



# eServices in Estonia: a success story

A Secure Identity Alliance Visit Report

June 2014



# Table of Contents

---

<b>1. Executive Summary .....</b>	<b>3</b>
<b>2. The history of eServices in Estonia .....</b>	<b>5</b>
<b>3. Key Success Factors.....</b>	<b>6</b>
<b>4. Estonian eServices in action .....</b>	<b>9</b>
<b>5. Case Studies .....</b>	<b>13</b>
5.1. Case study #1 Income tax returns .....	14
5.2. Case study #2 e-Police.....	14
5.3. Case study #3 Elections .....	14
5.4. Case study #4 National census .....	14
5.5. Case study #5 ePrescriptions.....	14
5.6. Case study #6 eHealth services .....	15
5.7. Case study #7 Energy smart grids .....	15
<b>6. Looking to the Future.....</b>	<b>16</b>
<b>7. Concluding observations .....</b>	<b>16</b>



# 1. Executive Summary

At the end of April 2014, the Secure Identity Alliance undertook a three day visit to Estonia to meet with key players in the eGovernment and eServices ecosystem. The aim was to identify how eID, authentication and the interoperability framework that underpins eGovernment in Estonia has enabled the creation of state-of-the-art eServices and built the all important trust between citizens and government that has powered the take-up of these services.

Universally recognized as one of the advanced electronic administrations in the world, Estonia's comprehensive e-Services platform has fundamentally changed how citizens access basic, daily services from both the public and private sectors.

## e-Government in action

The Estonian e-Government centralized system has two key aspects. First, its data architecture allows agencies and private-sector entities to retain their own records rather than combining all data on centralized servers. Second, access is provided through a secure nationwide electronic ID system. Users simply swipe their physical ID cards through a reader and then enter their personal ID number. Recently Estonia has added secure mobile access via smartphones.

This digital infrastructure has enabled a digital society to blossom, transforming interactions among government agencies and between the government and its citizens. As a result e-Services have become a routine aspect of everyday life, with almost 100 percent of public services for both businesses and citizens now available online: e-elections, e-policing, e-healthcare, e-banking, e-tax filing and e-schools are all standard practice.

Today, Estonia's e-Government platform allows access to more than 550 e- and m-services. Citizens can register for unemployment benefit, file for parental leave, undertake property registration, utilize notary services, access digital medical records, and order prescription-drug renewals online – and more.

The implementation of e-Government has revolutionized citizen/government interactions in Estonia; in 2011, 94 percent of all personal income tax returns were submitted online and 25 percent of votes in the last parliamentary elections were cast over the Internet.

***"The only thing you can't do online is get married or buy a house! However, contracts for these activities can be generated online, ready for download and signature when you visit the public notary's office."***

**Annela Kiirats, eGovernance Academy, Estonia**

### Estonia: Fact File

Population: 1.3 million

Mobile Penetration:  
128%

Internet Penetration:  
78%

ID Card: Compulsory

Other eDocuments:  
DigiID, Mobile ID,  
Passport, eStamp,  
Driving License, Resident  
Permit

eID providers: Police and  
Border Guards



## Powered by eID

The Estonian e-Services ecosystem is underpinned by eID. In 2002 the first nationwide eID card was launched to all Estonian citizens and aliens residing within the country. A multifunctional card containing both visual and electronically accessible information, the eID acts as a regular identity document, can be used to generate digital signatures, and also operates as an access key to eServices.

In 2010 two new derivations of the eID card were launched: a digi-ID (the first 'pure' identity document that establishes a person's identity in an electronic environment and can be used for digitally signing documents) and a Mobile-ID (the second 'pure' identity document which allows citizens to use a mobile phone as a form of secure electronic ID to access secure e-Services and digitally sign documents).

All transactions that take place over the X-Road (the Government's interoperable ICT data distribution architecture) are made possible using e-ID/digi-ID/Mobile-ID identification, giving people the confidence that the person on the other side is the person they say they are, and that the digital signature is real and will stand up in a court of law when necessary.

