e-Estonia guide

the most advanced digital society in the world

— Wired

Estonians are pathfinders, who have built an efficient, secure, and transparent ecosystem that saves time and money.

e-Estonia invites you to join us on a digital journey.

about Estonia

Estonia is an innovative nation in Northern Europe known for its digital ambitions. Thanks to smart e-solutions created here, it takes only a few hours to start a company and minutes to declare taxes. The nation is in the top countries in Europe in terms of start-ups per capita and ranks first in the Entrepreneurship Index by the WEF.

However — there's a lot more to discover! We have world-famous choir music and Simple Session — the most international action sporting event in the world. Meanwhile, we hold the fourth place in urban air quality in the world, with forests covering about half of Estonian territory. And still, as a digital society, almost 90% of Estonian households have broadband coverage.

Discover what our innovative country has to offer!

SITUATED: on the Gulf of Finland

POPULATION: 1.3 million

OFFICIAL LANGUAGE: Estonian

TOTAL AREA: 45,339 sq. km

CAPITAL CITY: Tallinn

CURRENCY: Euro (€)

GOVERNMENT: Parliamentary democracy

MEMBERSHIP: EU, NATO, OECD, WTO, Digital Nations

country of pathfinders

Estonia has become a place where new digital solutions get their start. We are used to being pathfinders in digital society and government. These days, our tech startups are also disrupting industries one by one.

Siim Sikkut

Estonian Government Chief Information Officer

Our intent is not to be pathfinders just for the sake of being cool, considering it comes with costs. If you choose to try things early rather than follow, adopt rapid reforms and not fear the unknown approach or tech, it is inevitable that things sometimes go wrong. It is important to stick to your principles, learn from mistakes (quickly!), and to talk about them openly — features common to true experts and the best innovators.

We are after the crude benefits of digitisation as a country. We constantly seek, develop and adopt new digital solutions that allow us to do things faster, better, and cheaper (though many of them are cool, too!). In the governmental sector, in companies, in the everyday life of people.

The reason is that Estonia, as a small country, has never enjoyed abundant natural resources or a huge internal market. Thus, we must be very efficient with whatever little that we have. And we do have some industrious and entrepreneurial people. In fact, according to the World Economic Forum, we are the most entrepreneurial country in Europe.

Estonia has realised that our size is actually an advantage, which helps us create effective solutions that the world needs — and punch beyond our natural weight in the world. That's probably why Estonia is among the top countries in Europe ranked by start-ups per capita. The examples range from private sector's Skype to the e-residency programme created by the government. e-Residency is our governmental startup that offers great benefits to cross-border entrepreneurs from around the world. (If you haven't joined yet, you should: visit e-resident.gov.ee).

we have built a digital society — and so can you

This is how a successful digital society was built in Estonia, and it's the way we intend to continue. Right now we are working, for example, on making public services work invisibly aka proactively in the background for a seamless user experience. We have a wide programme for AI adoption going on — we see the future in AI-powered government. We will be restarting and rebuilding several digital systems, architecture and infrastructure to prevent them becoming a legacy in the next years.

We have built a digital government and society from scratch, and so can you. Today, Estonia has shared its e-governance journey with more than 100 governments that follow our example and employ the competence of our experts and tech companies.

If you want to see how a truly successful digital society works close-hand, do come to Estonia — or start by checking out e-estonia.com. Our private companies, experts as well as government officials are happy to share our digital know-how and solutions to make the world more efficient and simply a better place.

e-Estonia is an incredible success story that grew out of a partnership between a forward-thinking government, a pro-active IT sector, and a switched-on, tech-savvy population. Being a pathfinder in public sector e-services meant that nothing was prepared for us — we had to cut our own trail to discover how to provide services in a form that did not yet exist, and which could be available to everyone 24/7.

Here are some indicators that show how IT-solutions have improved everyday life in Estonia.

