacist's life is made easier by the fact that a great portion of the patient's prescription data are already available in the system, and only the information on the quantity and cost of the medicine actually dispensed needs to be added to the prescription. In many cases, even that takes place by means of a device reading the bar code from the medicine packaging. Previously, the data on paper prescriptions had to be inserted manually to the pharmacy's information system in order to present an invoice to the Health Insurance Fund.

The state gets the chance to assume better control over what goes on in the field of medicines – including prescription medicines without a reduced rate. Although various databases used to contain statistics on medicines before, it could not be used quite as efficiently. By means of the new system, the data will in the future always be available after a one-day waiting period. For example, a supervisory body gets the opportunity to screen the prescriptions dispensed from the pharmacies of a particular area and conduct an inspection in those pharmacies the following day for the purpose of monitoring the legal delivery of medicines.

The state gets the chance to assume better control over what goes on in the field of medicines – including prescription medicines without a reduced rate.

Conclusion

Despite the difficulties that occurred in the initial stage of the information system, we have by the end of the first year of operation come to a situation where more than 95% of pharmacies have joined the system and an estimated ¾ of prescriptions were already digital in 12 months after the launch. Medicines were dispensed on the basis of 4.1 million digital prescriptions in total.

A nationwide poll conducted in October 2010 aimed at getting an overview of the opinions of residents on various health-related areas showed that 41% of all respondents thought that the digital prescription would make it easier to prescribe and buy prescription medicines. However, the satisfaction rate among those who had a personal experience with digital prescription was as high as 92%.

The information system will be improved and developed in the future as well to expand the functionality of the system in different segments.

2.2.3
The Changing eKool

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Koolitööde AS

In September 2010, the activities of the eKool became very popular overnight – the service that had functioned as an everyday information source for hundreds of thousands of people was given a new face. Although teachers could still enter lessons in the class register and children and parents were able to view grades and absences, many felt that their customary service had become "a kind of a Facebook", unaccustomed and therefore useless. Koolitööde AS, who is in charge of developing the eKool, did not make such a change without a real need, of course. In what follows, I will explain what prompted us to develop the new version and why was the change so radical.

eKool is an information system that follows a classical scheme in its development. Setting the task and the definition of a problem is followed by a solution and actual use, in the course of which, the user's needs and understanding reach a new level. The information system then has to undergo a new development cycle to meet the changed demands or cease to function. When the eKool was launched in 2002, schools were asking for an administrative information system – it was essential to take the information generated in schools on paper into a computer and get an overview of what was going on in the school. School leaders wanted to make the computer a tool for every teacher and reduce paperwork. Some schools wanted to share information with students and parents. That was exactly how the eKool was designed and built. Parents soon became avid supporters of the eKool, because they liked the possibility of seeing grades before they were entered in students' daybooks and observing day-to-day home assignments without bothering the teacher. Pupils liked the fact that the teacher filled in their daybook for them, but they did not like that parents could see their grades without their own mediation.

The initial idea and dream of a couple of schools that was realised by Vaata Maailma AS proved viable. The number of eKool users increased, teachers got used to the computer as an everyday tool and computers reached classrooms. The use of ICT tools enables a school to teach better. The logical result of such a process was that schools reached a new level: teachers learned to use the few available tools well and know enough to demand the options that a modern study information system needs to provide.

2010 and 2011 were the years of change for Estonian schools. A new Basic Schools and Upper Secondary Schools Act is already in force; in autumn 2011, schools will be starting a transition to a new national pupil-centered curriculum, and the focus of the curriculum has shifted from teaching to learning. That is supported by new requirements for schools, such as formative assessment; the methodology used must be considerate of the child and relevant. Schools' curricula must be reviewed; textbooks will undergo certain changes. Schools are faced with a great challenge, dealing with which can be supported by technological means. The changes are aimed at the school as a learning/teaching community, and the e-environment of the school can help to shape and hold it together.

In the academic year 2003/2004, a total of 4.6 million grades were entered into the eKool, while in the academic year 2009/2010, the corresponding number was 54 million.

The new development cycle of the eKool was therefore necessitated on the one hand by the changing tasks and demands of schools, while on the other hand, the architecture and technological solution used in the system created in 2002 had become obsolete and could not cope with the data volumes and usage activity that had increased by several hundreds of times.
In the academic year 2003/2004, a total of 4.6 million grades were entered into the eKool, while in the academic year 2009/2010, the corresponding number was 54 million. For the teacher and pupil, this growth ▸

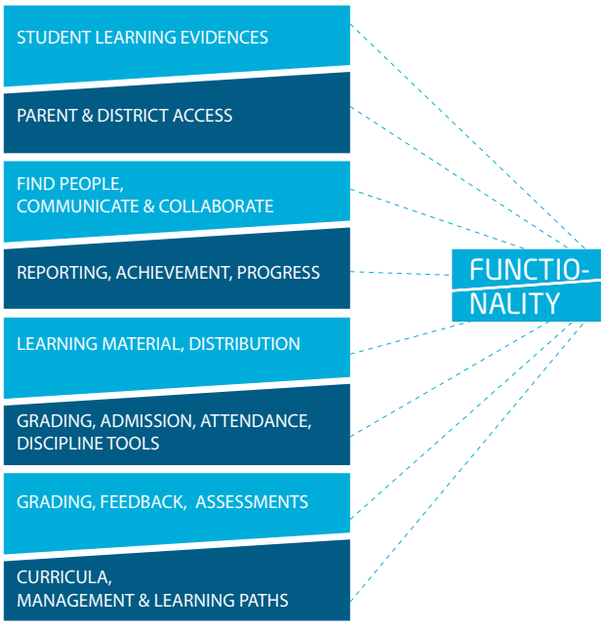
manifested itself mainly in the slowness of the eKool during the final weeks of quarter terms, whereas for the administrator of the information system, there were constant disturbances. The new version is very different from the previous one, because the whole logic of data management had to be changed. The eKool of the first version was "soft" – the school was able to determine very different learning and classroom systems; the only fixed data element was the personal identification code. A pupil's curriculum, class, subjects, grades were freely determinable and schools used very diverse solutions. This convenience that the schools liked made it impossible to communi-cate with other information systems that required a clear determination of data. In the new version, the element connecting the activities of the eKool is the curriculum, by means of which, different years' results can be linked, data can be shared between schools, and information can be exchanged with national registries.

Devising the new eKool began in spring 2009. When thinking through the activities necessary for schools in a new way, we tried to solve the existing problematic points already in the design phase of the system. This approach has also resulted in the modular structure of the eKool – all users have a page containing their own information and, based on their roles and rights, the school's (or schools') and the child's (or children's) pages. All other activities open from these pages in separate windows, and after closing the activity window, the user can return to where he or she started. Besides easier navigation, such a structure makes it possible to interface the additional services developed by eKool (e.g. sharing study materials or organising appraisal interviews) and third party services.

This approach has also resulted in the modular structure of the eKool – all users have a page containing their own information and, based on their roles and rights, the school's (or schools') and the child's (or children's) pages.

The previous version of the eKool made a start with reducing the routine work of teachers. The new eKool introduced more options: in four months, teachers have added 14,000 study material files to home assignments and tests; the option to comment on grades that was initially greeted with reluctance has by now been integrated into the work process of teachers and more than 500 thousand comments have been added. In order to apply the new teaching options, a pilot project was launched in cooperation with a publishing house to distribute study materials to schools. In the future, both paid content of verified quality and teacher-generated content must become accessible in that manner.

Each school is singular, and therefore, there are no universal solutions. In the future, the eKool will focus on learning and teaching, just as it does today, and will not try to become a giant system that does everything. This direction can be seen in the added figure – all modules that are included in the development plans of the eKool or are already completed are focused on learning and teaching. The future of the e-environment suitable for schools and providing the additional services necessary for schools lies in interfacing – the school decides for itself which functionality it uses and what services it applies. That is sure to appease the schools who insist that they only need a class register and everything else should be removed.



The eKool will continue to change because the school system is constantly changing as well, and therefore, a service that supplies schools with tools cannot cease to develop either. We will certainly try to manage development more smoothly in the future – so that each year, new exciting options would be added for both children and their teachers!

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2.2.4

Developments of the e-Land Register in 2010

The year 2010 has been exceptionally busy for the Estonian e-Land Register[75]. Previously, the main goal was to update and maintain the system, whereas last year, we took quite a few steps towards a completely paperless Land Register. During development work, services were completed for digitising the land registry documents, which had so far existed in paper form, as well as for viewing the digitised documents. The e-Land Register was also interfaced with the Register of Construction Works, enabling citizens to request the general data of a building located on a registered immovable easily and conveniently.

Digitising Documents

Although electronic entries have been made in the Land Register for years already, digitising the whole Land Register archive was commenced in 2010. For that purpose, the processing software used in land registry departments was supplemented with funding from the European Regional Development Fund and photographing solutions (reflex cameras together with tripods and ring flashes, boards for mounting documents) for digitising large-scale documents. Flat-bed and fast feed scanners and KodakPro software were also taken into use.

Thanks to digitising the archive, land registry documents have been available online to everyone since June 2010.

The e-Land Register Service "View the File" Created for Citizens

To request access to a file, the customer needs to identify him- or herself on the website, make an inquiry and open the print of the register part. The wish to view the land registry documents has to be justified. If the documents have not yet been digitised, owners of the registered immovable can also request to have documents digitised by means of the e-service "Request Digitising".

If the request has been made and the land registry department finds that the interest is justified, the customer gains access to the requested documents in the e-Land Register after five working days. In addition to digitising, the owners of registered immovables can also grant the right of viewing the documents of their registered immovable to other natural persons. By giving authorisation, access is ensured also to those persons otherwise not entitled to it.

The owners of registered immovables can also grant the right of viewing the documents of their registered immovable to other natural persons.

As a second important project, the Land Register was interfaced with the digital archive of the Land Cadastre. This means that notaries, the Land Board etc no longer need to send maps or plans of registered immovables to the land registry department, because direct links to the plans and maps of land plots have been added to the processing software at the disposal of assistant judges.

More Convenient Search

One important change in 2010 consisted in interfacing the Land Register with the Address Data System. The transition took place within one working day – smoothly and without any problems. As a result of the interfacing, it became much easier to add persons' addresses in the processing software of the Land Register and search registered immovables by address in the web portal of the e-Land Register.

One important change in 2010 consisted in interfacing the Land Register with the Address Data System.

Previously, county, parish and town had to be selected in order to find a registered immovable, whereas now, only ▶

75 https://kinnistusraamat.rik.ee

the address needs to be inserted on one line and the system will look up the needed immovable. A more convenient and efficient search is a step forward with regard to user-friendliness.

Data Exchange with Register for Buildings

In November, a development of the e-Land Register was completed, making it possible to view the general data of buildings located on the registered immovable through the e-Land Register portal. Previously, people who wanted to find information on the buildings on a registered immovable had to operate between the websites of the Register for Buildings and the Land Register, which was time-consuming and bothersome.

If a person knows that there are buildings on his or her registered immovable and discovers that they have for some reason not been entered into the Register of Construction Works, he or she can send an application through the e-Land Register to the local government corresponding to the address of the building and have the reasons investigated or to request further information.

Now, users have the opportunity to view the general data on the building located on a registered immovable in addition to the detailed information on the land register part, and go to the website of the Register of Construction Works to see more specific data.

In the Register of Construction Works, information is requested on the basis of the Cadastral Register number. If the requested Cadastral Register number is not found from the Register of Construction Works, it is likely because either there are no buildings on the registered immovable or the requested building / Cadastral Register number has not been entered into the Register of Construction Works.

If a person knows that there are buildings on his or her registered immovable and discovers that they have for some reason not been entered into the Register of Construction Works, he or she can send an application through the e-Land Register to the local government corresponding to the address of the building and have the reasons investigated or to request further information.

Register of Construction Works Interfaced with the Land Cadastre

Among other things, the Register of Construction Works was interfaced with the Land Cadastre in the framework of the project. Based on the data of the Land Cadastre, an analysis was performed and the data of the Register of Construction Works were organised. The buildings on the register were tied to the cadastral units in the Land Cadastre. In addition, the validity of the Cadastral Register numbers entered into the Register of Construction Works was checked and invalid register numbers were equipped with a respective label in the Register of Construction Works. The interfacing and organising of registers was possible thanks to the Regional Development Fund of the European Union.

Improving the quality of the data in the Register of Construction Works makes it possible to find information on buildings from the e-Land Register and the Register of Construction Works more quickly and effectively. As a result of the interfacing of registers, citizens now have a solid overview of the data of the buildings on registered immovables and their status in registers.

Next Steps

The projects of the previous year were a big step forward in e-administration. Thanks to the new services and interfaces, citizens can easily get all the information on their registered immovable from one place and without any paperwork. Thanks to digital data exchange with the digital archive of the Land Cadastre, the work of land registry departments has also become much easier. Because of an interface with the Address Data System, the addresses in the Land Register can be compared to the data in other registers, and as a result, interaction with other systems has improved.

A major project in 2011 will be creating a registered immovable portal[76], the purpose of which will be to create a separate web environment and thus make submitting applications to the land registry department easier. Through the creation of the portal, processes will become easier, more convenient and logical for citizens as well as officials. The creation of the registered immovable portal is a large-scale and extensive project, in

A major project in 2011 will be creating a registered immovable portal, the purpose of which will be to create a separate web environment and thus make submitting applications to the land registry department easier.

76 Portal for Submitting Registration Applications

the course of which both regular users and officials will be tutored to ensure a painless application of electronic processing. Increasing user-friendliness and developing logical systems is a continuous and long-lasting process that is our goal today as well as in the future.

2.2.5

Visualising Data in the Case of the Commercial Register

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Collecting and storing data has been the task of a future-oriented state for centuries. This activity has not changed much by today. Data are still gathered; they are stored and used at times to make the state machine run more efficiently. The Commercial Register is exactly that kind of a register, where all enterprises and the related data and rights are registered. The more accurate the collected data is, the better they protect the entrepreneurs' legal certainty about their property.

Making Most of the Data

Making data intelligible and visualising it is a trend increasingly used for explaining ideas and relations, actions and consequences. The visualising system of the Estonian Commercial Register is one such example (see the figure below).

The visualised Commercial Register is a service that provides an overview of the connections between legal and natural persons registered in the Commercial Register.

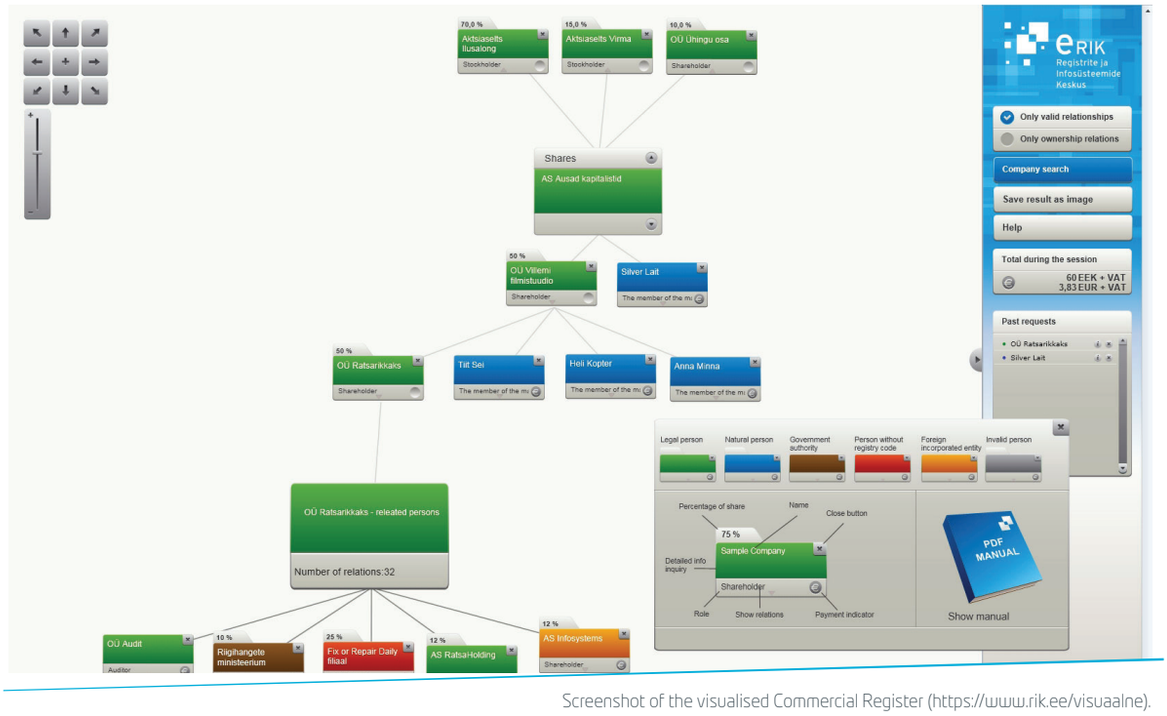
The visualised Commercial Register enables making enquiries about the persons related to an enterprise, so that the results are displayed as a graphic figure. This interactive picture shows how enterprises and entrepreneurs are mutually related and what the different shares in ownership are. The same data can also be accessed in a conventional way, but visualisation makes relations easy to understand and comprehend. The visualised Commercial Register thus makes the work of all users easier and reduces the time spent on enquiries.