X-Road is the backbone of 'e-Estonia', allowing the nation's various e-Services databases - both in the public and private sector - to link up and operate in harmony. Launched in 2001, the X-Road data exchange layer is a technical and organizational environment which enables secure Internet-based data exchange. Both public and private sector organizations can connect their information systems with X-Road, giving both institutions and citizens the ability to securely exchange data, and access data maintained and processed in state databases.

## Sharing expertise and learning

The SIA found a striking level of transparency in the Estonian eGovernment system. Indeed, Estonia has already moved beyond eGovernment to the beginnings of true e-Democracy.

All the key agencies we met in Estonia strongly welcomed the new eIDAS Directive for European interoperability and security, stating their belief that security levels should not be lowered.

***"American Cloud players request you sign the 'conditions of use', just like a marriage contract. When you marry, you sign up too, but you don't know what for!"***

**Jaan Priisalu, Director General, Estonian Information System Authority (EISA)**

Eager to collaborate, cooperate and share the practices that underpin its implementation of government eServices, Estonia is only too happy to cooperate with other countries looking to initiate e-Government. The SIA recommends that any country on the brink of making the move to e-Government should spend some time visiting Estonia to see for themselves how the country's eGovernment infrastructure and eServices operate.

A number of countries have already taken advantage of Estonia's development cooperation outreach project, which is coordinated by the country's e-Governance Academy, to discover how they could go about delivering better, more transparent public services. In 2013 Estonia welcomed 250 international delegations and is currently exporting its X-Road data exchange layer to several countries.



## 2. The history of eServices in Estonia

When Estonia first became independent in 1991, its leaders faced a grim reality. As small country, with limited resources, the government took the conscious decision to build an open e-society – a cooperative project involving government, business and citizens that create a brighter future for all. Estonia wanted to make bureaucracy a thing of the past, ensuring that all levels of government ran more efficiently than before. It also wanted to create a better community for citizens and enable a prosperous environment for business and entrepreneurship. To achieve this vision, they decided to use local IT companies and make use of the standard Internet to digitize services. In this decade, legislation was passed that would pave the way for the creation of the national ID card and the X-Road platform; both would be critical to developing the digital society systems that were to come.

Estonia passed the Digital Signatures Act in 2000 and standardized the national Public Key Infrastructure (PKI). Meanwhile the X-Road data exchange layer became the basis for the creation of a new e-state and the in 2002 the first electronic IDs were implemented. Today every person over 15 years of age is required to have an ID-card; in addition to establishing an individual's identity in an electronic environment, the ID-card can also be used by Estonian citizens as a travel document.

In general, all decisions taken in the development of the national eServices program were based on pure pragmatics – the population and the country's resources where not overly abundant. It was therefore critical to come up with something clever and future proofed.

Estonia based its e-Services digital infrastructure on the Internet and avoided the creation of separate and specific data networks to ensure its people have constant access to the services built for them. It also launched the innovative 'Tiger Leap' project to seed technology savvy skills among Estonia's citizens to prepare them to use the developing digital society systems that were to come. Today, Estonia ranks among the most wired and technologically advanced countries in the world, with free WiFi connections nationwide delivering direct access to public and private eServices.

The other crucial step taken was raising the awareness of the population and promoting the use of the ID card. Introducing people to the idea of using technology and e-services was done in stages – for example, 10 percent of the adult population tried their first e-skills out registering for national events, such as the Estonian Song Festival, which became their gateway 'first experience' of eServices.

### Key Milestones

**1992:** Personal Identity Code (PIC)

**1992:** Population register (holds PIC)

**1996:** Internet bank authentication (1st eID)

**2000:** Digital Signatures Act

**2002:** ID card introduced, certificates, PKI (2nd eID)

**2007:** Mobile ID system comes online (3rd eID)

**2009:** Concept of digital documents

**2009:** DIM becomes the responsibility of the Ministry of the Interior

**2010:** DigiID (1st "pure" digital identity document)

**2011:** Mobile ID (2nd "pure" digital identity document)

**2014:** 4,000 e-Services provided by the public and private sector

**2017 (?):** Use of biometric credentials: state issued max 5 years valid compulsory ID document from 15 years age. Usable for visual and electronic authentication.



