

[Tulevik]*

Process of Modernization and Technological Development in Estonia

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* Future, in Estonian

The work will teach the worker. Estonian proverb

SIMPLICITY is the best word to describe this Baltic country. Its flag represents the main landscape of the country; a white land covered in snow, a black forest, and a blue light sky. And so is its economy, politics and taxation. What a minimalistic artwork is Estonia.

Estonia is the smallest of the three Baltic countries, with the smallest population and a quite big border with Russia, concretely 294 km long. Even so, Estonia has a bigger GDP per capita (17,727.5 USD in 2016 according to World Bank) than the other two Baltic states: Latvia and Lithuania. It has a bigger presence in the markets and a bigger quality of life according to the OECD in a study done in 2017.

Technology is a very important part of Estonia's economy. According to the World Bank, 15% of Estonia's GDP are high tech industries. Following the example of Finland, Estonia has made technology the most important aspect of their economy and society. But not just that, with the eyes faced towards the future, or as the Estonians call it "*Tulevik*", this former part of the Soviet Union of 1,3 million inhabitants has become the most modernized state in Europe.

The 24th of February of 2018 Estonia celebrated the 100th anniversary of the its independence, so it is interesting to see how the evolution of this small country is and will continue to be.

All this has been possible because of different figures like Laar, Ilves, Ansip, and Kotka.

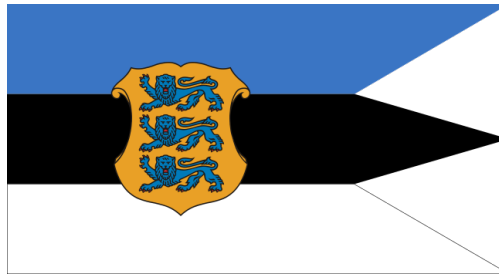
History

Estonia got back its independence from the Soviet Union by referendum in 1991. The new government was formed by the 32-year-old **Mart Laar** and a cabinet composed of young people that had no relation with the previous Soviet occupation. In fact, his cabinet had a median age of 35 years old. This composition avoided any corruption that, for example, influenced many other post-Soviet Republics, like Ukraine or Belarus, as they were still being ruled by the old Soviet oligarchy. They had no opportunity of development and in consequence, were stuck in poverty and corruption and many times under the new Russian sphere of influence.

Nevertheless, the country had a very weak economy, so Laar decided to liberalize the economy. One of his main reforms was the establishment of a flat income tax, the first in the world, which made the taxation very simple and easy for the government. Other reforms were the privatization of most of the industry and a continuous effort of the Government of Estonia to establish free trade agreements with other European countries, especially with Scandinavian ones. According to Laar, the main ideas of his reforms came from the book *Free to Choose*, written by Milton Freedman.

Laar was Prime Minister for two terms from 1992 to 1994 and between 1999 and 2002. The next governments would follow those patterns of free economy and modernization, mainly by the centre-right Reform Party that held the government between 2002 and 2003 and from 2005 to 2016. It has also taken part in all governments from 1999 to 2016.

During the Soviet period, the government from Moscow didn't improve much of the infrastructure and roads from Estonia, and most of them were canalized to the East and not the West. When the market to the East collapsed, the government saw that they needed a new communication system that would connect them both with the outside and with most parts of their own countries. Since the country had a very poorly done infrastructure, the government tried to improve the telecommunications and for it he invested what they could, and the rest was privatized. The telecommunications market in Estonia is among the most liberalized in Eastern Europe. In 1998, a 49% stake



in the state-held Eesti Telekom was sold to a consortium of state-controlled Telia (Sweden) and Sonera (Finland). They refused to buy the second-hand Finnish phones and instead made a new digital system of their own. There are three mobile phone service providers: Eesti Mobiiltelefon (a subsidiary of Eesti Telekom), Radiolinja Eesti (a subsidiary of Finland's Radiolinja), and Ritabell (a joint venture between the British Millicom International and local Levi-com). Estonia has the highest number of mobile phone users per capita in Central and Eastern Europe. Eesti Telefon, the fixed line division of Eesti Telekom, had a monopoly in domestic and international fixed line calls until 2001.

The Tiigrihüpe Programme

The Estonian government tried to create a very modern communication network. For this, back in 1996, President Lennart Meri announced the so-called **Tiigrihüpe**, Tiger's Leap in Estonian, a four-year project developed by the Republic of Estonia that pretended to modernize the telecommunications and connect all Estonians by the Internet. He made it arrive at most homes and places. The idea of this project was proposed by the ambassador to the U.S. Toomas Hendrik Ilves who, years later, would become President of Estonia himself, and by Jaak Aaviksoo, who later would become minister of Economy. The Tiigrihüpe was included for the first time on the budget in 1997. Thanks to it, by 1998 all schools had internet connection and computers in their room and in 2001, the first Free-Public Wi-Fi connexion was installed. Nowadays the Wi-Fi areas are very common, as by 2011 there were 2,440 registered areas of free Wi-Fi and by 2013, the 4G covered 95% of the territory. Finally, in



2000, the access to the internet was considered a Human Right by the Estonian government as it was explained by the **Estonian Institute of Human Rights**. In 2016, it was recorded that 91% of Estonians are internet users and similar numbers compose mobile phone users.