Making data intelligible and visualising it is a trend increasingly used for explaining ideas and relations, actions and consequences.

Creation of the system proceeded from the goal that it had to make work easier and be user-friendly. The solution created fulfils these objectives perfectly.

The data of the e-Commercial Register have legal significance. Relevant decisions can be made on the basis of these data, because the state guarantees the relevance and accuracy of the e-Commercial Register data.

Through the visualised Commercial Register, enquiries can also be made from the e-Land Register or the



Screenshot of the visualised Commercial Register (https://www.rik.ee/visuaalne).

Through the visualised Commercial Register, enquiries can also be made from the e-Land Register or the Official Publication Ametlikud Teadaanded.

Official Publication *Ametlikud Teadaanded*. The opportunity to view information from several different sources at once makes the visualised Commercial Register an especially effective tool for making a background check, preventing money-laundering or fighting corruption.

Thanks to the visualised Commercial Register, it is more convenient for entrepreneurs to check the background of both co-operation partners and debtors. The work of those officials who investigate different relations and money-laundering schemes also became easier. The visualised Commercial Register is also sure to simplify the work of journalists and investigative bodies. But above all, the service is designed for financial institutions for the prevention of money-laundering.

Thanks to the visualised Commercial Register, it is more convenient for entrepreneurs to check the background of both cooperation partners and debtors.

In the future, there are plans to link the visual Commercial Register to the Commercial Registers of other European countries. An international dimension in the visualising solution would also serve the purpose of simplifying the monitoring of international money-laundering.

Where Do the Data Come from?

The effective use of state-collected data is an important subject, but the collection of data is just as vital. With each new idea, there is the temptation to ask for more data from entrepreneurs. The more we collect, the more new needs we discover, and in the end, the entrepreneur is burdened by bureaucracy.

The entrepreneur needs to submit an annual report once a year. The report is significant, above all, for assessing the sustainability of the enterprise. In addition to the Commercial Register, there are other state agencies that request the same information (such as the Tax and Customs Board, Statistics Estonia). Submitting the same information to the state over and over again burdens entrepreneurs and as a result, they have less time for their principal activity.

Would it be possible, somehow, to make life easier for the entrepreneur and reduce the double collection of data by the state?

Since 1 January 2010, a new procedure for submitting annual reports has been in effect. Reports are submitted to the Commercial Register through the e-reporting environment in the XBRL format. This national project was one of the biggest in 2010 in terms of its scale and volume. The project concerned more than 120,000 entrepreneurs.

The unified reporting environment created makes entering and sending information much easier and more convenient for entrepreneurs, as there is a certain place, form and manner for submitting all the required data.

The unified reporting environment created makes entering and sending information much easier and more convenient for entrepreneurs, as there is a certain place, form and manner for submitting all the required data. There are also no double submissions or doubling of data. For state agencies, processing business data became easier, because data can be compared right away, and quicker, as they are available through the state's data exchange framework X-Road.

The electronic processing of reports therefore helps to arrive at a situation where the data that have been submitted to the state once can be fully used in the private as well as the public sector. In addition, the entrepreneur does not need to submit the same data multiple times to several state agencies.

The advantage of a unified environment is an automatic check that notifies the entrepreneur of any mistakes made at entering data. Such a check helps to reduce the number of warnings and fines received by entrepreneurs each year in great numbers from the Commercial Register due to errors in annual reports.

The new environment makes it possible to not only send, but also to fully create annual reports. On the basis of the pre-existing forms, the main reports and all annexes to the annual report can be devised. The report can also be created and signed, audited and of course sent directly to the Commercial Register in electronic form. So far, user feedback has shown that the new reporting environment is highly esteemed for its user-friendliness as well as logic.

The XBRL format, which is used for submitting annual reports, is an economic information reporting language that is widely used around the world. Estonia has managed to introduce and adopt XBRL reporting quickly and completely. The development of e-reporting was financed from the resources of the European Regional Development Fund and thus, other European countries can also use the results free of charge.

The results are so good that the project has drawn the attention of various high-level delegations from other countries and has also been noticed on the international ▶

arena. At the worldwide e-solution contest World Summit Award 2011, the e-reporting environment created by the Centre of Registers and Information Systems was selected as the best solution in its category among more than 460 projects.

The e-reporting project is a good example of a state initiative that reduces the burden of both the state and the entrepreneur. Of course, it is not only an IT solution. IT must be accompanied by legislation as well. Estonia has enforced various laws and statutes that prevent the burdening of entrepreneurs with double reporting. In short: no state agency may request information from the entrepreneur, if another state agency has already done it or if the official is able to get that information from national databases. That is because national data are available for free to the employees of state agencies. It is therefore not difficult for the officials to check, for instance, signatories from the Commercial Register, or for the notary to check the Land Register for the registered immovables belonging to the person.

The interoperability of national registries is an important backbone of the simplification of state tasks and duties. A similar interoperability should also function between the registries of European countries.

Estonia is determined to make it easier for entrepreneurs and citizens to access national data, thereby making the state more transparent and secure. Other member states should follow this example, because in that case the cross-border systems of the European Union would also work better. A service such as visualisation across European Commercial Registers might be an important challenge at the moment, since it would benefit all organisations working on the prevention of money-laundering. Hopefully, such necessary services will not get caught in the peculiarities of data composition or restrictions related to data protection at the registries of different member states.

Examples of rules enforced in Estonia that improve the IT interoperability of the state:

› each citizen has free access to his or her details through the state portal;

› data enquiries from national registries are free for all state officials;

› national registries and information systems have been linked with the national data exchange framework (X-Road)[77], enabling them to interact securely. Each registry gets to decide on the right to access its data.

The Centre of Registries and Information Systems (Registrite ja Infosüsteemide Keskus – RIK) is an institution under the administration of the Ministry of Justice, aimed at creating an innovative environment that provides integrated e-services for a more effective functioning of public administration, legal and criminal policy.

RIK administrates and develops many registries and information systems that are important for the state and the citizen. That includes the Commercial Register, e-notary and e-Land Register, as well as several legal information systems.

RIK is one of the biggest IT-oriented state agencies in Estonia. Our team includes 150 expert professionals. We carry out and manage national projects.

Video: http://www.youtube.com/user/justiitsministeerium#p/u/3/shjqb5E_0QU.

Instructions: https://ariregister.rik.ee/files/Kasutusjuhend_visuaalne_AR.pdf (in Estonian only).

Technical Requirements

To use the visualised Commercial Register, Microsoft Silverlight must be installed on the computer. The programme can be downloaded free of charge and if Microsoft Silverlight has not yet been installed, the required link is also displayed upon launching the visualised Commercial Register. To install the programme beforehand, it can be downloaded here:

http://www.microsoft.com/getsilverlight/get-started/install/default.aspx.

77 http://www.ria.ee/x-road

2.2.6

Virtual Old Town of Tallinn

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Tallinn as a travel destination is made unique by its well-preserved Medieval Old Town. At the end of 2009, Tallinn City Planning Department initiated the project "Creating a 3D Model of Tallinn Old Town and Making It Available for Public Use", aimed at introducing our capital to all those interested and generating a wish in a potential tourist to come here him- or herself. In the course of the project, a virtual world accurately reflecting the heritage conservation area of the Old Town together with all the buildings and their surroundings will be created. While moving around in the 3D environment, the user also has the opportunity to view information about sights of interest and enjoy multimedia in various forms: panoramic photographs, virtual tours, videos, and audio guides, contemporary and historical photographs. The Old Town, which belongd to the list of UNESCO World Heritage Sites, can be accessed virtually regardless of one's physical location – it only takes a computer connected to the Internet.

In the course of the project, a virtual world accurately reflecting the heritage conservation area of the Old Town together with all the buildings and their surroundings will be created.

From Idea to Execution

The idea to create a virtual Tallinn had been the subject of meetings and discussions for several years before the launch of this project. There were numerous ideas on what a virtual city should consist of – an Old Town reflecting the historical Tallinn, a virtual world introducing cultural objects, or a solution focused on architecture. The most direct predecessor of the current project was an idea for an architectural guide of Tallinn. That cooperation project, which was planned in the early summer of 2008 by the Tallinn City and the Union of Estonian Architects, consisted of an interactive map that was to introduce the old and new architecture of Tallinn. The final solution, however, contains fragments of each proposed idea.

In the late summer of 2008, the Tallinn City Council approved the development plan of the Old Town for 2008–2013, which included the construction of a complete 3D model of the Old Town. Its purpose was to introduce the Tallinn Old Town online, and the Geomatics Service of the Tallinn City Planning Department (TCPD) in cooperation with other related institutions in Tallinn was made responsible for carrying out the work.

In 2009, the head of the Geomatics Service of TCPD began to actively look for solutions and funding to reach the goal. In the summer of the same year, the people in charge learned about a funding option from the European Regional Development Fund targeted at local governments for promoting the information society. That provided an excellent opportunity to carry out the idea that had been toyed with for long. In the summer of the same year, TCPD already drafted a preliminary application for the project. Due to its interesting content, it won the approval of the final beneficiary in three months. A full application was achieved seven months later.

Because of its innovative and versatile nature, the project needed serious preliminary work in order to find potential executors. So as to achieve the objectives of the project, collectors of laser data, 3D technicians and architects, but also a media enterprise and a company working on databases thus had to start cooperating. For the involved parties, the experience could mean finding a new niche or a cooperation partner for a long time.

In May 2010, work with contractual partners was commenced, with four partners out of five at once. Typically, several parties lined up behind one partner. Work was managed by the geoinformatics division of the TCPD Geomatics Service. City designer from the same department, specialists from the geodesy and cartography division, the heritage conservation division of the Tallinn Cultural Heritage Department (TCHD) and the tourism division of the City Enterprise Department (CED) were involved in the work as partners. Decisions were made by TCPD, CED, TCHD and the IT core of the city as a leading team together with representatives of SA Tallinn 2011. ▸

Data and Application Needed for Achieving the Goal

The complete three-dimensional visualisation of the Old Town (~121 ha) and the availability of information that could be interesting for the tourist enable the user of the 3D application to get a feel for the uniqueness of Tallinn and the options available in the city by means of a virtual model. The solution consists of a 3D interface and a panoramic photo interface. The solution will be created in three languages (Estonian, English, Russian) and will allow using location-based services (base map, thematic information and an address search).

The complete three-dimensional visualisation of the Old Town and the availability of information that could be interesting for the tourist enable the user of the 3D application to get a feel for the uniqueness of Tallinn and the options available in the city by means of a virtual model.

The data presented in the application can broadly be divided into two groups – a 3D data system and an information data system. The 3D data system is in turn divided into 3D buildings, other urban environment elements and landscape, while the information data system consists of panoramic photos, historical and contemporary photos, audio and video files, audio tours, descriptions of sights, tourist information on institutions and objects.

The Tallinn Old Town has well-preserved historical and distinctive buildings, walls, courtyards, fascinating sculptures and unique doors, windows, facades. Streets with a variety of appearances make it exciting to move around the Old Town – some of them seem like tunnels between blocks of buildings. That is why some places cannot be accessed in a regular way. Others are so narrow that driving a car there is quite impossible, even if you really want to. In addition, streets are covered by cobblestones that restrict movement. The 3D data system described below is able to convey all of this interactively and trouble-free.

› 3D models of about 700 buildings. Original data for the 3D shapes of buildings and the ground were collected with a helicopter from air as well as by scanning with a car and a tripod on the ground. Requirements were set for the density of data recording – point density per square metre was 35 from air and 100 from the ground (a different point density is pictured in Figure 1 on page 82). In addition, the location accuracy of the data collected was checked. In order to get the final models of buildings and the ground, photos were taken to cover the buildings with a photographic texture, and aerial photographs were employed to depict the ground. Buildings were divided into different detail classes based on their importance and peculiarities. Building parts bigger than 15 cm had to be depicted uopn modelling the most detailed buildings. The corresponding size in the case of less detailed buildings was 50 cm. The third class of vectorised models was more generalised. An example of a detailed building model – Tallinn City Hall – is given in Figure 2 on page 82. In addition to the level of detail, buildings also differ in size. For instance, the Toompea building almost takes up a whole block, but a single kiosk is also considered to be a building. The example provided above serves to compare a high-priority building to a less detailed one.

› A gound model, orthophoto and 3D sculptures, facilities, lamps, greenery and other objects that create an accurate picture of the urban environment. Sculptures are modelled the same way as buildings and covered, according to material, with the correct texture. Standard symbol models were created for other elements of the urban environment, such as trees, bushes and lamps. These models are used to represent them in the virtual world. Here, the so-called Old Town lanterns are of interest, since they are exceptional to this area and make it unique.

› Upon deciding on the travel destination, the modern tourist is influenced by the information available about the object of interest. A potential visitor gets the best idea of Tallinn Old Town thanks to good images (incl. panoramic photos), audio and video material and accompanying explanatory texts. All of the described materials are very important, because people often want to know much more about different buildings, sculptures and other facilities than just see what a particular object looks like. The 3D application contains the following information to help to get to know the objects of interest better.

› 101 panoramic photographs taken in the street, on top of buildings with high and spectacular views, or inside distinctive and valuable buildings. There are two types of panoramic photographs in the application: cylindrical and spherical. The first kind paints quite a good picture of the 360-degree view from standing level. Spherical panoramas also make it possible to look at the sky and the ground. It is important to use that picture type with interiors, because in those cases, significant elements can be found on e.g. the ceiling of a building.

› 30 contemporary photos that are contrasted to 70 scanned historical photos. Thanks to the correct position in the virtual world, the user can spot the similarity between the earlier view and the current one. There are many shots of Freedom Square, for example, taken at different times and from different angles.

› 9 tours on different topics, introducing the 3D world to the first-time visitor without navigating within it, for instance. The user is taken from one location to the next in the virtual environment, and is told a story about each object. The tours are versatile and include several dozen objects within topics, such as museums, churches, city walls etc.

› 3 videos about the major sights of the Old Town helping to take a peek into the real world, but also leaving something for the tourist to discover on the spot in case of each object.

› 66 detailed descriptions about the important objects of the Old Town interesting for the tourist and educational for students, for example.

› 10 audio clips about interesting Old Town objects that need to be highlighted among many other fascinating objects even by means of sound.

› About 300 information points about objects located within the Old Town. These include the main venues of the Capital of Culture events, general information of services aimed at tourists, and a brief cultural and historical overview of sights of interest.

An animation introducing the 3D application of the Old Town that will be distributed to popularise the application is an informative and the most general element.