Public Internet access points were built at 500 locations in Estonia, such as libraries and post offices, to cater for citizens with no access to the Internet at home or who do not own a computer. In addition, the government-backed technology investment body - the Tiger Leap Foundation - ensured that all Estonian schools were online by the late 1990s. Children and young people encounter electronic communications as soon as they enter school. In a sense, e-school acts as a technological and educational partner for Estonians.

Today the e-school system allows parents, students, teachers and school administrators to connect. Exam marks, assignments and attendance in class are all available to parents at the click of a mouse.

Since the first eID cards were inaugurated in 2002, a total of 152 million documents have been signed by means of digital signatures (as of March 2013) and 246 million authentications have been undertaken.

### 3. Key Success Factors

---

All too often the success of e-Government in Estonia is attributed to the 'green field' situation or the small scale of this tiny country. But what makes this country interesting is not just that people can elect their parliament online, or get tax overpayments back within two days of filing their returns. It's that is that the level of service citizens today enjoy did not result by the government simply building a few websites.

Instead, Estonia took the decision to redesign its entire information infrastructure from the ground up with openness, privacy, security and 'future proofing' in mind. Its vision was to combine all day-to-day transactions and processes into one e-government infrastructure that's easy to use and productive.

To maximize the successful evolution of digital-democracy, Estonia established an e-Governance Academy - a non-governmental, non-profit organization established by the Government of Estonia, the Open Society Institute and the UN Development Program - to increase the awareness and capability of Estonian local governments in the implementation of open, transparent and engaging governance and the sharing of best practices.

#### 'A can do, will do' mindset

A strong political will to develop a convenient and transparent society, based on ICT, was the starting point. Political leaders worked closely with the ICT community to implement initiatives that would support the creation of a minimal, highly efficient state.

Viewed as a force of progress, the promotion of e-Government was widely supported by officials and the private sector. This positive viewpoint led to the launch of initiatives such as the Tiger Leap program, which provided information technology to schools in the 1990s.

The first building block was the introduction of a unique ID methodology across all systems - from paper passports to bank records to government offices and hospitals - that identifies every citizen. To enable citizens to transact with one another, Estonia passed the Digital Signatures Act in 2000 and introduced a standardized national Public Key Infrastructure (PKI) which binds citizens' identities to their cryptographic keys - making a signature, a signature in the eyes of the law.



## Private public partnership

To accelerate innovation, the state tendered the building and securing of its digital signature-certificate systems to private parties – a consortium led by local banks and telecoms. Public and private players can also access the same data exchange system (X-Road), enabling truly integrated e-Services.

In 2002 the government introduced eID-cards to support online transactions. At that time 57 percent of Estonian Internet users were using Internet banking. This trust in e-banking helped to seed the take-up of eID verification system which would enable government services to work online.

Banks cooperated with the government to reap the benefits of convenient and secure eID. Smartcard ID readers were distributed to customers free of charge by banks, enabling them to authenticate and transact online, and banks became hubs in the government network. For banks, the advantages were clear: utilizing the highly secure National ID was free and minimized the need for them to maintain or manage an ID database – it's the reason why increasing numbers of retail and loyalty companies today utilize the government's eID.

***“People may not trust their government, but they trust their bank. The early popularity of online banking was a gateway for gaining acceptance of eGovernment services within the population.”***

**Mary Pedak, Estonia's eGovernance Academy**

## Keep it simple – but logical

The foundational 2002 law forced all decentralized government systems to become digital 'by demand' – no part of the government can turn down a citizen's digitally signed document and demand a paper copy instead. Yet a social worker, in a small village, can still provide the same service by handling the small number of digitally signed email attachments the office receives.

In other words, Estonia did not try to change the way things are done on paper overnight – instead, implementation has evolved, with citizens and businesses receiving incentives to utilize eServices where they exist.