Savings and efficiency:

→ At least 2% of state GDP is saved due to collective use of digital signatures

→ 844 years of working time saved annually thanks to data exchange

→ Time to establish a business reduced from 5 days to 3 hours

e-Government indicators:

→ 98% of Estonians have a national ID-card

→ 46,7% of Estonian voters from 109 countries used i-Voting during the last European Parliament election

Financial indicators:

→ 98% of companies are established online

→ 99% of banking transactions are online

→ 98% of tax declarations are filed online — it takes only 3 minutes!

→ Over 70,000 e-residents

Healthcare:

→ 99% of patients have countrywide-accessible digital records

→ 99% of prescriptions are digital

→ 2,3 million queries by doctors and 2,3 million queries by patients every month

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our success story

X–Road data exchange platform:

→ 99% of public services online with 24/7 access

→ 1,3B+ queries annually via X-Road

Public safety:

→ e-Police system available in police cars unites over 15 databases, including those of Schengen and Interpol

→ Estonia was the first country in the EU to legalise testing self-driving vehicles on public roads

Cyber security:

→ Locked Shields is the world's largest and most advanced international technical live-fire cyber defence exercise — it takes place annually in Estonia concurrent with the CYCON conference

→ Estonian government started live tests with KSI Blockchain technology in 2008. Today, KSI Blockchain service is available globally.

→ Estonia hosts the NATO Cooperative Cyber Defence Centre of Excellence and European IT agency

→ Estonia is an elected member of the UN Security Council, active from 2020.

Education:

→ First in Europe in the OECD PISA tests

→ Two times more students in ICT-related courses on the average than in other developed countries

→ 100% of Estonian schools use e-solutions

When Estonia started building our information society about two decades ago, there was no digital data being collected about our citizens. The general population did not have the internet or even devices with which to use it. It took great courage to invest in IT solutions and take the information technology route. Here are some of our best e-solutions that have led to Estonia becoming one of the world's most developed digital societies.

Principles of Estonian e-governance:

→ **Decentralisation** — There's no central database and every stakeholder, whether a government department, ministry, or business, gets to choose its own system

→ **Interconnectivity** — All system elements exchange data securely and work smoothly together

→ **Integrity** — Data exchanges, M2M communications, data at rest, and log files are, thanks to KSI blockchain technology, independent and fully accountable

→ **Open platform** — Any institution may use the infrastructure and it works as an open source

→ **No legacy** — Continuous legal change and organic improvement of the technology and law

→ **Once-only** — Data is collected only once by an institution, eliminating duplicated data and bureaucracy

→ **Transparency** — Citizens have the right to see their personal information and check how it is used by the government via log files

#2 INTERNET FREEDOM
Freedom House 2019

the journey of e-Estonia

e-Tax board
Electronic tax filing system. Each year, around 95% of all tax declarations in Estonia are filed electronically.

Population Register
The state's database for holding basic information about each person living in Estonia.

X-Road
The backbone of e-Estonia. Invisible yet crucial, it allows the nation's public and private sector e-Service databases to link up and function in harmony.