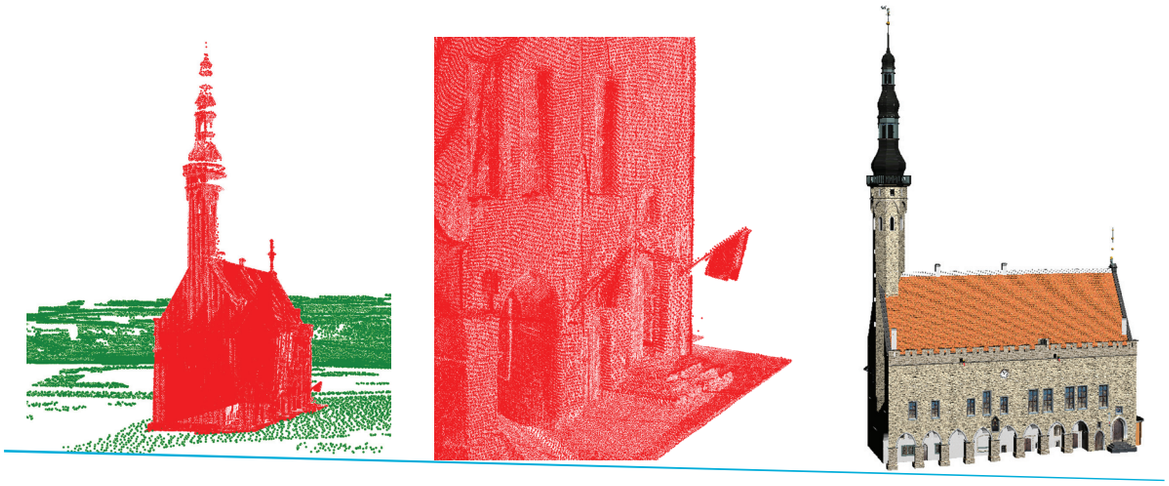
Apart from the points mentioned above, added value will be generated during the project. That value can be used to organise the development of the project in the future. This includes, for example, the technical solutions that will be developed for updating 3D data. The virtual model of the Tallinn Old Town will certainly become an example for many other organisations who would like to present their 3D data or sights of interest in a modern way.

Wonderful Experience

When the project was launched, the general public, potential participants and organisers expressed great interest towards this innovative work. In the course of the project, the client as well as the executors had to complete tasks that no one in Estonia had performed before. Urging partners to cooperate and the interdependence of their results are a great example of a joint project. The project has experienced unforeseen circumstances right from the start, whether in the form of weather conditions or the narrow streets of the Old Town. Even the constant and active motion in the Old Town characteristic of the summer season posed difficulties in gathering data. However, all troubles were overcome and the result is a wonderful and unique experience.

Now that the final results of the project are about to be presented to the general public, we are anxious with anticipation. We do not know yet how popular the proposed solution is going to be. We believe, and the trends of the 3D world have shown, that a great future awaits this solution. In addition to the created solution and its data system, the project also generated added value, which we are extremely pleased with. At the moment, the public is free to use one part of the project – the application featuring panoramic photos of the Tallinn Old Town[78].

We believe to have created something truly wonderful in cooperation with great people. Something that gives joy and information to the ever-globalising and Internet-dependent mankind and thereby raises awareness of Estonia, Tallinn and its Old Town. You are welcome to virtually explore the Old Town!



Scanning result -
Tallinn Town Hall building.

Modeling result -
Tallinn Town Hall building.

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2.2.7

Real-Time Public Transport Information System

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The Estonian Road Administration is developing a real-time public transport information system in the framework of the project "Development of the Public Transport Information System" (PTIS). This system will make it possible to follow the service of public transport vehicles according to the timetable and identify deviations from the planned schedules. "The Real-Time Information System" (RTIS) will also help to plan optimal timetables on the basis of the amount of time needed for covering line segments that are identified according to real-time data, taking into account reductions in the capacity of roads and streets during rush hours.

RTIS is therefore a tool that makes improving the quality of the public transport service possible by eliminating the issues identified with the help of the system.

RTIS is based on GPS positioning devices, which are widespread in the field of freight transport by road and are installed in public transport vehicles. In freight transport, the main objective of using a surveillance system is to monitor the purposeful use of vehicles and the fuel consumption. In the case of a real-time surveillance system for public transport, the most important task from the perspective of the client is to ensure service according to timetables. The main objective of the development of RTIS is not to create a tool for monitoring or sanctioning the drivers who carry out regular services. Rather, it is a solution that makes identifying problems in line planning possible.

RTIS is based on GPS positioning devices, which are widespread in the field of freight transport by road and are installed in public transport vehicles.

Opportunity to Provide Additional Services

At the same time, monitoring scheduled services is not the only option that RTIS provides. Given that comparing the planned timetables and the actual location of public transport vehicles enables calculating the estimated arrival times of vehicles at the next stops, the adoption of RTIS creates the opportunity to communicate that information to public transport users by means of passenger notification tools. For instance, the data calculated by RTIS can be used to control information displays installed at stops, but also to inform passengers of the exact departure times of public transport vehicles, deviations from the timetables or cancelled trips. A special public service will be established at RTIS to control these information displays. This enables using RTIS's information for controlling information displays based on different technological platforms.

RTIS compares the actual movement of buses equipped with positioning devices to the scheduled timetables of lines entered in the national Public Transport Register. Controllers equipped with GPS sensors installed on the vehicles send data about the location of a moving vehicle 2–4 times per minute, and these data are compared to the spatial description of the scheduled timetable of the line. If the system identifies a deviation exceeding the tolerated limit, the vehicle is regarded to be ahead or behind the schedule. It is also possible to identify deviation from the route, cancelled departures and other cases in which the actual service does not match the plan.

RTIS compares the actual movement of buses equipped with positioning devices to the scheduled timetables of lines entered in the national Public Transport Register.

Given that there are many enterprises in Estonia that specialise in GPS positioning services and are very competent in the area, and since several bus enterprises have already equipped their vehicles with positioning devices, then the development of RTIS did not start from scratch. The real-time server controlling the system does not receive positioning data directly from the GPS controllers installed on the vehicles. Instead, data are transmitted to RTIS through the provider of the positioning service. For that purpose, two possibilities have been taken into account in the development of the system. According to the first option, the transmission of data is initiated by the provider of surveillance service, who sends standardised data to the RTIS real-time server by means of a REST web service. An alternative is having the RTIS real-time server initiate the transmission of positioning data – in that case, RTIS requests data through an interface opened for that

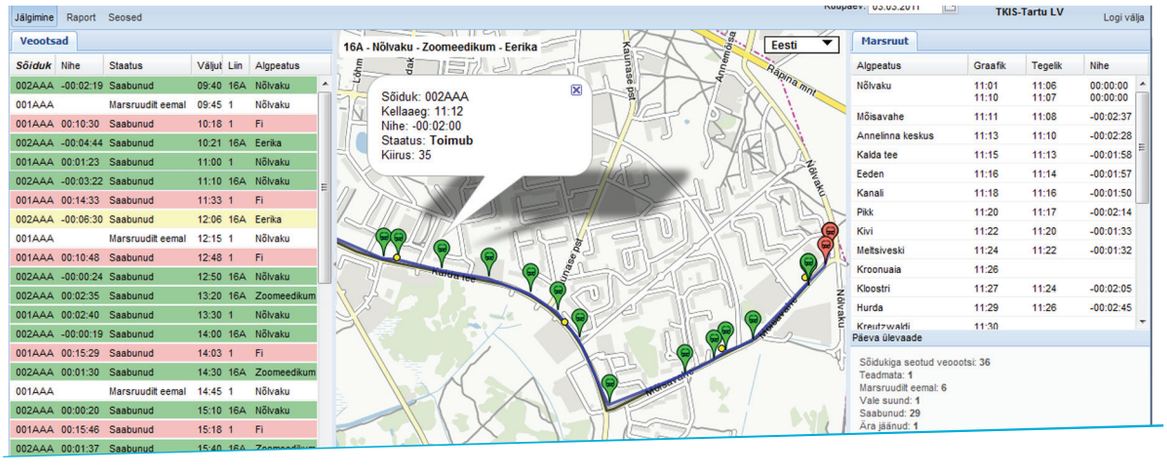
purpose by the provider of the positioning service.

By now, two buses servicing lines in the Järva County and two buses servicing Tartu urban lines have been interfaced with RTIS in order to test the development. Due to the different natures of urban and county lines, somewhat different technical solutions have been used for collecting positioning data in these two areas. In the case of Tartu buses, positioning data are sent at the moment when bus doors open and close. This solution allows to accurately analyse the time spent at the stop and take it into account upon preparing timetables. The disadvantage lies in the fact that no positioning data are transmitted in the segment between stops, meaning that deviations from the schedule cannot be identified promptly enough. Järvamaa buses send data about their location every 15 seconds. That makes it possible to compare the actual service of the bus to the timetable more accurately. Sending data at intervals independent of the opening of doors suits county lines well – also because when no passengers want to get on the bus or off it, there may be several stops in which a county bus has no reason to stop or open its doors. In addition to the opening and closing of doors, other indicators of service can also be transmitted to the real-time server along with GPS coordinates. For instance, it is theoretically possible to connect a passenger-counting system to the controller and thereby achieve a real-time overview of the passenger count of the vehicle.

An important prerequisite for the functioning of RTIS is the existence of connections between the vehicles monitored and the timetables of lines.

An important prerequisite for the functioning of RTIS is the existence of connections between the vehicles monitored and the timetables of lines. Without it, comparing the actual and scheduled services would be impossible. Public transport vehicles are used on different weekdays as well as on different lines within one day, and vehicles often need to be directed to a line other than the one initially planned. This makes managing the connections between timetables and vehicles a constant process. In the case of RTIS, three different functional options that the carriers can choose from according to their needs and IT capability have been created for facilitating the management of connections. The first option for managing connections between vehicles and line schedules is to use the dispatcher application of RTIS that works on a regular web browser. Given that many carriers use special software to plan the work schedules of drivers and assign vehicles to lines, creating connections by means of the dispatch appli-cation of RTIS would mean needless extra work for them. That is why the web service REST, enabling the carrier to interface the existing software with RTIS, has been developed as the second option for presenting the connections between vehicles and lines. The easiest solution for ensuring the connection between the vehicle and the line to be serviced, however, is to have the numbers of the serviced line and the trip to be transmitted in real time together with the received positioning data. Nevertheless, this solution is applicable only if the bus is equipped with positioning devices that enable the driver to enter the number of the serviced line and trip before setting on a line. If ticketing devices equipped with modern GPS surveillance systems are introduced in buses, the latter solution becomes the most preferable.

The Real-Time Information System will be completed during 2011. So far, Tartu City has expressed great interest in adopting the system, already planning to equip almost a third of urban line bus stops with electronic displays that give information to passengers. The introduction of modern ticketing devices also provides the opportunity of interfacing Tartu county line buses to RTIS as well. The project "Development of the Public Transport Information System" is funded by Iceland, Liechtenstein and Norway through the EEA and Norwegian financial mechanisms. The system is developed at the request of the Road Administration by a consortium that includes AS Cybernetica, Affecto Estonia OÜ and EOMap Geodata AS.



2.2.8

Speed Cameras on Tallinn–Tartu Highway

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In 2009, stationary automated speed cameras measuring the speed of vehicles were installed on highways for the first time in Estonia as one of the measures of the Road Traffic Safety Programme. The cameras were to record the speed of vehicles as well as the time and place of a violation of traffic rules take a photograph of the speeding driver his/her vehicle.

In 2009, a total of 16 speed cameras were installed, all of them within a segment of Tallinn–Tartu highway about 65 kilometres long. The measuring boxes of the speed cameras were installed by the end of October, additional tuning and testing followed in November.

The drivers travelling from Tallinn to Tartu are monitored by speed cameras on a ca. 65-kilometre road segment (from Sõmeru to Kiigevere). The flow of traffic moving from Tartu to Tallinn is monitored by cameras on a ca. 33-kilometre road segment (from Koigi to Matsimäe). The segment most packed with speed cameras lies between Matsimäe and Kükita, where nine have been installed.

Up to mid-November, most of the measuring boxes were empty – only a few boxes had been equipped with test cameras. By 27 November, a camera was installed in each speed camera box, and traffic signs informing drivers of an automatic control were added to the respective road segments. During the test period, the intervention threshold was set to 97 km/h and speeding was not followed by legal proceedings.

Aimed at Calming Down the Traffic

In choosing the location for the speed cameras, the past five years' statistics of traffic accidents resulting in human injuries on a particular road segment, as well as traffic density, speed of vehicles, availability of electricity and other local circumstances were taken into account. Speed cameras are installed with the aim of calming the traffic and thereby reducing the number of accidents. The cameras keep the speeders in check and help to lower the speed to legal limits, making traffic safer on hazardous road segments. Other countries' experiences have shown that speed cameras help to reduce the number of traffic accidents resulting in human injuries by an estimated 20%.

Speed cameras help to reduce the number of traffic accidents resulting in human injuries by an estimated 20%.

The camera records the speed of all passing vehicles. If a driver exceeds the legal speed limit, the camera takes a photograph of the vehicle, also showing the driver. The data recorded by the camera, including the photograph, are sent to the police proceeding centre. There, the number plate of the photographed vehicle is used to identify the person responsible for using the motor vehicle.

The measuring principle of the measuring system is based on measuring the time difference between the transmission of light impulses to the measured object and back. The speed is calculated based on that time. Next, the calculated speed is compared to the previously provided limit value for picture-taking, and if that is exceeded, photographic documentation is created.

A cautioning fine is given to the person responsible for the motor vehicle at the time of the misdemeanour. If the person responsible for the vehicle reports the details of the person who was using the vehicle to the body conducting extra-judicial proceedings, the cautioning fine is cancelled and a fine notice is sent to the person who was actually using the vehicle. The cautioning fine accompanying the application of written cautioning procedure does not entail consequences under the Penal Code, because it is not a penalty applied for an offence and is not entered into the Punishment Register. In addition, it cannot be relied upon in considering repeat misdemeanours or applying other legal consequences intended for offences.

Average Driving Speed During the Test Period was 85 km/h

The test period that lasted from autumn to winter 2009 did not entail any consequences under the Penal Code, i.e. no misdemeanour procedures were initiated and no drivers were fined. In February 2010, the first written warnings were sent to speeders about the violation of law.

During the test period, the measuring results from eight speed cameras indicated that the average speed of vehicles on the monitored road segments was 85 km/h. In the 90 km/h zone, the average speed of vehicles was 88 km/h and the average speed in the 70 km/h zone was 70 km/h.

The intervention threshold of the speed camera is set to 97 km/h in the 90 km/h zone. When the picture is taken, a red flash from the speed camera can be seen. This sends a signal to the driver that the driving speed should be reduced. The red filter of the flash helps to prevent the danger of blinding the driver.

Speed Camera System Fully Launched on 10 May 2010

It was announced in April at a Traffic Committee meeting in the Ministry of Economic Affairs and Communications that the speed camera system was going to be launched in full on 10 May. Until then, speeders caught by the speed camera had got away with just a warning, but starting from 10 May the speeding camera system was in full operation. This meant, above all, that fines were imposed on the offenders identified by speed cameras.

The Traffic Committee also approved the installation of new speed cameras. The Jõhvi–Narva segment of the Tallinn–Narva highway and the Pärnu County segment of the Tallinn–Pärnu highway were considered as possible locations.

On 25 and 26 November, eight speed camera boxes were installed on the road segment between Pallika Village and Reiu Village in Pärnu County on the Tallinn–Pärnu–Ikla highway.

In December, some of the existing speed cameras were relocated from Tartu highway boxes to Pärnu highway and systematic testing was conducted. Starting from 22 December, all eight speed cameras on the Tallinn–Pärnu–Ikla highway (92nd–142nd km) started to measure the speed of passing vehicles and offenders began to be fined.

Developments in 2011

The installation of five measuring boxes on the Jõgeva County segment of the Tallinn–Tartu highway (122nd–151st km) and of one additional measuring box in the Harju County is planned for the 1st half-year of 2011. That brings the overall number of speed camera measuring boxes on the Tartu highway to 24. A so-called rotation method will be adopted, meaning that speed cameras will be relocated between measuring boxes on a regular basis.

There are plans to acquire about 10 speed cameras by means of a new procurement by 2011 and install them in the East Viru County area of the Tallinn–Narva highway. The road segment between Jõhvi and Narva still stands out by its great number of traffic accidents resulting in human injuries. According to current plans, the first speed cameras will be installed on the Narva highway in autumn 2011.