***“Everything takes ten years.”***

**Mary Pedak, Estonia eGovernance Academy**

## Estonia: creating an information society

100% of schools and government organizations are ICT equipped

97% of businesses use computers

76% of families have a computer at home

75% of homes have broadband

78.6% use the Internet (15-74 years)

93% of tax declarations in 2013 were submitted online

99.6% of banking transactions are performed online

63% of people use electronic versions of Acts and laws

1140 free WiFi areas

***“Instant access to the Internet has become a social right.”***

**Anna Piperai, ICT Center**



Everything hinges on the provision of a compulsory national ID card to citizens at a reasonable cost, and full process automation: for example, when a child is born the birth certificate is automatically generated by the hospital; by the time the mother returns home, the benefits she is entitled to are already in her bank account.

More recently, a Mobile-ID service has been launched, giving Estonians the option of using their mobile phone as a secure electronic ID. The system is based on a specialized Mobile-ID SIM card which users must request from their mobile phone operator. Without installing additional hardware or software users can access secure systems and affix their signatures by simply typing a mobile ID PIN code into the phone.

## Transparent, open and accountable

The movement of data between systems relies on a fundamental principle to protect people's privacy. In Estonia, the citizen owns his or her data and retains the right to control access to that data. For example, in the case of fully digital health records and prescriptions, people can assign access rights to the general or specialized doctors of their choosing.

In scenarios where citizens can't block the state from seeing their information – such as a policeman using a real-time terminal – they're able to get a record of who accessed their data and when. If, having visited the online portal, a citizen sees a government official has accessed their personal data without good reason they are able to file a complaint online and initiate an inquiry. The unauthorized access of citizen data is punishable by law; individuals may lose their job or go to jail.

## Incentivizing citizens

Alongside educating citizens on the benefits of secure ID in relation to the convenience and ease of access to government and private sector eServices such as banking, the government has also introduced a number of 'soft handcuff' style incentives to promote the acceptance and use of secure eID.

For example:

- secure eID is required for any monetary transfer of 200 Euros or more
- in 2007 all businesses were required to use the e-tax system exclusively and paper filing was abolished
- citizens utilizing the e-Tax board to file their returns online are guaranteed to obtain any tax refund within 3-5 days.

The introduction of the ID bus ticket proved – after e-banking – to be the second major trigger that incentivized people to apply for ID cards: for example, the Municipality of Tallinn offers a 30 percent ticket price discount for ID holders and today 90 percent of Estonians hold an ID-card.

## Creating an open, decentralized system

The Estonian e-digital society has been made possible by the creation of an open, decentralized system that links together various services and databases. The flexibility provided by this approach has enabled new components to be developed and added.



The interoperable ICT distributed architecture means that each Government agency has its own database. Utilizing a “only-once” principle, no government agency is allowed to ask a person for information that another government institution already has asked for.

***“IT is about saving time and this is what we do: automate processes. Governments should use budget crisis to move to eGovernment. X-Road was created because of the lack of Money in Estonia. You also need to solve the ID issue; without ID, nothing works. Transparency is key and you need to define interfaces between agencies.”***

**Jaak Priisalu, Director General, Estonian Information System Authority (EISA)**

## International collaboration

Estonia is now starting to provide citizens of other countries access to its own secure and convenient e-Services. A virtual, or e-residency, service is being launched that will provide electronic identity in the form of a digital ID to non-residents, including:

- expatriates
- foreign clients of banks
- members of companies’ governing bodies
- scientists and consultants
- students
- e-enthusiasts
- Friends of Estonia.

## 4. Estonian eServices in action

eServices in Estonia are divided into three categories, dependant on the status/role of the user:

- citizen
- entrepreneur
- official.

Each citizen has a unique ID and may have several roles. As a result, their access rights are determined by their roles.

### Technical Overview: Estonian eServices

Model: Centralized

eID providers: Police and Border Guard

PKI: Yes

Population Registry: Yes

Biometrics: No

Program access: Card reader, mobile

Certification Authority: SK (joint venture between banks and telecom)