ID-card
Estonia has by far the most highly-developed national ID card system in the world. Much more than a legal photo ID, the mandatory national card also provides digital access to all of Estonia's secure e-services.
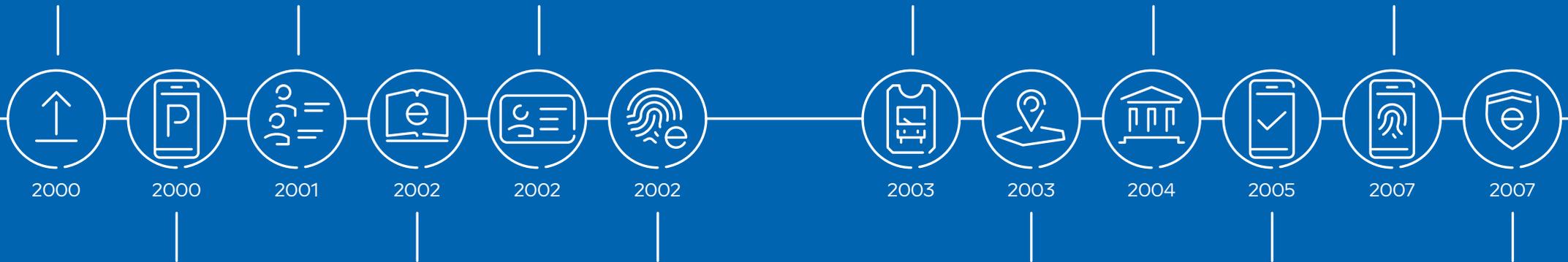
ID bus ticket
On buses and trams, a passenger may dial a telephone number to buy a ticket or a monthly pass. Because the ticket is tied to the passenger's state-issued ID code, any ticket controller who checks the passenger's ID card will instantly see that a ticket has been purchased.

Estonian Education Information System
A state database that brings together all information related to education in Estonia.

Mobile-ID
Allows people to use a mobile phone as a form of secure digital ID. Like the ID-card, it can be used to access secure e-services and digitally sign documents but has the added advantage of not requiring a card reader.

| 2000 | 2000 | 2001 | 2002 | 2002 | 2002 | 2003 | 2003 | 2004 | 2005 | 2007 | 2007 |

m-Parking
Mobile Parking is a convenient system that can be used in privately-owned and public parking facilities in Estonia, allowing drivers to pay for parking using their mobile phones.

eSchool
One of the most widely used web applications for schools in Estonia, it provides an easy way for parents, teachers, and children to collaborate and organise all needed information for teaching and learning.

Digital signature
Since 2002, every Estonian resident has been able to provide a digital signature. Today, this is done via ID-card, Mobile-ID, or Smart-ID, for safe identification and use of e-services.

e-Land Registry
A one-of-a-kind web application that contains information on all property ownership and rights for properties and land parcels.

i-Voting
A unique solution that simply and conveniently helps engage people in the governance process. In 2005, Estonia became the first country in the world to hold nationwide elections using this method.

e-Police system
Involves two main tools: a mobile workstation installed in each patrol car, and a positioning system that shows headquarters every officer's location and status.

KSI blockchain
A blockchain technology designed in Estonia and used since 2012 to make sure networks, systems, and data, such as national health, judicial, legislative, security, and commercial code systems, are free of compromise, all while retaining 100% data privacy.

e–Prescription
A centralised paperless system for issuing and handling medical prescriptions. At the pharmacy, all a patient needs to do is present an ID-card. The pharmacist then retrieves the patient's prescription from the system and issues the medicine if it has been prescribed to the patient.

EV quick–charging network
The charging infrastructure project created an Estonian network of quick chargers. Quick chargers for electric cars blanket Estonia today and ensure freedom of movement for drivers of electric cars.
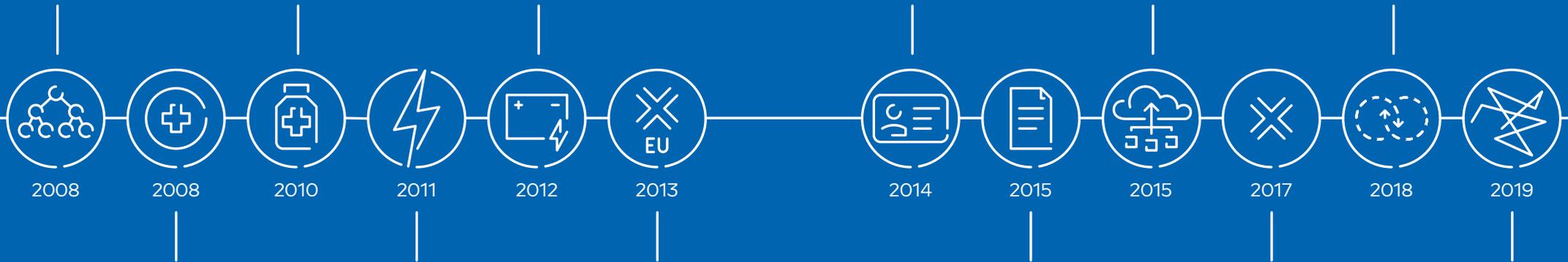
e–Residency
A transnational digital identity for which anyone in the world may apply allows the user to run a trusted location-independent EU business online with all the tools needed to conduct business globally.