2.2.9

e-Invoice Taking Root in Estonia

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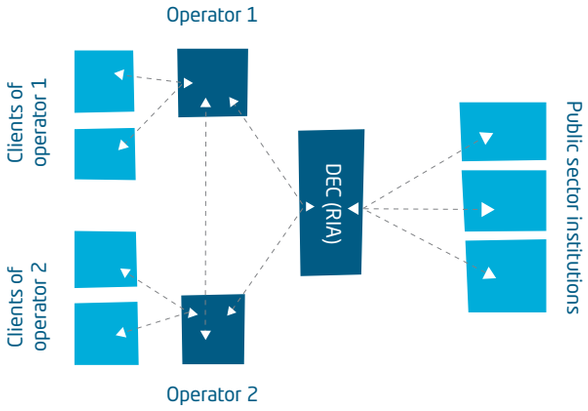
In 2010, the Estonian Informatics Centre (Riigi Infosüsteemide Arenduskeskus – RIA) completed technical preparations in the field of e-invoicing. By the end of the year, it could be said that the Estonian public sector was ready to actually introduce e-invoices according to the 80/20 Pareto principle.

At the end of 2009, a new version of the e-invoice XML standard that considers the needs of the Estonian public sector was completed by a 40-member expert group. The same expert group also approved the technical platform for the e-invoice circulation in the public sector, as presented below.



Technical platform for e-invoicing in the Estonian public sector.

This model includes as many of the existing services and systems as possible, in particular the X-Road[79] for ensuring security, the document exchange centre (DEC)[80] as one of the main data exchange channels of records management, and e-invoice operators in the form of the private sector.

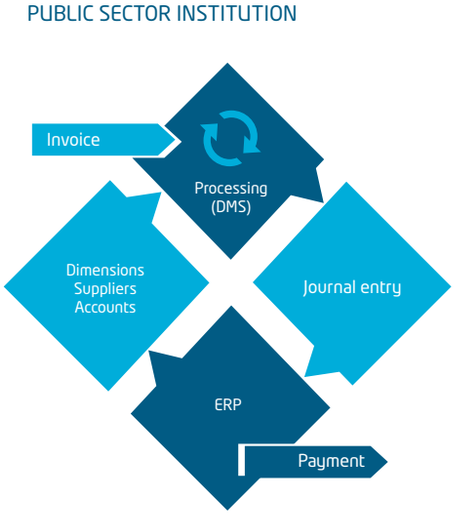
In 2010, RIA concluded cooperation agreements with e-invoice operators to adopt the functionality of e-invoicing. The agreement enables the public sector to receive e-invoices cost-free and, in the future, to introduce mutual communication with the private sector, i.e. the sending of e-invoices by the public sector.

In order to receive e-invoices, a public sector agency only needs to interface their records management system to DEC.

In order to receive e-invoices, a public sector agency only needs to interface their records management system to DEC (nearly 500 agencies have completed this procedure in previous years). The sender of the e-invoice must sign up with an e-invoice operator, which can in some cases, depending on the service provider, even be done for free.

Invoice is Processed in the Existing Records Management and Accounting System

Technical support for the transition to e-invoicing was arranged by RIA, the initiator of the e-invoice project financed from EU Structural Funds. As the starting point of the project, RIA chose the principle that document processing must be as easy and automated as possible, while also fitting into the everyday working process. At the beginning of 2010, a data description of the e-invoice processing information was completed at the request of RIA. This made it possible to link information systems with each other, as well as process and forward e-invoices in the existing records management systems (DMS) and accounting systems (ERP).



Transmission of the data needed for processing an invoice within an agency.

To improve the readability of the diagram, the detail that DMS and ERP actually exchange data over DEC has been

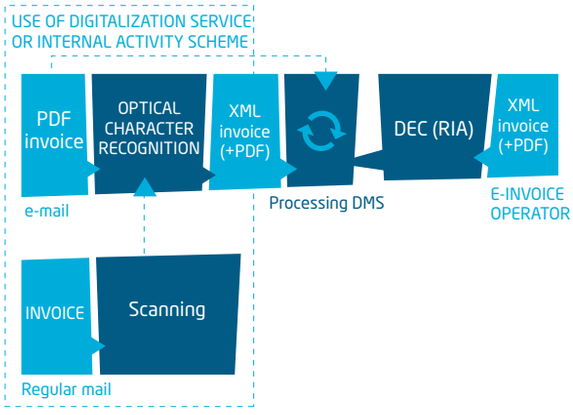
79 http://www.ria.ee/x-road

80 http://www.ria.ee/dec

left out. Exchange of financial data (including information on suppliers, accounts, VAT rates, financial dimensions) with ERP is required for processing an invoice in DMS. When the processing is complete, confirmed journal entry data are sent from DMS to ERP, and on this basis, taxes can be transferred in ERP without any additional procedures. The whole system can be audited on the side of both DMS and ERP, thus ensuring the transparency of all cash flows. Such a structure makes it possible to replace the current software with another version without changing the logic of processing. This certainly helps to ensure market competition and guarantee a reasonably priced product or service to the introducers of e-invoicing. It is also in line with the support service centralisation project[81] of the Ministry of Finance, in the course of which state agencies will switch to a common financial accounting and personnel and wage calculation system SAP. In order to introduce the system, an agency needs to install an e-invoicing module on its DMS and ERP (the software is free of charge, developed under RIA's funding) and adjust them to the administration procedures of the agency.

The whole system can be audited on the side of both DMS and ERP. Thus ensuring the transparency of all cash flows.

Invoices Need to be Digitised Only During the Transition Process



Digitisation and the inclusion of an invoice.

We believe that the main cost of creating e-invoices must be incurred by the seller of the service/product (private sector supplier) and the buyer (state) should be involved in the digitisation of paper invoices as little as possible. Since buyers have an advantage, they have the right to demand an e-invoice from the seller, otherwise no order is placed. So as to make the transition to fully electronic invoicing as smooth as possible, data can be digitised flexibly in the form of in-house scanning on the basis of the models described earlier, but it can also be procured as a service from the private sector.

If only some invoices need to be digitised (up to a few hundred per year), it is reasonable to use in-house labour; however, if there are many (e.g. in the case of consolidating support actions through subdivisions), it is more efficient to procure the service from an e-invoice operator in the market. In that case, the invoice receiver only needs to process the invoices.

Complete Solutions Await for an Introduction

The Ministry of Finance has initiated a procurement for an e-invoice processing service to provide a solution to agencies not using DMS. The service will be launched in March-April 2011. This service is certainly going to help those agencies that are only taking their first steps in the transition to digital administration, as well as those who find the complete service under development to be useful. The agencies already in possession of a DMS, however, can use the e-invoice modules resulting from RIA's e-invoice project.

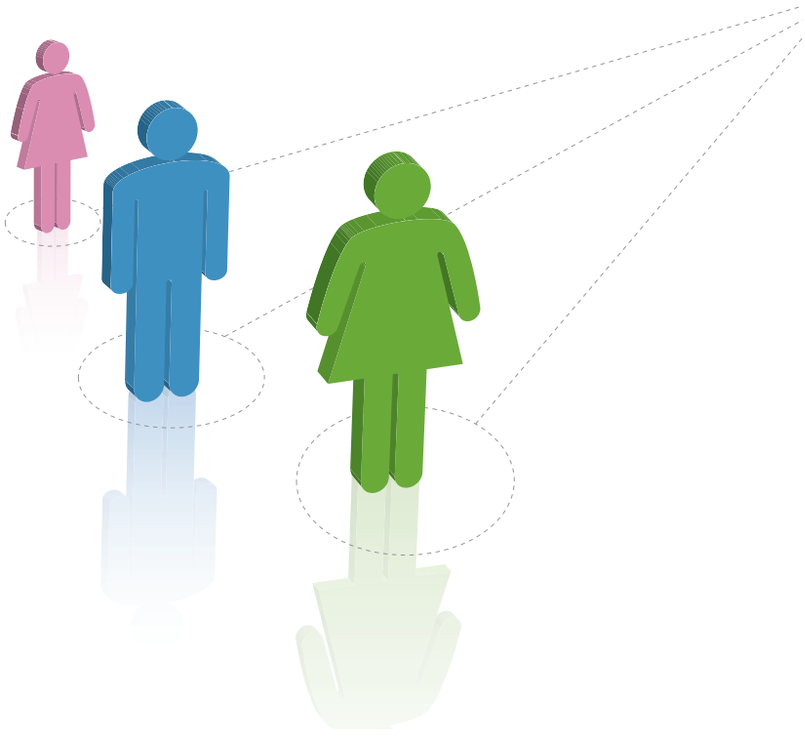
As of the end of 2010, interfaces have been developed for software products Amphora, GoPro, Livelink, Webdesktop as well as Pmen and SAP in the framework of RIA's e-invoice project. In 2011, interfaces will be created for software products Alfresco and Postipoiss, as well as Axapta, if possible, and there is also a plan to complete the development with Tresoor.

As of the end of 2010, interfaces have been developed for software products Amphora, GoPro, Livelink, Webdesktop as well as Pmen and SAP in the framework of RIA's e-invoice project.

Awareness of e-Invoicing on the Rise

In summary, it can be said that compared to previous years, 2010 was a year of applying the knowledge and best practices that saw the building of a transnationally functioning e-invoicing infrastructure. Now that interoperability between agencies and information systems has been achieved, further plans can be made with the main emphasis on raising awareness. At the end of 2010, two e-invoice information days were organised for the records management and accounting specialists of public sector agencies (including local governments). In 2011, there are plans to inform private sector entrepreneurs on a much larger scale; to make sure that they know what an e-invoice is, what the public sector is going to demand, and how to issue it. In the case of a full transition to e-invoices, the aspect of time must certainly be considered, since this will be the first real step in the digital world for many agencies. The state has to help them move forward in overcoming this digital divide.

81 http://www.fin.ee/tugiteenused in (Estonian only)



III
Development of a Knowledge-Based Economy

Promoting the Introduction of ICT in Other Walks of Life

3.1.1 Examinations Information System – Pleasure and Pain of Creating an IT Solution

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Supporting the Development of an IT Learner

By learning, people gain knowledge and skills that help them to understand the surrounding world better. Knowledge, forming the basis of personal development, enters their consciousness by means of communication. In the past ten years, the rapid development of information and communication technologies has completely changed the environment where people obtain and exchange information. Today's information technology provides the opportunity to take the learning process to a whole new qualitative level.

The function of the National Examinations and Qualifications Centre is to organise the external assessment of learning outcomes in general education schools. The aim is to give learners, teachers, schools and the bodies organising learning independent feedback on the quality of learning as well as on the learning outcomes achieved by the end of study stages. Traditionally, the primary methods of external assessment have been academic placement tests and examinations. External assessment is carried out on an annual basis, because the preparation and organisation of high-quality tests in a paper world is expensive and time-consuming. An academic placement test, examination or any other test requires a sufficient number of high-quality individual questions that are clear in terms of what and how they measure.

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Electronic (e-)Questions

E-questions, e-materials, e-books are not a goal in themselves. "E-" is a feature that provides a better opportunity to support the development of the learner in the learning process. IT allows for a completely different environment requiring that the developers of the e-learning environment have a much broader and more innovative approach than just entering the materials that have worked well in the paper world into the computer.

Teachers have done a great and much-appreciated job in creating e-materials. Lots of different study materials can be found from Miksike and the Koolielu portal of the Tiger Leap Foundation, but also from the websites of teachers' subject communities. These materials have been created by professionals in their field, but are nevertheless based on personal experiences. Another person might therefore not be able to use them in the same way. Also, the materials are mostly PowerPoint presentations that only utilise a fraction of the options offered by IT solutions.

ÕKVA

In September 2008, the Minister of Education and Research signed the ESF programme "Improving Learning Quality through the External Assessment System of the Internal and Learning Outcomes of Educational Institutions" or ÕKVA. The Examinations Centre was appointed as the executor of the programme. One of the sub-goals of ÕKVA is creating an examinations information system or EIS. The

signing of the programme was preceded by preparations lasting for more than two years. There are still as many people in the Examinations Centre who are passionate about using e-solutions in testing as many of those who are sceptical.

EIS is divided into three modules: question bank, management module, and test organisation module. The creation of the information system proceeded from the principle that new modules can be added later as the need arises.

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EIS is based on the principle that all questions in the information system have been created by professionals in the field, they have been pre-tested, and their quality is assured.

Upon launching the project, we also investigated other countries' experiments in the field. We studied the experiences of the first IT academic placement test conducted in England and visited Denmark, where e-testing has already been practised for about ten years.

On the international level, more and more importance is ascribed to the development and use of electronic questions. Many countries participated in the electronic reading assessment at the international PISA 2009 study. In a 2011 European language survey SurveyLang and PISA 2012 study, Estonia is also going to participate in electronic testing. The PISA 2015 test will be completely electronic, posing a serious challenge to Estonia to take the IT infrastructure of schools to the level needed.

These days, topics like the development of functional reading skills are emerging as new focal points in teaching. In addition to regular functional reading skills, there are also talks about the functional reading skills of electronic materials, which are becoming increasingly significant for success in later life and which are difficult to assess by means of a simple paper and pen.

Upon starting work at automatising external assessment, we decided to focus precisely on how to make the most of IT solutions and what needs to be done differently in the current testing process, so that the solution would indeed help all parties as much as possible. We also considered how to find a broad range of applications for the new emerging technical options.

The central place in the information system being created belongs to the question bank, which consists of a systematised collection of high-quality individual questions. The questions available in the question bank can be selected and used according to need. A question comes with instructions and correct solutions, and each question has so-called quality indicators – level of difficulty, differentiation power, type of question.

The central place in the information system being created belongs to the question bank.

We hope that EIS will also contribute to a more widespread use of e-learning in schools. The teacher is given the chance to use e-questions, compile tests and have pupils take them either in the classroom or at home, as well as receive immediate feedback on the results. These days, pupils use computers a lot anyway. If pupils are tested in an environment that is more similar to the learned information and includes more interesting and varied questions requiring higher-level thinking, it will also be followed by a change in learning in schools.

Role of EIS in Supporting Formative Assessment in General Education Schools

Based on the high-quality questions available in the electronic question bank, tests can be compiled quickly, the success level of teaching can be determined, and if necessary, adjustments can be made in the learning process. After answering the questions contained in EIS, the pupil finds out his/her results at once, reducing the teachers' burden in checking homework. In addition to tests, the question bank also contains other materials that support the pupil's development into an independent learner – questionnaires, feedback forms and assessments of the pupil's work. The questions in the question bank can be used by all interested parties: developers of study materials, subject teachers, pupils. The system also allows, in principle, to give homework to pupils and check it. Parents also have the opportunity to see where children have run into trouble when solving the questions and to offer their help. Questions can be looked up from the system for practising at home as well.

EIS – Challenge for the Examinations Centre

Making a start with the project was a great challenge for the whole organisation, because:

1. The Examinations Centre had no prior experience in the execution of an IT project on such a large scale.

2. The project involved a great number of people from three departments of the Examinations Centre. Such a broad range of concerned persons was a challenge for the successful management of the project. We realised – a plan of action had to be drawn up to make sure that what had been agreed upon would actually be fulfilled. This ▶

plan needs to be reviewed periodically and adjusted over time, if necessary.

3. Despite having almost 15 years of experience in devising questions on paper, the specialists at the Examinations Centre had no experience in creating e-questions. We needed to develop a common understanding of what an e-question is, what kind of value is added to the testing process by the computer, and what are the related risks.

The project was preceded by preparatory work:

1. we familiarised ourselves with the e-testing experiences of other countries;

2. we developed a common understanding of e-questions and e-testing among the Examinations Centre specialists involved in testing;

3. preliminary agreements related to e-questions and e-testing were reached; we realised – in order to ensure the success of the planned undertaking, all parties have to contribute as much of their time and knowledge as possible; we found it important to talk things through and arrive at agreements among ourselves before starting work with the developer;

4. we thought it necessary to involve all major parties; the preparatory process involved the representatives of all three content departments: both specialists and managers were represented, as well as representatives of the IT competence of the Examinations Centre; writing the terms of reference was led by a person with IT back-ground outside of the Examinations Centre;

5. detailed terms of reference were written for the developer; over the course of six months, content representatives met twice a week in order to write down a completely exhaustive and accurate analysis document for the developer; writing the terms of reference helped us harmonise our own understanding of EIS, while also serving as input for the developer of EIS.

What Did We Learn?

We have already moved on to the second part (out of three) of the project. Programme activities will come to an end in December 2012. By now, two modules have been completed – the question bank and the management module. We are working on the organisation module, which is the most sizeable of the modules. We have realised that in order to achieve a result that would satisfy everybody, the following points have to be considered:

› Before commencing work with the developer, the client needs to think the desired result through and write it down as accurately as possible. Constant communication and contact between the client and the developer is also important.