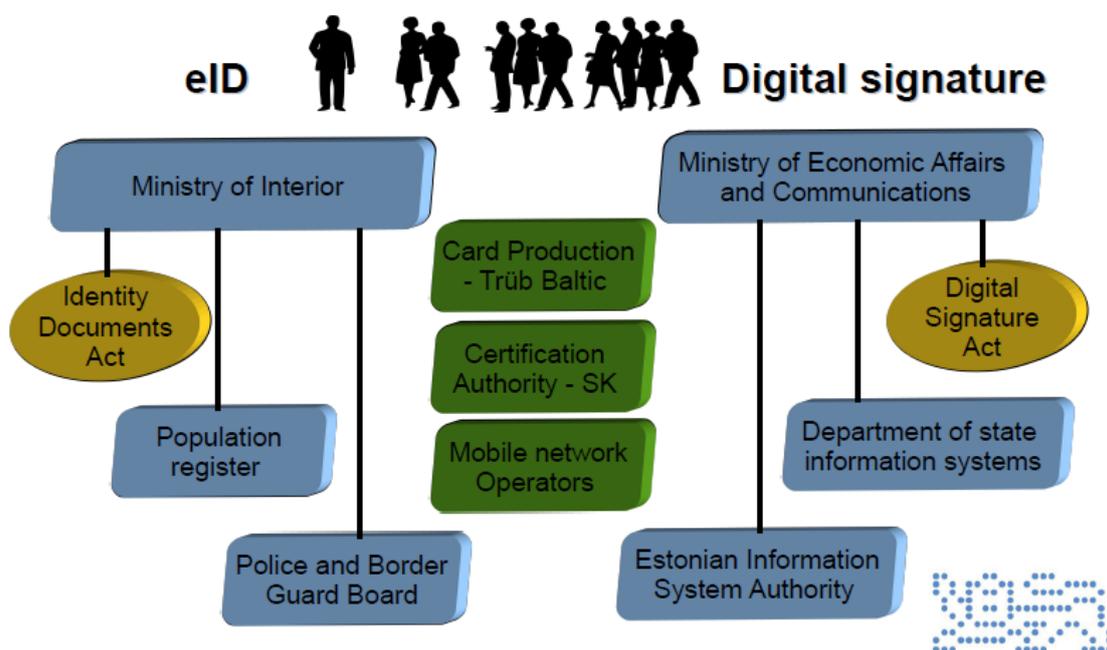
## The Estonian ecosystem

In Estonia the Ministry of Economic Affairs and Communications holds political responsibility for the development of the state information policy. It elaborates the state's economic policy and development plans, and drafts legislation bills in a variety of fields - including informatics and the development of state information systems.

The Estonian Information System Authority (EISA) is under the authority of the Ministry of Economic Affairs and Communication. The Authority's mission is to "coordinate the development and management information system so that Estonian citizens are served in the best possible way". It oversees the coordination of all Public Key Infrastructures related to the operation of ICT and Information Technology, such as the state portal [www.eesti.ee](http://www.eesti.ee), the middleware system X-Road, the Government backbone network EEBone, the administration system of the State information system (RIHA) and the electronic document exchange centre (DVK). It is also responsible for state information system development projects and the preparation and participation in international projects. Finally, EISA monitors the legislation process concerning the management information system requirements.

The Police and Border Guard Board, issuer of the ID-Card, is under the authority of the Ministry of Interior. In March 2013, the Police and Border Guard Board had issued over 1.2 million active ID cards.

A total of 246 million authentications and 152 million digital signatures have been made (March 2013).



Source: Mark Erlich, Estonian Information System Authority



## ID-Card

In January 2002, Estonia started issuing national ID cards. The card, which fulfils the requirements of Estonia's Digital Signatures Act, is mandatory for all Estonian citizens and residing foreigners over 15 years of age.

Applications can be made on line, and the card acts as the primary document for identifying citizens and residents. It can also be used in any form of business – governmental or private and is a valid travel document for domestic travel and movement within the European Union. In January 2007 the card, which is issued by the Citizenship and Migration Board, became valid for five years (previously it was valid for 10 years).

The card contains advanced electronic functions that facilitate secure authentication and provide a legally binding digital signature for public and private online services. An electronic processor chip contains a personal data file, a certificate for authentication (along with a permanent email address: Name/Surname @ eeesti.ee for eCommunications with the public sector), a certificate for digital signature and their associated private keys, protected by PIN codes.

In other words, the chip carries two certificates: one for legal signatures and the other for authentication when using a website or service that recognizes the government's ID system (online banking, for example).