World's first data embassy
Assuring our digital continuity, Estonia is the first country in the cloud. Our critical databases and services are backed up in a high-security data centre in Luxembourg.

Proactive government services
To make sure all public services involve as little repetitive bureaucracy as possible, the government is proactively managing essential routine state services

| 2008 | 2008 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2015 | 2017 | 2018 | 2019 |

e–Health system
A nationwide system integrating data from Estonia's healthcare providers to create a common record every patient can access online.

Smart Grid
A digitally enabled electrical grid that gathers, distributes, and acts upon information regarding the behaviour of all participants (suppliers and consumers) in order to improve the efficiency, importance, reliability, economics, and sustainability of electricity services.

X–Road Europe
Estonia was the first in the world to interconnect decentralized components of state- and public sector databases at the national level.

e–Receipt
A portal that enables end users to manage their receipts, as well as documents related to those, such as letters of guarantee and product manuals, in a single, convenient web environment.

NIIS X–road consortium
Nordic Institute for Interoperability Solutions (NIIS) ensures the development and strategic management of X-Road and other e-governance solutions.

Government AI strategy
Creating the legal and strategic framework for accelerating AI development, a detailed strategic plan is made for promoting implementation of AI solutions in public and private sector

building blocks of e-Estonia

e-Estonia's success relies on an open-minded citizenry, who are eager to use e-solutions, and a strong infrastructure that has made it possible to build a safe and user-friendly e-services ecosystem.

e-Governance

Thanks to a safe, convenient, and flexible digital ecosystem, Estonia has reached an unprecedented level of transparency in governance and built broad trust in its digital society. For example, our government uses e-Cabinet to pass laws, while citizens use i-Voting to have their say. As a result of digital signatures, Estonia annually saves 2% of GDP and has become a hassle-free environment for business and entrepreneurship. Estonia is probably the only country in the world where 99% of public services are available online 24/7.

e-Identity

Thanks to a digital identity issued to every Estonian and e-Resident of Estonia, the country is years ahead of countries still trying to work out how to authenticate people without physical contact. In Estonia, every person can provide digital signatures using their ID-card, Mobile-ID, or Smart-ID, so they can safely identify themselves and use e-services. Digital signatures have been used in Estonia since 2002, over 800 million signatures have been provided since then — this is more than in the rest of the European Union.

Interoperability services

The 21st-century keywords, citizen-centred state, and service-oriented information system, require information systems to function as an integrated whole to support citizens and organisations. To do that, organisations and information systems, such as the Population Register or State Portal, must be interoperable and able to work together so that data is requested from the citizen once. Estonia's solution for maintaining a modern state is the data exchange layer X-Road, which saves Estonians 844 years of working time every year.

Security and safety

Being a digital society means exposure to cyber threats. With solid investments in cybersecurity infrastructure, Estonia has developed extensive expertise in this area, becoming one of the most recognised and valued international cybersecurity experts.

After our experience with cyberattacks in 2007, scalable KSI blockchain technology was developed in Estonia. Besides securing its own e-services with blockchain, such as e-Law and e-Court, Estonia also became host to the NATO Cooperative Cyber Defence Centre of Excellence and the European IT agency. Also in regular use, e-Police, Alarm Centre, and e-Ambulance Fast Reaction keep Estonian streets safe.