› If the client lacks IT competence, which is often the case, it is a good idea to involve a so-called independent expert in the project from the very start. The expert would advise the client in technological matters and serve as an "interpreter" between the developer and the content side, if necessary.

› Given that the principal job of the content people is not development work, it is a good idea to draw up a detailed plan of action at the very beginning: activities, deadlines, people responsible. Adherence to the schedule must be reviewed at certain intervals.

› It makes sense for the client to hire a project manager who would be given so-called special authorisation for the duration of the project.

› If problems arise, they must be resolved at once instead of putting them off or hoping that they will disappear by themselves after some time – they will not.

› We also learned that despite thorough preparations, the development period is very stressful and difficult for the organisation. It benefits the achievement of the goal if everybody involved exhibits an understanding and professional attitude.

By the end of the ÕKVA programme, EIS must be functional. That is to say, it must enable the creation of e-questions and tests, and the general public must have access to all of that.

At the moment, we are concerned that although we will be able to complete the information system in time, the Examinations Centre will not have the capacity – i.e. we will not have enough money, time or e-question writers – to fill the question bank of EIS with high-quality e-questions for all subjects. We hope that we will not arrive at a situation where the information system has become technologically obsolete before we are able to introduce it in full. Time will show if we will be able to increase the technical capability of the system as well as raise the awareness of people enough to actually put the testing environment EIS to practice.

3.1.2

Competition "Innovaatiline kool 2010"

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In spring 2010, the Tiger Leap Foundation organised a competition "Innovaatiline kool 2010" for development projects designed to apply ICT in education. The purpose of the competition was to encourage and support experimentation with innovative educational solutions. All general education schools could participate in the competition seeking new IT solutions for modernising education. The total budget of the competition was 1.9 million kroons; the projects of 18 schools were awarded funding.

Setup of the Competition

Schools could apply for funding for ICT development projects as per their necessity, but on the condition that the operator/owner of the school will provide at least an additional 20% of the amount applied for. The contribution of the school owner could also be bigger than 20%. The amount to be applied for was not limited.

Development projects characterised by the following were preferred:

› compactness, i.e. aimed specifically at creating a new complete ICT-related service/solution/system etc that supports learning;

› innovation;

› supporting the covering of new cross-curricular topics of technology and innovation.

› It was not the aim of the project competition to support:

› creating a basic infrastructure;

› replacing obsolete ICT tools;

› updating, improving or repairing the existing infrastructure.

Applications had to be signed digitally by the school leader and submitted by 31 May 2010. Contracts were concluded and funds were transferred to the winners in June 2010. Since 2008, all correspondence with schools has been taking place paper-free, only by using digital signatures.

Applications Submitted to the Competition

229 applications were received by the deadline. A total of 22.1 million kroons were applied for and more than 5.1 million kroons' worth of own contribution was guaranteed. 59 applications were rejected due to inadequate application documents or violations of contracts concluded with the Tiger Leap Foundation within the past three years. 170 applications for nearly 15.5 million kroons in total were sent for evaluation. The overall budget of the project was 1.9 million kroons. Competition for funding the projects was therefore extremely intense.

Taking a look at the projects that funds were applied for, there were a lot of applications for building and improving a data communication network, as well as for the purchase of computers, laptops, servers, computer projectors, interactive whiteboards, answering systems, document cameras, timetable software, information booths, photo editing software or learning software. There were also quite a few projects for creating a media classroom, introducing media studies, as well as creating various e-courses. The creation of opportunities for video learning and e-learning, establishing e-learning environments and information systems, acquisition of tablet computers and creation of software and content for them was also presented, as was the purchase of test equipment for teaching STEM subjects.

Evaluation of Applications

The most important criterion in the evaluation of applications was the compactness and innovativeness of the project. Do other schools have something to learn from this? Would it be interesting to come and take a look, once it was finished? Would other schools find

The project's connection to the application of the new curriculum, the adequacy of the goal set and the desired outcome, the practicality and feasibility of the action plan, and the reasonableness of the budget were also taken into account. ▸

SCHOOL	AMOUNT APPLIED FOR (EEK)	CONTENT OF THE PROJECT	COMMENT
Gustav Adolf Upper Secondary School	200 000	Virtual tour in the historical school house and museum	
Kanepi Upper Secondary School	96 371	Consortium of small schools, use of video conference in conducting joint lessons	Partial funding, because not the whole budget was directly related to the work of the project
Kihelkonna School	175 000	Introducing tablet computers in learning	
Kolga Secondary School	100 000	Consortium of small schools, use of video conference in conducting joint lessons	Partial funding, because not the whole budget was directly related to the work of the project
Kuressaare Upper Secondary School	112 200	Developing software solutions for an interactive learning environment, creating a prototype	
Mikitamäe School	16 000	Data collectors and various sensors that work in conjunction with a computer, special software for teaching STEM subjects	
Päinurme Boarding School	11 760	Use of GPS devices with photographic memory for teaching geography and related subjects	
Rannu Secondary School	100 000	Data collectors and various sensors that work in conjunction with a computer, special software for teaching STEM subjects	
Save Upper Secondary School	93 000	Data collectors and various sensors that work in conjunction with a computer, special software for teaching STEM subjects	
Tallinn Boarding School No. 1	57 450	Interactive whiteboard and special computer mice for disabled children	
Tallinn English College	116 000	A collaboration-based environment for group work and feedback created for pupils and teachers	
Tallinn Lilleküla Upper Secondary School	53 357	An e-textbook created for media studies	
Tallinn Secondary Science School	65 020	Requesting video lectures from universities for talented pupils	
Tapa Upper Secondary School	110 000	Digitising the Tapa Museum, photographing objects in the area, creating an interactive map and website in the course of learning	
Tartu Private School	205 000	Introducing tablet computers in learning	
Tartu Mart Reiniku Upper Secondary School	82 031	Data collectors and various sensors that work in conjunction with a computer, special software for teaching STEM subjects	
Turba Upper Secondary School	82 568	Consortium of small schools, use of video conference in conducting joint lessons	Partial funding, because not the whole budget was directly related to the work of the project
Viimsi Secondary School	194 080	Use of photo cameras and GPS devices in teaching natural sciences	
Total	**1 869 837,8**		

it interesting to hear about the success story afterwards at a conference? The effect of the project on learning was considered another major criterion. Does the described project make the teaching method better and more interesting? The project's connection to the application of the new curriculum, the adequacy of the goal set and the desired outcome, the practicality and feasibility of the action plan, and the reasonableness of the budget were also taken into account.

All of the proposed solutions were necessary and interesting in their own way, but many had already been applied at several of our schools and therefore not very innovative. Funding was awarded to the most innovative solutions that other schools would have something to learn from. It was decided to fund the development projects of 18 schools.

The results of the Kihelkonna School's project, for example, were also covered in the Maaleht newspaper from 17 November[82]. This school tested tablet computers, using the oft-mentioned iPad, but other schools have been testing other exciting IT solutions.

The development projects of all the schools were carried out by the beginning of 2011. The results of the winning projects were presented to the academic community on 21 February 2011 at the annual conference of the Tiger Leap Foundation. This made it possible to assess their effect on learning and to analyse which direction we should take on the road to educational innovation.

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82 Article "Kihelkonna School was the First in Estonia to Test Tablet Computers in Learning" in Maaleht: http://www.maaleht.ee/news/uudised/kylauudised/kihelkonna-kool-testis-esimesena-eestis-oppetoos-tahvelarvutit.d?id=35122119 (in Estonian only)

3.1.3

Rakvere Smart House Competence Centre

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Smart House Competence Centre and the Viru Region

Each village, municipality or county has to find a niche, its own special value to attract tourists, provide jobs for local entrepreneurs and persuade educated young people to return. Traditionally, the Viru region has mainly been an industrial region where technologies once applied are largely outdated or have become rather inefficient by now. The primary competitive advantage of entrepreneurs is based on either labour costs or environmental and resource charges, which are lower compared to those on the main target markets.

Presently, the main idea is to establish and start a competence centre in Rakvere for developing smart house technologies.

The Rakvere Smart House Competence Centre was created as a result of evaluating several ideas. Initially, there were plans to establish a centre for creating and developing competence as well as maintaining and concentrating knowledge, incl. concentrating libraries, local educational institutions and development centres into one building. Presently, the main idea is to establish and start a competence centre in Rakvere for developing smart house technologies, i.e. the Smart House Competence Centre.

As of now, the Rakvere Smart House Competence Centre comprises an initiative group of over 30 parties, including the Lääne-Viru County Government, Rakvere City, Viru Region Competence Centre Foundation, Estonian University of Life Sciences, AS Erahariduskeskus, Rakvere Vocational School, Lääne-Viru University of Applied Sciences, Narva Vocational Education Centre, Lääne-Viru County Union of Local Authorities, Lääne-Viru Development Centre Foundation, Eliko Tehnoloogia Arenduskeskus OÜ, Yoga OÜ, ITVilla OÜ, Visioline OÜ, Wiseman Interactive OÜ, PT Mikro OÜ, Zoroaster OÜ, Conviso OÜ, ASBL Information Centre of Sustainable Renovation, Tallinn University, AS Võrguvara, Energiasäästubüroo OÜ, AS E-Betoonelement, the Rakvere College of Tallinn University, EA Reng AS, Tallinn Technical University, Elion Ettevõtted AS, OÜ Reminet.

The establishment of the Smart House Competence Centre in Estonia and, more specifically, in Rakvere, was supported by several circumstances. The primary significant factors were the strength and diversity of the ICT domain in Estonia, specialities taught at educational institutions of the Viru region (information technology, construction, control engineering, environmental engineering, mechatronics, social care etc), the diversified business environment of the Viru region allowing to increase the added value of products and services by integrating them with smart solutions, as well as the special position of Rakvere in Estonia and the world. Among one of the first towns in the EU, Rakvere has achieved a 20% reduction of CO^2 emission and done even more to save the environment and reduce its effects on the climate. The energy efficiency of buildings owned by the town has been increased and the town has participated in international climate- and energy-related projects.

Among one of the first towns in the EU, Rakvere has achieved a 20% reduction of CO^2 emission and done even more to save the environment and reduce its effects on the climate.

The priorities of the EU and the world in general are currently focused on reducing the effects on climate and increased energy efficiency. There are plans to reduce the emission of greenhouse gases by 20%, increase the share of renewable energy by 20% and improve the efficiency of energy consumption by 20% by the year 2020. About 40% of the energy consumption and 36% of CO2 emissions are related to buildings and therefore, a significant necessity for changes is seen in that area. In order to realise the changes, it is required that all new buildings used by the public sector should be virtually zero-energy buildings by 2018 at the latest. All new buildings should be zero-energy buildings by 2020. The domain of ICT is considered to play an important role here, as it would be able to manage a building's technical systems in a sustainable and smart manner, while considering the user's needs.

Main Issues that the Smart House Competence Centre Could Help to Solve

During the more detailed outlining of the initial idea for the competence centre, several significant problems have been identified which the competence centre could help solve.

One considerable issue is the delineation and definition of the domain of "smart house". The area of interest of the competence centre includes several domains, primarily ICT, but also construction, control engineering, energetics, electronics etc. We need specialists who are able to cooperate with designers and builders and make technical systems function according to the needs of the users of the building. Based on the issue mentioned last, the main competence domain of the Smart House Competence Centre comprises development of control software and complete systems which can increase a building's energy efficiency, user-friendliness and safety with the help of various sensors, monitoring devices and inter-device communication systems.

According to a survey among cooperation partners of the Smart House Competence Centre, the main problem in up-to-date automated/smart buildings is their non-compliance with stated objectives. This means, for example, that an installed ventilation or heating system is incorrectly managed and fails to ensure the expected energy saving. This may partly be caused by insufficient cooperation between different interested parties. For a better outcome, tools facilitating the designing of a building should be used more. Designers could be aided by various construction information modelling programs, but those are seldom used by architects and designers. Modelling tools for designing of special parts of a building are used even less. E.g. while energy saving and energy efficiency, assessed pursuant to energy efficiency categories provided in legislation, is currently important in designing any building, the additional saving and efficiency possible through the correct installation and adjustment of automated management and control system is not taken into consideration. According to the standard EVS-EN-15232:2007, automated management and control systems alone allow achieving a greater energy saving. As for heating energy, energy-efficient automated systems would allow achieving a saving of up to 40% in non-residential buildings and up to 19% in residential buildings. Well-functioning management and control systems would allow saving up to 14% of electric power in non-residential buildings and up to 8% in residential buildings. Energy is saved through controlled, necessity-based management of heating, ventilation, cooling and lighting. Considering the EU requirement for new buildings by 2020, the skill of managing and controlling a building's technical systems is of decisive importance. A building with good thermal insulation and well-planned position in relation to the sun increases its heating energy efficiency but will not guarantee the optimal functioning of systems or consider the users' other needs.

According to a survey among cooperation partners of the Smart House Competence Centre, the main problem in up-to-date automated/smart buildings is their non-compliance with stated objectives.

The third important challenge for the Smart House Competence Centre is to activate and increase research and development activity in the region and the engagement of entrepreneurs in the region. It requires financial resources, an infrastructure necessary for R&D, competent researchers and sustainable, purposeful development. With the support of Enterprise Estonia (EAS) and the Ministry of the Interior, this goal can be striven for over the following four years, as a grant for launching regional development activities is allocated from the competence centre development programme.

Main Objectives and Expectations for the Smart House Competence Centre

The development of the competence centre is based on the objectives established for the development of regional competence centres receiving support from EAS and the Ministry of the Interior. The overall objective of regional competence centres is to develop regional competence centres outside Harju County, Tallinn and Tartu which would have potential to become internationally competitive in at least one defined domain and thus increase the competitiveness of the whole area.

The overall objective of regional competence centres is to develop regional competence centres outside Harju County, Tallinn and Tartu which would have potential to become internationally competitive.

For the Smart House Competence Centre, this means focusing on three main directions of development activity which comprise the development of control and integrated systems:

1. for home and working environment (e.g. devices and aids intended for seniors, home appliances, home equipment, office equipment);

2. for technical systems of buildings (heating, ventilation, cooling and lighting systems); ▶

3. for buildings and their surrounding space as a whole (general condition of the building, administration, considering the surrounding environment and needs depending on the environment, incl. parking, external lighting).

In order to achieve the objectives, it is intended to start a training programme for harmonising knowledge and skills. It is also planned to update the curricula of the specialties related to the competence domains of the Smart House Competence Centre and taught at the region's educational institutions and to provide in-service training for professors of such specialties. In order to supplement the infrastructure necessary for the development activity, it is planned to establish a so-called living lab comprising different trial objects in Rakvere City. The primary trial object is the new and renovated administration building of the Rakvere City Government where various systems will be tested in an actual living or working environment.

Furthermore, studies, analyses and potential applied surveys or product development projects are planned for the next four years; relevant topics are added continuously. The primary surveys aim to clarify the needs of different social groups, their opinions of and interest for the use of various technical aids. Another prioritised area of study is the methodology of economic analyses in order to be able to assess the economic cost-effectiveness of solutions to be developed or applied, their life cycle or different types of income and expenses.

Main Achievements of the Smart House Competence Centre

Since 2009, the Smart House Competence Centre has been engaged in the development of its conceptual design and strategy. At the founding of the centre, a cooperation board of all cooperation partners was established. The board, that gives advice to developers, meets on a regular basis. The most important major event for the Smart House Competence Centre up to date was the two-day Smart House Conference that was held in Rakvere in April 2010 and had over 100 participants. A major speaker at the conference was Ron Zimmer from Canada, the Director General of "CABA" (Continental Automated Buildings Association). The Rakvere Smart House Competence Centre also concluded a cooperation agreement with that organisation. Furthermore, Finnish and German competence centres related to the subject of "smart house" were visited in autumn 2010 and it was agreed to initiate joint international cooperation projects.

Smart House Competence Centre in 5 years

The vision of the Smart House Competence Centre is to become in 5 years an internationally recognised development and cooperation centre engaging international experts and providing opportunities for high-level R&D activity. One of the major advantages of the centre will be a trial environment based on the principle of a living lab and comprising several different trial objects with different purposes and uses. This would allow engaging in development activities – not only for local entrepreneurs or research and educational institutions, but also for international companies. The effect of the Smart House Competence Centre on the region will enable both to establish new companies and create new jobs. The Smart House Competence Centre will also become an important symbol of Rakvere besides the theatre, the Vallimägi Hill and the Aurochs sculpture, where one can try and test smart control systems and integrated solutions which help make life more comfortable, energy-saving and safe.