The certificate contains only the holder's name and personal code (national ID code). The data file and certificates are valid only for the duration of the identity card and thus have to be renewed every five years.

***"There has been no fraud in 12 years. Estonia is the only country in the world where all IDs have the same legal value. This is a powerful incentive for use."***

**Helar Laasik, Chief Expert, Estonian Police and Border Guard Board**

## eID, digi-ID and mobile-ID – what's the difference?

Technically they're all the same; the only thing that differs is the issuance and identity management process. State issued certificates (the mandatory national card) are issued by Police and Border Guard Board and there are a number of services that require this state issued identity document for access; for example, you can't vote or access some services with a mobile-ID that is not issued by the state.

Digi-ID is an additional token for electronic use only (it can't be used as a physical document for travelling like an ID-card) and is founded on the same concept: a pair of keys, certificate, same identity management, etc. The level of eID penetration in Estonia has reached a point where people are required to use their eID to do their daily work; issuing of digi-ID takes less than an hour as pre-produced cards are used (only the physical identification and certificate issuing process takes time). Examples of how digi-ID is being utilized by citizens include:

- doctors working in hazardous laboratories can bring things into the workspace, but can't take them out: they need an additional token they can leave at work
- if someone loses their ID-Card they can't wait for weeks for a new one and can use an additional token at work



- people who don't want to use their personal identity document (the ID-card is a physical mandatory document that can also be used as a travel document) as a working tool have the option of using a Digi-ID instead.

The Estonian PKI mobile-ID has been developed as a convenient solution on a SIM card for authenticating and digital signing. The mobile ID solution is used for both public and private eServices.

Certificates are issued by Police and Border Guard Board (<http://www.politsei.ee/en/>) to the user (a certification authority acts on behalf of Police). First the user has to apply for a mobile-ID from his mobile operator, to get special SIM card and apply for the appropriate certificates from the police (we call this a following process for the activation of mobile-ID). The police system checks if the user is allowed to apply for a mobile-ID and sends information to the certification authority (CA) which then checks if the application data is correct (that given phone number is connected to the individual, for example) and the public key is sent to the CA. When the certificate is issued, it is stored on a public repository and not on a SIM; the CA is using an SMS service, which has a limitation on amount of data, as a communication channel. All processes are automated and applications prefilled and can be done over the Internet (the user needs an ID-Card to apply and sign digitally).

Charging for the state ID system has been kept low to encourage maximum citizen uptake and usage. The ID-card price is 24.28 Euros, which includes 10 e-transactions; and mobile-ID costs 60 cents, with limited transactions. Businesses are charged for all their e-transactions.

Currently uptake on mobile-ID remains low; it is mostly being utilized by mobile users keen to overcome the no-reader obstacle. But mobile operators, in conjunction with the SK certification authority, are about to launch a number of initiatives to further its adoption.

## SK – Estonia's primary certification authority

SK is Estonia's primary, and currently only, certification authority (CA) providing certificates for the authentication and digital signing of Estonian ID Cards.

Established in 2001 by two leading Estonian banks (Hansapank – a member of the Swedbank group, and SEB) and two telecom companies (EMT and Elion) following the adoption of the digital signature law a year earlier, this private company provides certification services for the state (the Estonian Ministry of the Interior). Its services include:

- certification and time stamp services for the ID-Card
- technology for digital signature (the DigiDoc system is widely used in Estonia for storing, sharing and digitally signing documents); checking certificate validation/file encryption
- validation services
- consultation services.

SK is paid by the Estonian government to issue certificates, and receives payment from private sector eServices providers for transaction signing/verification services.

Aware that eID is a long term business, SK is also in charge of incentivizing the population to take up the use of e-signature and eServices.

**"We're in the business of changing people's behaviors!"**

**Tarvi Martens, Development Director, SK Certification Center**



X-Road provides a distributed, secure, unified web-services based inter-organizational data exchange framework. Built to satisfy the highest security requirements, X-Road does not centralize the data and does not change the ownership of the data.