Healthcare

Estonia's healthcare system has been revolutionised by innovative e-solutions. Patients and doctors, not to mention hospitals and the government, benefit from convenient access and savings that e-services deliver. Each person in Estonia has an online e-Health Record and can use e-Prescription to get medicine without paper prescriptions. The electronic ID-card system and blockchain technology are used to ensure health data integrity and mitigate internal threats to data.
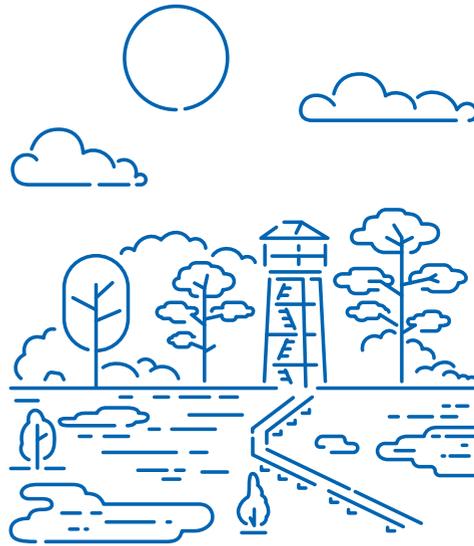
Location-based services

Thanks to the location-based aspect of many of our public services, Estonia has been able to increase the well-being and safety of its citizens. In 2000, Estonia made headlines by pioneering a system that can instantly pinpoint the location of any GSM mobile phone used to make an emergency call. Today, Estonia continues its commitment to innovation and new technologies by offering the opportunity to use Estonia as a test bed for self-driving technologies and intelligent transportation systems.

#5 MOBILE BROADBAND SUBSCRIPTION
World Economic Forum 2019

#1 INDEX OF READINESS FOR DIGITAL LIFELONG LEARNING
CEPTS 2019

Business and finance

Modern e-solutions make setting up and running a business in Estonia quick and easy. Estonian solutions like digital signatures, electronic tax filing, the e-Business Register, and the availability of public records online have pared down bureaucracy to a bare minimum and facilitated an environment where business is easy, yet also secured with blockchain technology. It's a simple fact: Where business is easy, business will grow. That's why Estonia is among the countries hosting the highest concentration of start-ups per capita.

#2 PUBLIC SERVICES IN THE DESI INDEX
EU Commission 2019

#1 STARTUP FRIENDLINESS
Index Venture 2018

Education

The goal of the educational digital revolution in Estonia is to implement modern digital technology, such as e-School or the Estonian Educational Information System, more efficiently and effectively in learning and teaching, and to improve the digital skills of the entire nation. For example, our goal includes ensuring that every student receives the knowledge and skills to access the modern digital infrastructure for future use. Estonia's success in the digital revolution is reflected in the fact that twice as many students pursue IT-careers in Estonia versus the average in other OECD countries.

#1 DIGITAL HEALTH INDEX
Bertelsmann Foundation 2019

ongoing projects and an ambitious future

Successful countries must be ready to experiment. Building e-Estonia, one of the most advanced e-societies in the world, has involved continuous experimentation and learning from mistakes. Estonia sees the natural next step in the evolution of the e-state as moving basic services into a fully digital mode: for citizens, things can be done automatically and, in a sense, invisibly.

In order to remain an innovative, effective, and successful Northern European country that leads by example, we need to continue executing our vision of becoming a safe e-state with automatic e-services available 24/7.
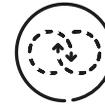
A new digital nation

e-Residency is building a new digital nation for citizens of the world where no-one is held back from their entrepreneurial potential because of where they choose to work or reside. This has enormous potential for unlocking global growth by democratising access to entrepreneurship and e-commerce. We believe that countries will one day compete for e-residents based on the quality of their public e-services and their business environment.