Increasing the Competitiveness of Estonia's ICT sector

3.2.1 Unique e-Receipt Helps to Stop the Use of Paper Receipts

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Estonian Association of Information Technology and Telecommunications

The concept of e-receipt, initiated by the Estonian Association of Information Technology and Telecommunications (AITT) within the ICT cluster project, is unique in the whole world. In the future, it could be developed into a successful Estonian export article. Hopefully, the solution for replacing the currently used paper receipts with an electronic database will reach the stage of the first flagship project in autumn, 2011. From 2014, half of the card payments made in Estonia could be included in the general information set of the e-receipt system.

The concept of e-receipt is based on the free choice of a citizen to register his/her purchases in a general multifunctional database. This would considerably reduce the amount of annoying paper receipts. The user could obtain the necessary information about his/her purchases via computer or mobile phone and in case of a complaint or warranty claim, contact the retailer directly. The primary value for the customer is the sense of security that the purchase receipts are preserved and the personal data set can be accessed at any time. According to the concept, the e-receipt system will not focus on cash transactions but only include card payments with the individual's permission.

The e-Receipt solution will replace paper receipts with an electronic database.

Solution in Cooperation between the Public and the Private Sector

In turn, companies would get the chance to forward expenses and reports on business travels to the accountant electronically. Retail chains, banks and other companies providing e-receipts could also differentiate themselves clearly with an attractive, customer-oriented application and get added value from a new, reliable direct marketing channel between the customer and the retailer.

The solution serves the interests of a green future by saving paper. Purchasers of environmentally friendly products could get additional benefits through the e-receipt system in the future.

Of course, the participation of the state is necessary in operating this kind of a central database. Thus, we can speak of the e-receipt as a solution functioning according to the public-private partnership principle. State authorities such as the Ministry of Economic Affairs and Communications, the Consumer Protection Board and the Data Protection Inspectorate are currently engaged in the discussion and development of the concept.

Through the AITT and partner organisations, the parties related to the e-receipt concept and the Estonian e-Service Foundation to be created include the Estonian Traders Association, SEB, Swedbank, ▶

Eesti Post, Elion, Ericsson, eArvekeskus, Itella, Webmedia and a number of other companies.

A general receipt database would in the future allow developing a number of additional new services such as a registered e-letter, an e-insurance policy and an e-letter of authority.

A general receipt database would in the future allow developing a number of additional new services where an agreement is concluded between a private person and a business entity, such as a registered e-letter, an e-insurance policy and an e-letter of authority. E-receipt as a product could also be sold to other countries in the EU and the world, as according to a study by Invent Baltics, no country in the world is currently using such an application.

E-Receipt Unites Entrepreneurs

I am very glad that we have discussed the issues with all parties in an informal atmosphere and found solutions. Cooperation has been successful and we soon hope to achieve the objective – to launch the e-receipt flagship project during the upcoming summer.

There are still some concerns and fears to overcome – e.g. the transaction speed must be ensured in the developed e-receipt application, not to cause long lines at bank offices or stores. Retail chains do not apply standardisation of bar codes by product groups.

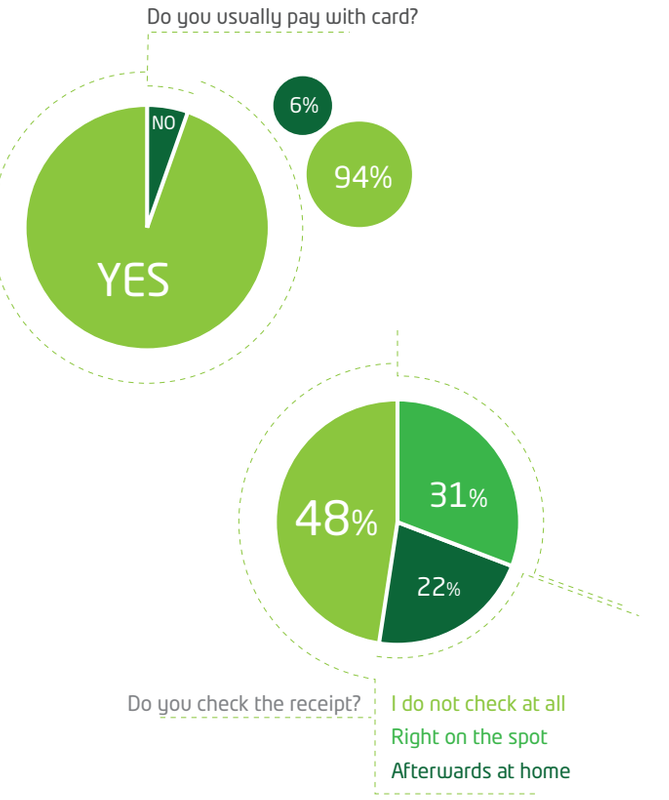
The e-receipt can be regarded as an important landmark in the ICT cluster project, aiming to intensify cooperation between companies and organisations of ICT and other domains.

The e-receipt is an important landmark in the ICT cluster project, aiming to intensify cooperation between companies and organisations of ICT and other domains. The outcome of a survey (see the next figure) conducted by the working group inspires confidence. Ca. 2,000 people expressed their support for the e-receipt project and as much as 70% of the interviewed people expressed their readiness to pay in the future a moderate monthly fee for using of this service.

Ragnar Toomla

Business Development Manager of Web and Mobile Banking, SEB Pank

Financial Diary, a new solution by SEB, provides our clients with an excellent overview of their monthly expenses. The e-receipt would be a perfect addition. Currently, the Financial Diary groups transactions automatically by store or beneficiary. E.g. if the client makes a purchase at Kaubamaja, we classify it as "clothing", even if the purchase was a home appliance instead. If the Financial Diary "knew" the content of the receipt in greater detail, the user could obtain an even more accurate overview of his/her expenses.



Results of a consumer survey organised by the ICT cluster's working group.

It is particularly important to ensure the privacy and protection of the user's data. This is the greatest risk of the e-receipt project. Thus, eliminating the possibility for third party to access data of person's purchase, should be eliminated.

Toomas Türk

Head of Division, Information Logistics, Eesti Post, Member of the Council of eArvekeskus

The e-receipt solution is unique, has a wide consumer base and can achieve a positive image based on an environmentally friendly, innovative

mindset. It is always interesting to participate in initiatives for the development of consumer solutions. We do it gladly, but it also has an important business-related point. Eesti Post as the company with the widest service network in Estonia communicates with its customers closely and daily. New potential services will not only save the environment and the expenses of receipt issuers but will also be included into our new-generation postal services. Thus, they will become a part of the simple and easy-to-use postal services for both businesses and private persons. Apart from that, the success of Estonia in the changeover to e-accounting will certainly receive another positive push, thanks to the opportunities and developments of the e-receipt. Considering different types of documents still forwarded as hard copies or printed on paper, this will certainly not remain the last initiative. The rapid development of e-services motivates changes in the whole classic institution of postal services and gives us an excellent opportunity to become successful in the export of solutions and standardisation of business models and services.

In 2011, ICT, banking and trade companies intend to jointly establish an Estonian foundation for e-services, the main objective of which would be supporting the development of innovative e-services, creating preconditions for the emergence of novel business solutions, uniting the information systems of companies and facilitating their access to national registers. One of the first duties of this future foundation is to implement the e-receipt project.

Photo by Kalev Lilleorg.

3.2.2

Garage48 – from an Idea to a Functioning Service within 48 Hours

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Garage48 Foundation

Garage48 is an initiative emerged from the Estonian Startup Leaders Club (ESLC) in spring 2010. It aims to encourage people through practical activities and positive models and motivate them to start their own enterprises.

ESLC is a club founded in 2009 to unite managers and founders of start-up enterprises. Many start-ups have similar concerns, challenges and joys which the club members can share and solve together. It could be finding and motivating suitable employees, involving additional capital, product development, business contacts or tips for the better organisation of sales activities. The club currently has about 35 active members who are trying to make it amonh the world's top three companies within their own niche.

In March 2010, five young Estonian entrepreneurs (Jüri Kaljundi, Rain Rannu, Martin Villig, Ragnar Sass and Priit Salumaa) found that it was time to create a practical initiative besides the Estonian competitions of evaluating business plans and other rather theoretical competitions. The launch of the initiative was guided by keywords such as product development, speed, economy, teamwork, internationality and communication. The name of the initiative, Garage48, came up in the course of the work – IT start-ups are often founded by a couple of friends in their parents' garage and an event is limited to exactly 48 hours.

The launch of the initiative was guided by keywords such as product development, speed, economy, teamwork, internationality and communication.

Garage48 is well suited for people with various technology-related business ideas who, for some reason, have not yet started realising their ideas. Garage48 is a "high-speed testing platform" for new ideas, allowing to create a functioning prototype of an idea, get feedback from users and clients and decide whether the idea really has actual, paying users and a greater business potential – all that within a short period of time.

What is Garage48?

The objective of Garage48 is to go from an idea to a functioning service (or prototype) in 48 hours, i.e. a week-end. 100 people registered for an event are divided as follows, considering different roles: 50 programmers, 20 designers, 15 project managers and 15 marketing specialists.

100 people registered for an event are divided as follows, considering different roles: 50 programmers, 20 designers, 15 project managers and 15 marketing specialists.

On a Friday night, 100 motivated people with an active mindset come together in a room where each and every one can suggest ideas for various services. An idea must be presented within just 90 seconds; ca. 30–40 different ideas are usually suggested. Thereafter, the authors of the idea try to "sell" it to as many people as possible. At the same time, all participants have to find their favourite idea to actively work on during the rest of the weekend.

Usually, half or 15 of the 30 ideas find a suitable team. The format of the event prescribes that all roles necessary for the realisation of the idea shall be balanced in each team – the project manager, designers, software developers and the marketer. Presenting ideas and forming teams normally takes 2–3 hours. Active work for carrying out the chosen project begins then, already on Friday night.

Saturday and Sunday are intended for active product development and programming. During the weekend, teams are visited by mentors – some with technical, some with business-related background and experience. Together with the mentors, project managers and marketers work on the business model and marketing tactics of the project. According to the format, participants are provided with food and soft drinks – everything to ensure that the teams can concentrate on the development of the chosen product as much as possible.

Time ticks on relentlessly and at 6 p.m. on Sunday, all projects must be ready for an on-stage presentation before all participants and the audience in the form of a "live demo". The majority of teams has managed this challenge and presented their products and services. The

best teams are recognised by the jury and the audience selects its favourite as well.

What Happens After the Weekend?

The stronger teams, e.g. Kratid.com, Defolio.com, Quotista.com, Laplab.net and Ordimo.com, also continue working on their project after the intensive weekend. On the other hand, some of the created services function still, although their teams no longer actively develop them: Localvortex.com, Smashr.net, Iseehitaja.ee, Prygikast.com, Blurt.at, Richrats.com, Moistatus.ee etc.

According to feedback from participants, the greatest advantages of Garage48 are the following:

› an extremely intensive and practical experience in product development; one must go from an idea to a functioning service within 48 hours; the tight schedule forces the participants to only focus on the most important things, as the service will never be ready in time if trivial issues are pursued;

› meeting new people and intensively working together for 48 hours provides a thorough overview of the characters and experiences of team members; pinding new acquaintances with similar mindsets creates good preconditions for starting and successfully developing business projects together in the future;

› the busy, but fun and easy atmosphere provides a pleasant change from the daily routine of work or studies; the participants can also meet new enterprising people from Estonia and its neighbouring countries; for those reasons, numerous people have participated in more than one Garage48-weekend.

Three events with the Garage48 format were held in 2010: the first in Tallinn in April, the second in Tartu in August and the third in Nairobi, Kenya, in October. The Kenyan event was held under the name of IPO48 in cooperation with HumanIPO.

For 2011, Garage48 plans to organise at least seven events in Estonia, Latvia, Finland and Sweden, along with five events in different African countries. It can be said that Garage48 has been received by participants very well and it has become a format for practical business events also beyond Estonia. More information: http://garage48.org

Garage48 HUB

In autumn 2010, the Garage48 team got the idea of establishing an open office in Tallinn for people working with start-ups, mobile and web applications – HUB. The idea was fuelled by the fact that such co-working opportunities are present in numerous cities throughout the world and also in the capitals of all the countries adjacent to Estonia. It took 480 hours, i.e. 2 weeks, to go from the idea to opening the HUB.

Garage48 HUB is intended for start-up teams, entrepreneurs, freelance programmers or designers and others who wish to work in an open office together with people with similar mindsets, either part-time or full-time. Working alone at home or in a single-room office is certainly pleasant, but a need for communication and requesting feedback to one's ideas will arise after a longer period of time. Besides good company, the HUB

Garage48 HUB is meant for start-up teams, entrepreneurs, freelance programmers or designers and others who wish to work in an open office together with people with similar mindsets, either part-time or full-time.

In April 2010, on first Garage 48, the participants show their willingness to participate also in the future-coming events. ▶

also provides office equipment, meeting rooms, a kitchenette and other practical amenities, the acquisition of which is often postponed by economical, recently launched companies.

The HUB intends to become a "nest" for start-up companies in Estonia, with regular practical seminars on topics related to business and start-ups, product development discussions, workshops for testing new services, meetings with various mentors etc. The HUB offers people visiting Estonia a good opportunity to work temporarily, hold business meetings and establish contacts with local entrepreneurs and technology specialists.

The HUB currently has over 35 members with different statuses, and this number is increasing steadily. The HUB offers its members flexible membership packages: one-day access, five- or ten-day packages and even one's own permanent working desk. More information: http://hub.garage48.org.

Future Plans for Garage48

An important part of Garage48's plans for the future aims to expand cooperation with companies and organisations interested in developing start-ups in Northern Europe or Africa. The envisaged cooperation forms are mentor-ship, announcing special awards in their areas of activity, spreading messages through marketing or financial support. Garage48 is open-minded towards events organised in new countries, but this requires initiatives by local people and their active participation in the whole organisation process.

3.2.3

Foot in the Silicon Valley Door – Breakthrough of Estonian Technology Companies onto the World Market

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Representation of Enterprise Estonia in Silicon Valley

Operating in Silicon Valley is something of a "gold standard" in the technology sector. It is the most recognised centre in the world, providing the best opportunities for start-ups, especially for so-called disruptive innovations. Some examples are Google, Apple, Yahoo, Facebook and also Skype, which is associated with our very own Estonia! Those enterprises were either born in Silicon Valley or moved there later, in order to become global market participants.

Why is Silicon Valley Unique and Why Should one be Visible There?

A business environment which justifies risk has developed in Silicon Valley. Failures are considered a journey towards success. The area concentrates global technology companies which are leaders in their niches, thou-sands of start-ups, venture capitalists and the providers of support services for businesses (lawyers, legal consultants, financial consultants, accountants etc). In the global perspective, Silicon Valley is not a large place. The population is ca. 3 million. San Francisco, one of the best known "iconic cities" in the world, in the north, San Jose in the south and several other smaller cities such as Palo Alto, Mountain View, Sunnyvale and others in between. In the context of Estonia, all that could be fitted between Tallinn and Paide! Silicon Valley

› accounts for 3% of the GDP of the US (18% of the Californian GDP – California alone is regarded as the eighth economy in the world);

› comprises 15% of the world's venture capital (ca. 40% of venture capital in the US);

› is the place of business for 20% of the world's software and hardware companies (over 6,600 companies with over 300,000 employees);

› is the location for recognised universities and research centres (11% of US patents) - Stanford University; University of California (Berkeley); University of San Francisco; San Jose State University; SRI International (former Stanford Research Institute).

› is one of the most international regions in the US: 55% of researchers here were born abroad (3 times the average of the US); 48% of the inhabitants are multilingual (the average of the US is 19%); 52.4% of the technology companies in Silicon Valley were founded by immigrants (as compared to 38.8% in the whole California, 25.3% in the US).

As the richest and most important technology market, Silicon Valley is the place where everybody is present.