Designed with no single point of failure, all components of the system can be doubled for resiliency against failures and attacks. Components available over shared or public network employ protective measures against denial of service (DoS) attacks.

All web-service requests and responses are digitally signed, time stamped, encrypted and archived by security servers. Adapter servers - a custom component that implements the web-services that will be shared via X-Road - contain the business logic of the particular X-Road service. The adapter server will query the registry or information system using a suitable protocol (SQL, EJB, SOAP, etc.) and transform the results back into a web-services response.

The platform for an adapter server can be freely chosen by the organization to suit its existing platform and IT policies; adapter servers have been successfully implemented on .NET, JEE, Python, various ESB and other platforms. The adapter server also includes a developer toolkit which consists of source codes, manuals, and templates for developing a needed adapter.

X-Road is an open source software. This means that its owner knows the code it contains and no one from the outside has the power to set its own limits or regulations, or change something in its structure.

In effect the eID is just the key to the data, which is stored at the service side. Each database is separate, making fraud more difficult. The data itself is secured by a solution developed by Guardtime. To review more about the technical structure of X-Road, visit [www.ria.ee/x-road/](http://www.ria.ee/x-road/)

## 5. Case Studies

---

Today around 3,000 eServices are available in Estonia: 600 government-to-citizen and 2,400 government-to-business services.

From the top down, Estonia has embraced an open yet secure e-Society approach. In August 2000, the Government changed its cabinet meetings to paperless sessions, using a web-based document system. By 2004, five information systems from five different government institutions were made interoperable so that parental benefits could be delivered as an eGovernment service. Today, new parents can log onto the state portal, register their child, select a link to the relevant state benefits and simply add their digital signatures to complete the process.

The penetration of eServices has been enormous; today nearly 99 percent of all banking transactions are done online in Estonia. Here we take a look at how eServices have changed the way people live their lives and do business in Estonia.



## **5.1. Case study #1      Income tax returns**

First launched in 2000, today 95 percent of all income tax returns are completed via the e-Tax board. Citizens can log into the system and review the data which appears in a pre-filled form, implementing any necessary changes before submitting their declaration. In countries where tax returns are still submitted on paper it can take up to two days to collect the data and complete the form. The Estonian e-Tax system enables citizens to complete their return in less than 10 minutes. The motivation for people to complete their income-tax declarations online is that it is convenient, free-of-charge, provides pre-completed information which is extracted from employers monthly tax reports – plus the government guarantees to pay back overpaid tax in just five days.

## **5.2. Case study #2      e-Police**

Every police car is equipped with a mobile workstation that allows police to submit queries to police related databases – including the Traffic Insurance Fund, the Motor Vehicle Registration Center, the Weapons Register and the Population Register. Queries can also be submitted to Europol, Interpol and Schengen Zone's information system. All of which ensures that if a driver is pulled over there is a good reason. The e-Police system also plays a role in wider-scale prevention work: for example, reminding owners if their car is due a check-up. All of which adds up to faster response times, decreased road fatalities, and increased security on the roads.

## **5.3. Case study #3      Elections**

In Estonia, voters can cast their ballots from any Internet-connected computing. The i-Voting system is proving a powerful way to attract more people to participate in elections, especially the younger generation, those that travel, soldiers and citizens not permanently domiciled in Estonia. The system eliminates the need to visit a polling station or search out an embassy when travelling or living abroad. In 2013, 25 percent of all votes were cast over the Internet.

The online voting service adopts all the principles of paper voting, offering a convenient alternative to the paper ballot. Digital voter registration is based on the national population register, with voters' identification being confirmed using eID.

## **5.4. Case study #4      National census**

Estonia holds the world record for census participation via the Internet. In January 2012, Statistics Estonia held the first e-census in the country and 66 percent of the population completed their census form online. The e-census questionnaire, which consisted of over 100 questions, was completed by 1.29 million permanent residents.