Data Embassy

The Data Embassy is an extension in the cloud of the Estonian government, which means the state owns server resources outside its territorial boundaries. This is an innovative concept for handling state information, since states usually store their information within their physical boundaries. Data Embassy resources are under Estonian state control, secured against cyberattacks or crisis situations with KSI blockchain technology, and are capable not only providing data backups, but also operating the most critical services.

Our data embassy is located in Luxembourg under a Tier 4 level of security — the highest level for data facilities. In this collaboration, Luxembourg and Estonia are pathfinders in creating a unique and innovative way to ensure digital continuity in the world.

Proactive seamless services

The Estonian government has decided to boost the paperless society and make sure all public services involve as little repetitive bureaucracy as possible. It means that as much government services as possible could be conducted either in a single online contact with an official or completely automatically. As a truly digital society, Estonia has already made an innovative leap by launching proactive family and parental benefits. This means that parents of a newborn no longer need to apply for benefits but receive a proactive proposal from the government for the benefits they are entitled to, which they simply have to confirm.

Cross-border data exchange

Estonia's future solution for healthcare is data-driven health. Firstly, thanks to a data-driven approach, including genome-based analysis (Estonian Biobank already has over 200 000 donors), people will become more aware of the factors influencing their health, enabling them to take control over their well-being. Secondly, patients will be able to augment their healthcare journey using a variety of apps and devices, which are certified by the state and can also be reimbursed. Finally, Estonia is also taking steps to become a test bed for innovative healthcare technology, including medical AI.

Intelligent transportation

Estonia is already an innovation leader in IT with electronic identity cards, i-Voting, and e-Residency. In 2017, we took another important step when the government made it legal to test self-driving vehicles on on all public roads. We believe that self-driving technology helps improve road safety and road use efficiency. With self-driving cars, Estonia will continue its commitment to providing a state-of-the-art platform for innovation and new technologies, as it already has all the prerequisites in place.

Artificial Intelligence strategy

The government artificial intelligence strategy 2019-2021 is a sum of actions that Estonian government will take to advance the take-up of AI in both private and public sector, to increase the relevant skills and research and development (R&D) base as well as to develop the legal environment. According to the current strategy and based on existing knowledge, Estonian government will invest at least 10M euros in 2019-2021 to implementation of AI strategy in its different directions. As of October 2019 there are at least 23 AI solutions deployed in the Estonian public sector, with a goal of having at least 50 AI use cases by 2020. Similarly, Estonian companies are already using AI in several business areas for optimising business processes, automating customer service, in product quality control, risk mitigation, and elsewhere.

Estonia was first in the world to test and use blockchain technology on national level

Estonia was first in the world to interconnect decentralised components of state and public sector databases at a national level

Cross–border data exchange

As businesses and citizens become more mobile, the need for truly international e-services becomes all the more pressing to remove the red tape involved in the cross-border movement of people and companies. Estonia has begun this work with a public sector data exchange facility, established between Finland and Estonia in 2017. Estonia hopes that cross-border data exchange will soon become possible between all European countries.

Real–Time Economy

The–Real Time Economy (RTE) is an environment where financial and administrative transactions connecting citizens, business and public-sector entities are in structured standardized digital form. These transactions are increasingly generated automatically and completed in real time without store and forward processes.. For example, solutions like real-time payments, e-ID services, real-time e-Invoicing, and e-Receipts, can hugely benefit the digital single market through direct cost savings. In Estonia many actions i.e. electronic authentication and digital signing already act as building blocks of the real-time economy. Continuing with the development of standardised data exchange solutions (using XBRL GL, GS1, and other global standards as well as innovative

technologies like blockchain and AI), and merging these projects and initiatives as links of real-time economy, will make it possible to develop RTE ecosystem.

Digital transformation in education

We in Estonia believe that raising smarter kids is the smartest investment a country can make. But we also understand the importance of lifelong learning. Estonia's educational digital revolution implements modern digital technology more efficiently and effectively in learning and teaching, improving the digital skills of the entire nation. One example: in 2020, large amount of study materials in Estonia are digitised and the goal for the future is to have all school materials available through an e-schoolbag.