As the richest and most important technology market, Silicon Valley is the place where everybody is present. Both private companies and enterprise agencies from numerous countries, if only to monitor the product development and market trends. Communication and information exchange is very open and occurs on all levels. Venture capital for the realisation of ideas and conquering the market is within arm's reach, and there are excellent opportunities to exit a business and start a new cycle with new ideas.

Enterprise Estonia in Silicon Valley

The goal of Estonia is to develop into a knowledge-based economy. To this end, we need intensive international communication or bridge-building with technology-related attraction centres in the world. EAS/Enterprise Estonia, one of the main support structures for developing Estonian enterprises, expanded its international network in 2007 by opening its representation in Silicon Valley. EAS also has representations in Hamburg, Helsinki, London, Kiev, Moscow, St. Petersburg, Shanghai, Stockholm and Tokyo.

The main duty of Enterprise Estonia in Silicon Valley is to create mutual contacts and partnerships between Estonian and American technology companies and R&D institutions. We provide Estonian companies with all kinds of help in entering the US market, including the establishment of a virtual or permanent office. An ▸

address and physical presence in Silicon Valley are extremely important in client relations, both for acquiring new clients and engaging venture capital. Of course, we also present Estonia to American companies as a good place for business in the region of Northern Europe (promoting foreign direct investments).

Enterprise Estonia in Silicon Valley cooperates closely with similar representations and companies of other Nordic countries. The social network Silicon Vikings[83] captures thousands of people and companies, offering them various contact events and news.

What are the Efforts and Successes of Estonia in Silicon Valley?

It is said that capital has no nationality. This also applies to enterprises/start-ups in Silicon Valley. It doesn't matter where you are from, but what you do and how well you do it. Since the establishment of Enterprise Estonia in Silicon Valley, i.e. within four years, we have made enough noise to be noticed in the various networks of Silicon Valley.

Since the establishment of Enterprise Estonia in Silicon Valley, i.e. within four years, we have made enough noise to be noticed in the various networks of Silicon Valley.

For example, Allan Martinson (MTVP), Andrus Aaslaid (Microsoft Estonia), Priit Vimberg (Yoga), Sten Tamkivi (Skype), Kalev Kask (eGeen), Andrus Viirg (Enterprise Estonia) have spoken and presented their enterprises at Stanford University; Rain Rannu (Fortumo) will do the same this year (2011). These men already have something more than a foot in the door of Silicon Valley. Participation in the Stanford seminar programme[84] has been a good opportunity to raise wider awareness of Estonia as an e-state and our business environment among Stanford students and entrepreneurs of Silicon Valley.

Another good example is cooperation in the areas of renewable energy and energy efficiency with Nordic enterprise representations in Silicon Valley (Finnode/Tekes, Innovation Center Denmark, Innovation Center Norway). The two large-scale events of Nordic Green have opened doors and provided contacts for further cooperation both in Nordic countries and in America for our start-ups like Yoga, Crystalsol, Goliath, Elcogen and the major company Eesti Energia.

Thirdly, several high-level Estonian government visits accompanied by entrepreneurs have been organised to Silicon Valley. The place has been visited by the Prime Minister Andrus Ansip (who in November 2007 opened the Enterprise Estonia office in Silicon Valley as the Estonian embassy of technology), the Minister of Economic Affairs Juhan Parts (who opened Nordic Green in 2008); the President of the Republic Toomas Hendrik Ilves (presentation of Estonian start-ups, 2009) and the Minister of Defence Jaak Aaviksoo (opening address at the cyber defence conference at Stanford University, 2010).

Cooperation with the Tallinn Science Park Tehnopol in organising study trips should also be mentioned. Several of our companies are already frequent Silicon Valley visitors. With the presentation of Fits.me, Massi Milano won the first prize at an international competition of start-up companies (International Investment Forum, the Plug and Play Acceleration and Collaboration Track) in October 2009. Modesat, Fortumo, Mikromasch and Artec Group have established their offices in Silicon Valley. The companies with the longest local experience and certainly the greatest success are eGeen, which performs clinical trials/analyses for US pharmacy industries, and FusionOne which offers web-based applications for mobile communication devices. Both have also engaged local venture capital: eGeen from DFJ (Draper Fisher Jurvetson) and FusionOne from BlueRunVentures.

The joint organisation of study visits with Tehnopol will certainly continue. The plans also envisage a more prolonged incubation programme for Estonian companies in Silicon Valley. One option is to organise it at the Plug&Play Tech Center by expanding the existing representation of Enterprise Estonia in Silicon Valley. The centre already houses enterprise incubators of several European countries. A critical mass of international start-ups has emerged, attracting in turn other actors on the Silicon Valley market.

In conclusion, some tips about going to Silicon Valley. Firstly, like in case of every enterprise, a lot of homework is required. One should understand what the market needs or where the issue lies, and then offer a solution. The solution does not have to be perfect – it can be improved on the basis of feedback from the first clients. Secondly, one should not be afraid of large expenses, but of small revenues. Silicon Valley is an expensive place in every sense of the word. However, being present there will pay off, as large profits can be earned from a rich market. And of course, there are excellent opportunities to further increase one's wealth with new enterprises. Do not give up after the first failure. Optimism will always do you good. *Surf's up, dudes!*

You should not be afraid of large expenses, but of small revenues.

83 www.siliconvikings.com

84 www.europeanentrepreneursatstanford.com

Companies Related to Estonia in Silicon Valley

› Artec Group, www.artecgroup.com – multidisciplinary product development: from microchips to electronic devices

› Booking Shark, www.bookingshark.com – a social network for the entertainment industry (garage bands, clubs, fans)

› EGeen, www.egeeninc.com – clinical trials and analyses for pharmacy industries

› Fortumo, www.fortumo.com – mobile services and payments

› Fusion One, www.fusionone.com – web-based applications for mobile communication devices

› Fotki, www.fotki.com – a social network for sharing photos and videos

› Guardtime, www.guardtime.com – an encrypted time stamp in data communication

› Modesat, www.modesat.com – a modulating-demodulating software for radio communication technology

› SPMTimps, www.spmtips.com – (formerly Micromasch) microneedles for electron microscopes (nanotechnology)

› Yoga, www.yogasystems.com – a complete solution for a smart, self-learning house (energy efficiency, security)

3.2.4

Artifact-Centric Service Interoperation

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Introduction

Doing business online means depending on a variety of e-services. Coordinating those services, each of which is possibly exploited on a proprietary platform, can require a level of IT expertise beyond the scope of small- to medium-sized companies. Even large enterprises, who invest significant resources into integrating these different platforms, often find that manually blending a group of e-services does not take full advantage of each individual service's technology. The aim of "ACSI" (Artifact-Centric Service Interoperation) FP7 project, where the University of Tartu is one of the contributors, is to develop a platform to automate the blending process in such a way that the interoperability of separately managed e-services could be facilitated and shared business goals achieved.

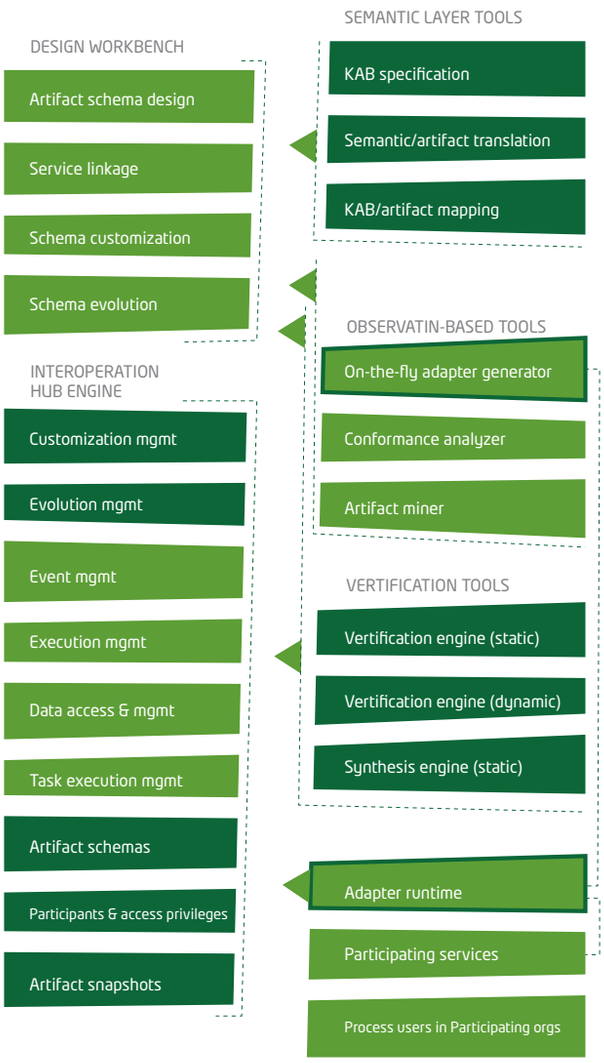
Interoperation between electronic services is one of the most challenging and pressing issues in today's increasingly globalised and decentralised economy, and furthermore, as emphasised in IDABC activities, it is a key factor in enabling the implementation of a pan-European e-government. So as to exemplify how the ACSI platform will tackle interoperability issues, let us consider the following case. A company that coordinates conference and convention events, for example, needs a broad variety of e-services, many of which are operated by third parties, to manage the scheduling, catering, decorations, lodging, transportation, finances, and more. The activities of these e-services will be interleaved in intricate ways, and will typically need adjustments – both manual and automated – as the event progresses. With modern technologies, coordinating these e-services usually involves the development of proprietary and ad hoc systems that require considerable expertise to create and maintain. These systems are mostly application-specific and do not have the flexibility to scale up when the number of customers or incorporated services increases significantly.

ACSI will provide an open-source platform, where businesses can easily create new or join existing blends of e-services. Since individual services are operated by different types of organisations with unique core competencies, manually developing and maintaining an application, which will combine all of them in a consistent manner, would be overly complex and far from being cost-effective. Any application sophisticated enough to fully support each service's capabilities would just not be flexible enough to support the variations stemming from different geographical regions or changes in a services' marketplace. ACSI overcomes these challenges by taking advantage of two fundamental concepts: the interoperation hub and dynamic artifacts, also known as business artifacts or business entities. While an interoperation hub serves as a virtual rendezvous for multiple services that work together toward a common goal, the artifacts provide a holistic marriage of data and processes, serving as the basic building blocks for modelling, specifying, and implementing services and business processes around which the hubs are structured.

Structure of ACSI

The ACSI project is a three-year project funded within the European Union 7th Framework Programme Objective 1.2 "Internet of Services, Software and Virtualisation" (FP7-ICT-2009-5-Objective 1.2), which started in June 2010 and will be finalised by the end of May 2013. The project consortium consists of Università degli Studi di Roma La Sapienza (Italy), Libera Università di Bolzano (Italy), Imperial College of Science, Technology and Medicine (United Kingdom), Technische Universiteit Eindhoven (Netherlands), Tartu Ülikool (Estonia), Indra Software Labs SLU (Spain), Collibra NV/SA (Belgium) and finally IBM (Israel) as the coordinator. The conceptual architecture of the ACSI hub system is summarised in Figure 1 outlining the following main components. The design workbench consists of four main components, which support designing schemas, linking services to deployed schemas, customising schemas, and evolving schemas. The interoperation hub engine provides run-time support for an interoperation hub. The semantic layer tool component enables setting up a "KAB " (Knowledge and Action Base), and then using it in connection with one or more artifact types, in particular to support artifact schema evolution. The verification tool

component holds the static and dynamic verification engines, along with the synthesis engine. The observation-based tool component includes the conformance analyser, the on-the-fly adapter generator used to generate run-time adapters; and the artifact miner.



Conceptual Architecture of the ACSI Hub System.

Observation-Based Techniques and Tools

Within the ACSI project, the University of Tartu is involved in the research of observation-based techniques and tools together with the Eindhoven University of Technology, Netherlands. The main goal of this research stream is to adapt, generalise, and apply process-mining and monitoring techniques to the context of artifact-centric interoperation hubs. This will include the development of techniques and tools for the process-mining of services and artifact-centric interoperation hubs, to support on-line compliance checks, the auto-generation of adapters, and the discovery of artifact-centric models that underlie a service's behaviour.

Process-mining is a relatively new area of research. It attracts a lot of attention and is nowadays reaching a mature stage of development. Process-mining uses knowledge discovery and data-mining approaches for the development of methods and tools needed for analysing process models and the actual execution of processes represented by event logs. Event logs consist of traces, each of which represents one execution of the business process. Each trace is a collection of temporally ordered events with their timestamp and associated data. Events can represent the execution of tasks, messages, transactions relevant to the business process. For example, the process of recruitment might start with the formulation of a job description, then publishing a job announcement, receiving and processing applications, selecting and interviewing candidates and so on, until a selected candidate accepts the position or until the position is closed for other reasons. One trace will represent the handling of one vacancy and all related events.

Examples of issues that can be addressed using current process-mining techniques include:

› conformance checking, i.e. checking whether the behaviour of a running system (represented by recorded logs) conforms to expectations such as a model specification, regulations, or contracts;

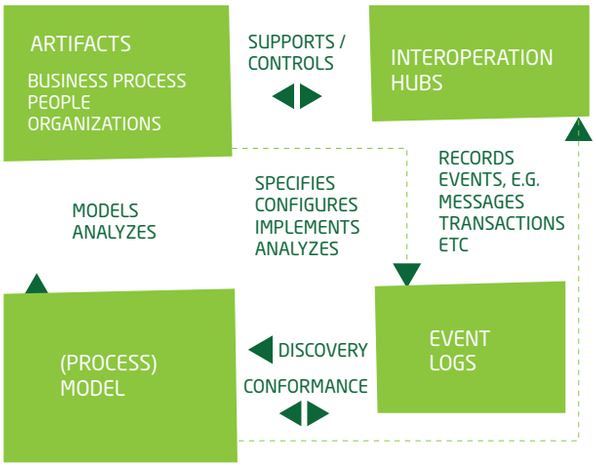
› process discovery and improvement, i.e. reverse engineering or redesigning business process models from event logs;

› monitoring the quality of service, i.e. identifying performance bottlenecks, monitoring flow times, resource utilisation, response times, error rates, etc.

For the recruitment example, a few specific questions would be: Does the process conform to the specification of company procedures? What are the deviations? If these deviations deal with unforeseen circumstances, how can we redesign the specification to reflect them? Where are the bottlenecks of the process? Which tasks require the most effort? What is the workload of the involved actors? What are the patterns of communication between the actors?

A wide variety of process-mining tools is integrated in the open-source framework ProM[85], which allows for the easy addition of new methods via plug-ins, visualisation of the results and import and export in a variety of formats. ▸

85 http://prom.win.tue.nl/research/wiki



The relation between process-mining, artifacts, and interoperation hubs.

Figure 2 shows the relationship between process-mining, artifacts, and interoperation hubs in the context of the ACSI project. Two main issues will be considered: discovery and conformance. These are discussed in the following paragraphs.

One important question concerning business process models is whether the actual execution of the process conforms to the model. Non-conformance can occur due to a variety of reasons, such as errors in execution, inadequacy of the model, change due to external factors, etc. So far, conformance checks have only been investigated for traditional process models expressed as Petri Nets. The ACSI project looks at this question in the context of artifact-centric models, which present additional challenges. In comparison to the traditional business process models, conformance to artifact-centric ones should consider additional aspects such as artifact structure, interaction and data. The objective of this research is to develop metrics and a methodology for assessing the conformance of event logs to an artifact-centric model as well as to implement tools for calculating and visualising the results.

The following classification of conformance to artifact-centric models was developed:

› structural conformance analyses the degree of conformance between the artifact structure of the model and the underlying entity structure of event logs;

› life cycle conformance analyses the degree of conformance between artifact life cycles and event logs;

› interaction conformance analyses the degree of conformance between the interaction among the artifacts specified in the model and that evidenced by event logs;

› data conformance analyses conformance with respect to the data attributes that belong to the artifacts, data changes and conditions against the data attributes and values recorded in event logs.