You can find out more about the e-census program and its success factors at <http://e-estonia.com/estonian-e-census-winning-trust-and-breaking-world-records/>

## **5.5. Case study #5      ePrescriptions**

More than 90 percent of medicines prescribed in 2011 were e-prescriptions. Today, citizens can get a prescription renewal over the phone, e-mail or Skype; if a patient calls their doctor on the way to the pharmacy, by the time they reach the counter their prescription is waiting for them. Patients can select their specific brand of a prescribed medicine, as GPs simply fix the active medicine substance. For pharmacies it has meant the end of having to decipher handwritten prescriptions, while licensed doctors



are instantly able to access the patient's medical history and medicine purchases – helping to avoid drug misuse. For the state, the introduction of ePrescriptions has reduced paperwork in hospitals and pharmacies and provided a clear overview of activities in the field of pharmaceuticals.

## **5.6. Case study #6 eHealth services**

The Estonian e-Health Foundation was established in 2005. Created by the Ministry of Social Affairs and six medical institutions, the Foundation is responsible for developing e-solutions in health-related services, assisting in the provision of high quality accessible health care services, and the development and management of the nationwide electronic health record system (EHR). In 2008, health care providers were obligated to forward medical data to the Estonian National Health Information System (ENHIS) and in 2009 the EHR system and the patient portal (Digilugu) were launched.

Today the EHR system integrates data from Estonia's healthcare providers to create a common record for each patient, providing doctors with access to a patient's records from a single electronic file. Medical staff can view test results as soon as these are entered, together with image files such as X-rays. In an emergency, a doctor can use a patient's ID card to view time-critical information such as blood group, allergies, recent treatments, ongoing medication and so forth. Citizens can log into the patient portal with an eID card to view their medical data and related information (such as recent appointments, prescriptions) – and the records of their children. They are also able to control which doctors have access to their files. The system also automates the compilation of national statistics data so government ministries can measure health trends, track epidemics and ensure health resources are being spent wisely.

## **5.7. Case study #7 Energy smart grids**

Estonian entrepreneurs and software developers have created smart metering and billing management software for use by utilities providers. The systems allow end users to monitor consumption in real time, compare packages to find the best deal and select how much of their energy comes from renewable sources. The same system can predict when a local electricity supply is likely to be under pressure, automatically offering consumers an instant bonus for cutting their consumption at these times. The approach has generated up to 25 percent savings on their electricity bill for residents in the village of Kelvingi.



## 6. Looking to the Future

---

Estonia has a number of bold plans for the future. For example, its e-Receipt program could see the paper receipts you receive after every purchase become a thing of the past. Instead, you'll be able to view every item you've ever bought, together with the warranties associated with the goods you've bought. For consumers, there's no worry about losing receipts if you need to return an item and the environment will be 'greener'.

And, because every person in Estonia has been provided with an e-mail address that's only accessible with an ID-Card, the moment you move physical address, you're always assured your mail gets delivered – electronically. No more missing envelopes or post going astray.

Similarly, goods and services are imported – and exported, for that matter – on a daily basis. So, why shouldn't state provided e-Services move across borders too? The e-Business Register already allows entrepreneurs to establish a business in Estonia using just their ID-cards from Belgium, Portugal, Lithuania and Finland. And the list is growing longer every day.

But the ambitions don't end there. Plans are afoot to introduce an e-Resident service for anyone living outside the country. This will enable people to use Estonian online services, open bank accounts and start companies without ever having to physically visit the country. The plan, which will require e-resident applicants to pass a background check similar to the visa application process and sign up to identify themselves with biometrics such as fingerprints or iris scans, could see the Estonian Ministry of the Interior being ready to hand out the first ID cards for e-residents at the end of the year.

By 2025, the Ministry projects that potentially 10 million people could have gained Estonian e-identity, boosting the potential influx of business and investment in the country and stimulating the digital economy significantly.

## 7. Concluding observations

---

From the very start, the mindset in Estonia was to utilize the Internet to maximize participation in a digitized eSociety in which eGovernment would support the delivery of services to citizens and businesses alike.

Determined to get the key infrastructure right – creating a platform that was flexible enough to develop and evolve – the Estonian government worked in collaboration with ICT companies and private companies to develop the key components it needed to ensure eServices could function optimally: e-signatures, legal frameworks, trust, eID.

The information platform Estonia has developed today enables citizens, businesses and government agencies to transact with one another with openness, privacy and security.