Reporting 3.0

The goal of Reporting 3.0 project is to reduce entrepreneurs' burden of obligatory data submission to state institutions using an automated and standardised (XBRL-GL format) data transfer. 3 government institutions (Bank of Estonia, Estonian Tax and Customs Board and Statistics Estonia) have already defined necessary taxonomies to guarantee this secure and standardised data transfer. This solution will save time and money, allowing companies to focus on growth and productivity.

IT sector

IT plays a central role in Estonian life because people trust IT solutions. Essential e-solutions in Estonia that enable the digital society to function smoothly were all built by local Estonian companies. Our IT sector has over 20 years of expertise and experience in automating public and private sector services. Today, virtually all state-related operations can be done online 24/7 — prescriptions are issued digitally and only a tiny fraction of individual tax declarations are filed on paper.

To date, Estonia has shared its e-governance journey with over 60 governments and exported its solutions to over 130 countries around the world. The Estonian IT sector and ambitious start-up community dare to create innovative e-services that change the world — from Skype to e-Residency.

the Estonian ICT cluster

The Estonian ICT cluster is the main force behind cooperation and development in the Estonian IT sector. It forms a collaborative platform for enterprises which combines competences and provides access to a dynamic network of companies. For example, most public and private

e-solutions in Estonia have been made using ICT cluster partners. Through the ICT cluster, Estonian IT companies can cooperate in order to find partners and develop new solutions, create new products, and improve their competitive ability on international markets.

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e-estonia briefing centre

Visit the gateway to Estonian digital society

The Briefing Centre presents the e-Estonia concept and acts as a coordinator for B2B, and B2G relations. We host presidents, ministers and highlevel global decision-makers from public and private sectors, investors, international media and connect them to Estonian companies. The Estonian government has also assigned the e-Estonia Briefing Centre with the role of coordinating the international image and narrative of e-Estonia. We share news about the digital society and its latest developments.

4800+ DELEGATIONS

65,700 VISITORS

130+ COUNTRIES

8,000 SUBSCRIBERS

42,000 DELEGATIONS

4500+ SOCIAL MEDIA FOLLOWERS

REGULAR VISITS:
→ a comprehensive and exclusive overview of the underlying mechanisms of e-Estonia by our inspirational speakers

→ 1-2 meetings with Estonian IT companies and/or public sector experts

CUSTOM–MADE VISITS:
→ consultation on programme agenda and custom-made business-programme with public and private sector experts

→ meetings and discussions with Estonian ICT companies for partnership ideas and best practice

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custom-made programmes for public and private sector

Get exclusive and unique insights about e-Estonia

We inspire our guests with the e-Estonia success story, its developments, benefits and challenges as well as ongoing projects and the future of e-Estonia.

We consult on and arrange custom-made B2B and B2G programmes, featuring Estonian public and private sector experts, which can boost innovation and international cooperation opportunities.

Custom-made programmes last between half a day to three days; send an e-mail to business.e-estonia@eas.ee for your personal agenda and quote.

Examples of successful custom–made programmes:

828
→ Carvajal Technologies (Colombia) delegation meeting with Estonian companies, e.g. Guardtime, OpenNode, Reach-U, Evocon

→ Toyota (South Africa) delegation meeting with Estonian companies, e.g. Autobahn, Pocosys, Proekspert, AuVe Tech, Fleet Complete

82G
→ Ekiti State (Nigeria) government officials meeting with Estonian companies, e.g. Net Group, Aktors, Best Solutions, Datel

→ Ajman (United Arab Emirates) government delegation meeting with Estonian companies, e.g SK ID Solutions, Cybernetica, Flowit, CybExer etc

Bookings: e-estonia.com/visit-us
Media inquiries: press.e-estonia@eas.ee
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get in touch and book a visit to the e-Estonia Briefing Centre: e-estonia.com

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