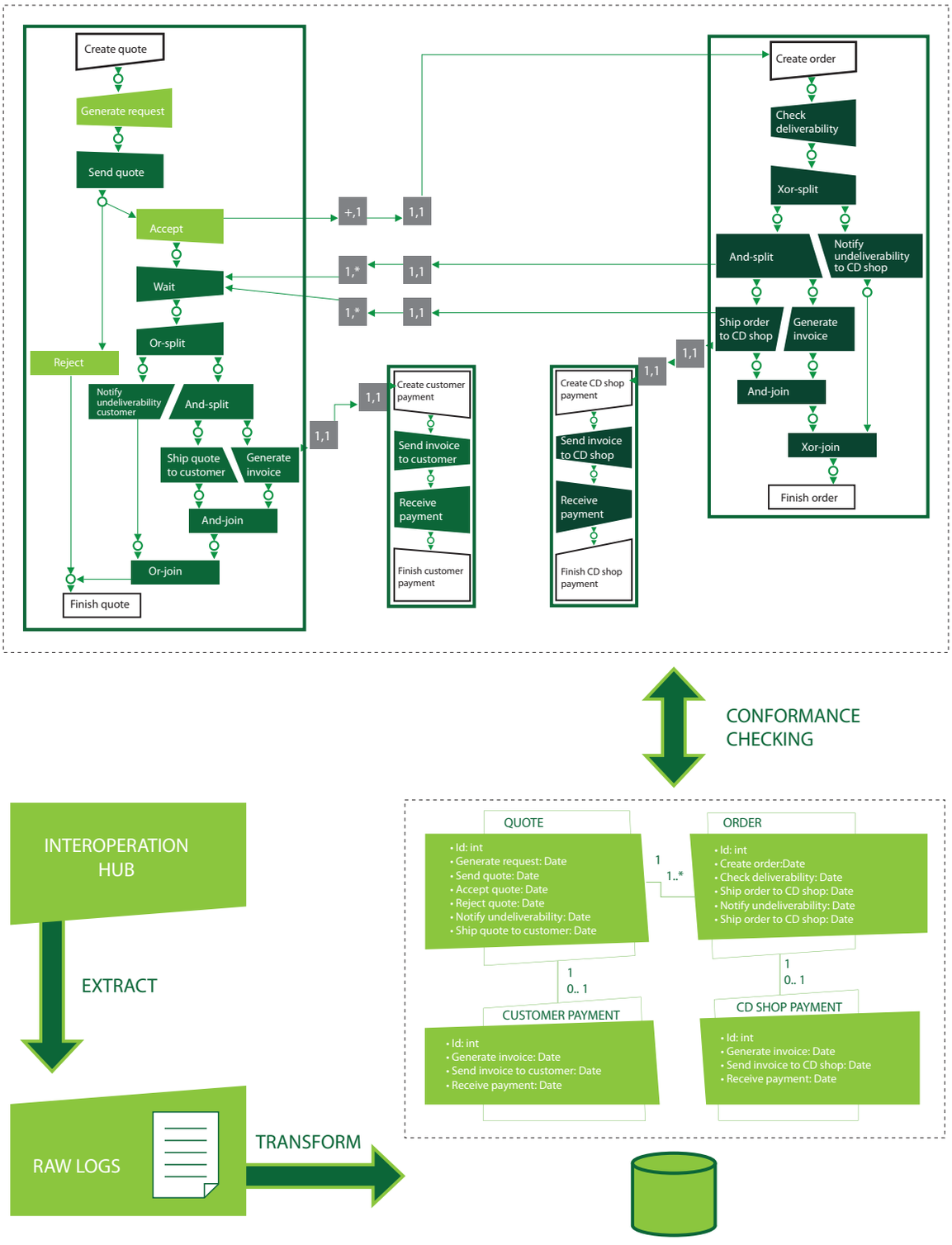
Current research at the University of Tartu focuses on the issue of structural conformance. Figure 3 shows the overall process of structural conformance checks which starts with raw logs recorded from the execution of the system and their transformation into a structured database, which is then used to calculate the structural conformance metrics.

The transformation step includes the discovery of entities together with events and data belonging to them as well as discovering the relationships between entities and the corresponding cardinalities. The conformance metrics can then assess how the entities and events belonging to them match the artifacts and their tasks in the model. Entities and artifacts are matched on the basis of their identifiers, which in case of the entities correspond to the key attributes discovered during the transformation phase.

We use a sophisticated method for calibrating the conformance measure based on the relative importance of the entity which takes into account both the dependencies between entities and the strength of the entity. The dependencies include the cardinality of existing relationships and the temporal precedence between entities as evidenced by the events in logs. A simple example would be an entity corresponding to the concept of an order placed by a customer and an entity corresponding to the concept of paying for an order, where one order can result in a zero or in one payment, depending on whether or not the order was delivered. Intuitively, a payment uniquely identifies the order and is temporally preceded by it. Therefore, if the payment entity is not represented by a separate artifact in the model, this is a sign of nonconformance. However, it is less severe than if the entity order was not represented by a separate artifact. The strength of an entity reflects the number of events associated with it and in a way, this represents its actual life cycle. Intuitively, high strength indicates a more elaborate life cycle and is therefore a good reason for having a separate artifact in the model.

The structural conformance scores allow analysing conformance both from the point of view of the artifact model and from the point of view of the event logs represented by the entity model. A tool implementing the transformation of raw logs into a structured database and the calculation of conformance metrics is being developed and will be integrated into the ProM framework.

In parallel, the concept of life cycle conformance to artifact-centric models is being investigated by our project



The overall process of structural conformance checks.

partners at the Eindhoven University of Technology. In the immediate future, interaction and data conformance checks will be investigated as well in cooperation between the University of Tartu and the Eindhoven University of Technology.

The second phase in the observation-based techniques research stream is to shift the focus from merely detecting to repairing non-conformance by developing methods for the on-the-fly synthesis of adapters for resolving the mismatches.

Finally, the ACSI research will develop approaches for artifact discovery; that is, for constructing an artifact schema from a set of event logs. In this project, we position artifact discovery as a central maintenance activity in ▶

interoperation hubs. By constructing operational models on the actual behaviour of a hub from service interaction logs, we will be able to give reasons about the evolution of the hub and the changes that occur in the hub over time. In particular, we will be able to pinpoint how the processes supported by a hub are affected by the arrival or departure of services, and we will be able to monitor data quality.

Conclusions

The ACSI project is expected to deliver the technology that will simplify the blending of e-services. More specifically, a reduction of about 40% in the costs of creating such blends with respect to manual creation is expected, while further savings by enabling automation of about 90% can be achieved through the automation of data transformations needed to support the blends. These savings originate from significantly simplifying the process compared to conventional methods.

The ACSI will be provided as a SaaS (Software as a Service) implementation, enabling a pay-per-use model. This scalability and simplicity make it just as relevant for small organisations as for large enterprises. Ultimately, ACSI's interoperation hubs can be placed into a cloud to provide data storage and task executions on behalf of the participating services. Finally, once the system is in place, ACSI's capabilities extend beyond e-service blends. The platform will enable the effective management of all data underlying the business processes.

In conclusion, ACSI is expected to drive online businesses into a new era of simplified and cost-effective collaboration. Businesses, both large and small, can retain a laser focus on operations and goals, as they achieve new efficiencies using cooperative e-services. The public sector will benefit from ACSI's capabilities in making a wide variety of e-services interoperable with each other and leveraging the IDABC key factor in the implementation of a pan-European e-government, finally leading to the emergence of better services for European citizens and businesses.

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3.2.5

10 years of IT College

The idea to establish the IT College was born in the summer of 1999 in Tallinn during a seminar called Teleakadeemia (Teleacademy) organised by Sonera OY and Eesti Telekom. The University of Tartu and the Tallinn University of Technology introduced the idea to the Minister of Education, who in September 1999 put together a workgroup to launch the activities of the IT College. An agreement to establish the IT College was entered into on 29 December 1999 between the founders of the Estonian Information Technology Foundation: the Ministry of Education, the University of Tartu, Tallinn University of Technology, Eesti Telekom and the non-profit organisation Estonian Computer Association.

On 29 March 2000, the Estonian Information Technology Foundation was established to manage the IT College and on 17 May 2000, the first education licence was issued to the IT College.

The IT College is Estonia's first university of applied sciences focussed on IT.

The IT College is Estonia's first university of applied sciences focussed on IT. When the college launched its activities with the information technology systems' study programme, it offered three-year higher edu-cation studies in two curricula: IT Systems Development and IT Systems Administration. Now, students can choose from four curricula and study in the daytime or evening study format or the distance learning format. Information Systems Analysis and Technical Communication curricula have been added, and the latter can currently be studied only at the IT College.

Kalle Tammemäe was the Rector of the IT College from 2000 to 2010. In January 2011, Linnar Viik took up the duties of the rector. He has been connected to the college for 10 years, is a long-term lecturer at the college and a member of the college's supervisory board. The IT College has been uniquely shaped by its employees and renowned top specialists active in many different areas of business. A number of employees and lecturers have belonged to the staff of the IT College since its establishment and are especially favoured by students.

At the opening of the academic year on 1 September 2000, the college's first rector Kalle Tammemäe spoke to the students who had just enrolled in the college and said that they have the great responsibility of not only shaping the future of the IT College but of making history in the entire business sector of information technology. In his first opening speech, Kalle Tammemäe hinted to the students that anyone coming to study at the IT College must work hard to succeed. In his speech from ten years ago, the freshly appointed rector encouraged students to study and be ready for constant improvement and retraining.

Kalle Tammemäe, the rector of IT College 2000-2010.

The demand for IT specialists prevalent in the labour market is proof of the fast development of information technology and the ever-increasing need for specialists with higher education in the field of IT caused by this development. In 2008, the new academic building of the IT ▶

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College was completed under the pine trees of Mustamäe in the close vicinity of the Tallinn University of Technology. This is an impressive learning environment with modern material resources and qualified staff. Several information and communication technology enterprises that supported the establishment of the college have remained our good sponsors and friends to this day. For instance, the communications and information technology development centre put together by Elion and Ericsson allows studying modern Internet and digital TV products and developing new applications.

Such renowned names as TeliaSonera, Nutek, Microsoft, Oracle, Sun, Cisco, Sybase, SPSS, Swedbank, EMT, Hewlett-Packard and many other large enterprises are included in the list of long-term supporters of the IT College.

Moving towards a More International School

IT College is internationally renowned. It has partnered up with a network of institutions of higher education in Lithuania, Poland, Portugal, Germany, Finland, Denmark, Turkey, Slovakia, Austria and Sweden. Thanks to partner schools, students of the IT College can educate themselves further through academic mobility and foreign internships. Lecturers have the chance to guest lecture at institutions of higher education prominent in the field of information and communications.

In 2010, we created three new Erasmus intensive courses in cooperation with international partners. By taking part in the courses, students can acquire and practice in-depth expert knowledge in such exciting fields as hardware-software co-design of embedded systems, the innovative design of services and model data management in web-based information systems. Intensive courses are courses lasting up to a few weeks and taking place in a different EU country each year. During the courses, students can obtain practical skills and knowledge of fields specific to IT. At least ten participants must originate from outside the country where the course is held. Students love intensive courses, as they are then able to practice multicultural teamwork in addition to gathering knowledge on their specialties. Students taking part in the intensive courses come from at least three different countries. Erasmus intensive courses also provide lecturers with the excellent opportunity of experiencing teaching in another culture, exchange experiences, get new ideas and establish professional relationships with people active in the same field. All this due to the fact that the study activities are carried out by lecturers from different countries.

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Internationalisation is not merely a modern term for the IT College. Rather, it is a way of life – openness to a new, innovative, unique way of thinking and knowledge. English has been one of the study languages of the IT College for nearly a decade. The academic family of the college includes two lecturers who lecture in English: CISCO lecturer Truls Ringkjob and Doctor of Computer Science Andrea Corradini. In addition, guest lecturers from USA, Finland and Holland have visited the university over the years. With their open and guest lectures, they have also sparked the interest of these students and specialists who do not study at the IT College. At the moment, students are able to take courses read in English for up to 173 ECTS (European credit points). This is another step towards a more international school. The activities of the following years are aimed at increasing the number of foreign students – thus, we hope to diversify student life and establish a truly multicultural learning environment.

In 2001, the IT College was the first in Estonia to be granted the status of a Cisco Networking Academy and to launch an internationally renowned basic training on computer networks that oriented on practical tasks. Since then, the IT College has helped to found and prepare a series of local Cisco Academies all over Estonia. Certified Cisco programmes comply with standards recognised all over the world and give their owners all the necessary knowledge and skills to start work as network administrators.

In the academic year 2002/2003, separate curricula on **IT Systems Administration** and **IT Systems Development** were created. These curricula are the most popular in the school to this day. In the academic year 2003/2004, **IT Systems Analysis** was added as a new curriculum.

The curriculum **Technical Communication** was first opened in the academic year 2004/2005. This was where the first technical communicators in Estonia started their studies. Until now, the IT College has remained the only school where one can study the specific area of technical communication, which, in addition to an in-depth basic IT programme, also provides students with skills to

express themselves both orally and in writing and with knowledge on design, printing technology and market studies. The Technical Communication curricula prepares specialists who have a balanced understanding of both information technology and processes going on in communication and are able to introduce technological Estonian products to local and foreign consumers.

The distance learning option offered since the academic year 2006/2007 has increased the number of students considerably. In the first year, studies began with the IT Systems Administration curriculum. The following academic year, the IT Systems Development curriculum was added. The interest people display for the distance learning format has also increased year by year, which gives pleasure to both the management of the college and the entrepreneurs active in the IT sector. It is retraining that helps alleviate the great workforce deficit prevalent on the labour market in terms of IT specialists.

As of December 2010, there are 850 students studying at the IT College, while 418 alumni have headed to the labour market.

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Apart from the renewed curricula and the number of students that increases every year, the IT College is offering further professional training for adults. In autumn 2010, the first people interested in such an opportunity (IT specialists from local governments and organisations in public law) started their in-service training in the field of cyber defence. In addition, the IT systems administrators from commercial enterprises and the students of the IT College are welcome to raise their awareness about cyber safety. Over the course of these further professional trainings, students get a wide range of information technology knowledge from familiarising themselves with design programmes to programming themselves.

The graduates of the IT College have stood out on the international arena and brought home excellent prizes. In 2010, the IT College alumna Tuuli Zahvatkin participated in the European Skills Competition in Portugal as a specialist in the field of information technology. Last spring, she graduated *cum laude* from the IT College curriculum IT Systems Administration. In addition, Laur Mõtus, who has also studied in the IT College, participated in the competition. Supported by Cisco expert and lecturer Truls Ringkjob, who accompanied the Estonian team, Tuuli won the bronze medal at the EuroSkills competition as a Cisco specialist. Third place at the European Skills Competition organised for the second time is a great example of the level of courses taught at the IT College.

A robotics club established by students is also active at the IT College. Since 2002, the robots built by the college's students have achieved high places at the Robotex contest that boasts a long tradition. The robotics club is not for students exclusively – a number of the people involved have already graduated. In addition, people can join the club even before they come to study at the IT College. In December 2010, the Robotex jubilee event was held for the tenth time at the Tallinn University of Technology. The first prize was won by the IT College team Neve, whose members were Kristjan Mölder, Valdur Kaldvee and Mikk Pärast. The second place was secured by the team called Madistajad, represented by Tiia Tänav, Tiina Laast, Allan Vein, Madis Toom and Janek Sarjas. Over the course of 10 years, the college has achieved a total of 7 first places, 6 second places and 5 third places. Margus Ernits, who is a lecturer at the IT College and runs the robotics club, inspires club members with enthusiasm for robotics, enabling both students and pupils to gain knowledge in an interesting and playful way.

The IT College celebrated its 10th anniversary on 17 May 2010, on a day preceded by jubilee events organised throughout the entire birthday week. The Minister of Education and Research Tõnis Lukas, the former University of Tartu Rector Jaak Aaviksoo and other people who witnessed the birth of the college gave speeches at a celebratory meeting.

What Does the Future Hold?

As Toomas Sõmera, Chairman of the Estonian Information Technology Foundation (EITF) said, the objective for the near future is to keep adapting in the constantly changing environment and maintain a high level of interest in people who wish to enrol at the college. Despite the fact that the future is shadowed by a population decline among youngsters reaching adulthood, the college still aims at offering higher education in the field of information technology on a level comparable to previous years. Jaak Anton, Chairman of the Council of EITF wished in the 2010 yearbook of the IT College that the college family would have the "smarts and perseverance" to cope with the changing demographic and economic situation. These are the thoughts with which we should look into the future with our students and alumni alike.

Building of IT College.