E-Estonia

The three Baltic countries share a common problem: they have a large amount of emigration and, in consequence, a decreasing population. Since gaining back their independence, Estonia has lost 15% of its population. Meanwhile, Lithuania has lost almost one million citizens that emigrated. This is mainly because of the highly prepared youth the country formed, which after their studies go to other countries to form their life, most of them knowing English and having received a high ranked education. It has been recorded that The International Monetary Fund (IMF) has found that 20 million people left Central and Eastern Europe in the last 25 years; 6.25% of working-age people in the region. It said in a report earlier in 2016 that GDP would have been seven points higher on average by 2012 had those workers remained in their birth country. This has created a so-called “brain drain” in the three Baltic countries. Estonia isn’t an exception, after the fall of the Soviet Union and the possibility of returning.

To solve this, the Estonian government continued the Tiigrihüpe programme, and created a new system of simplistic bureaucracy based on an electronic ID card for things like voting, tax payment, register a business and many other things. This card was introduced in 2001, and some years later the 86% of the population use it. All this is done from the computer and is described as being “fast and simple”; some people have spoken about a tax payment done in three minutes by the computer.

The first time that this was introduced was in 1996, when Estonia introduced the so-called *e-Banking* which developed successfully. Today, 99.6% of banking transactions are done electronically and the number of users of online banking in Estonia is 1.8 million clients, more than the country's population of 1.3 million. In 2007, the government allowed voting through the internet in the general election, with this card, 1 out of 3 Estonians voted by the internet, and this result repeated itself in 2011.

In order to use it, the ID card must be introduced on a connector and connected through a USB port to the computer. After introducing your ID number, name, and password you will be able to access the services; the process is described by the Estonians to be simple.

All this was possible thanks to the President Toomas Hendrik Ilves, who promoted the technological development. For that, both President Ives and his Prime Minister Andrus Ansip relied on many programmers related to the Tallinn University of Technology and the software company “Nortal”, concretely the former CEO Taavi Kotka. The digitalization of the Estonians went into all the areas that conform to a western based society: banks, ministers, newspapers, broadcasts and political parties are completely digitized, which is called **E-Government** or Government in the Cloud, and is considered very innovative even between other Baltic states, such as Finland, that has also tried to develop its technology. All this has helped a lot in the development of the country. The government’s job became minimalistic, which helped to decrease the public spending and avoid any corruption in the administration. As Ilves once said, “You can’t bribe a computer”. On the other hand, it helped to the many Estonian migrants living in Britain or the US to still have contact with their country by voting or many times having their business there. Meanwhile, countries like Lithuania lost control of its fleeing population which cut a lot of ties with its motherland.

Individuals are able to access all e-Estonia data about themselves, and all queries to the system are logged. The data for e-Estonia is not stored centrally, but instead uses a data platform run by the government called X-Road to link information from local hosts. **X-Road** is rooted in a block chain called K.S.I., developed by **Guardtime** in order to prevent tampering. The system is backed up on servers in Luxembourg, which is governed with the same protections afforded by a diplomatic mission. The system is designed to allow the government of Estonia to function even in the event of an invasion by Russia. This was created when it became a real threat that many Estonians were signing their documents through the Internet and this system became hackable.

In 2014, the E-Estonian Council was created to administer all the digital governance. This council is directed by the Prime Minister and other Ministers. It also includes technicians and programmers that have worked in the programme like Annika Uudelepp, Linnar Viik, David Hinrikikus and of course Taavi Kotka. It was the successor of a similar institution that was called the Council of Informatics.

E-Governance Academy

In order to share this knowledge with other countries, the Republic of Estonia created in 2002 the **E-Governance Academy (e-GA)**, as part of the Tiigrihüpe, which nowa-



days is a non-governmental organization. This is a mission-based non profit organization that works as consultancy think tank . The objective of this mission was to teach the local authorities of Estonia how to implement e-Government policies, and it became so popular that it was repeated in many other countries.

E-GA is located especially in Eastern Europe and the Balkans where they offer solutions related to things like e-government, E-central government, e-democracy and cybersecurity.

From 2007 it also offers training to local authorities such as mayors or governors. The e-Ga has trained over 3500 officials from over 60 different countries. The Academy has helped to develop e-Government, for example, in Central and Eastern Europe, Asia and Africa, but cooperation with the countries of the European Union (Finland, Sweden, and Latvia) has also been developed. In Estonia, the Academy focuses on developing open government at the state and municipality levels. Countries that have taken the e-GA's service are, for example, Namibia, Faroes Islands, Ukraine, Palestine or Kyrgyzstan. In the Cayman Islands they have taught the way of use of the e-ID or to Armenians with a census using the Internet.

On the council of the organization there can be found people with big influence both on Estonian politics and influence like Mait Heidelberg, who is advisor on the Economic Ministry or Hannes Asok.

Economic Crisis

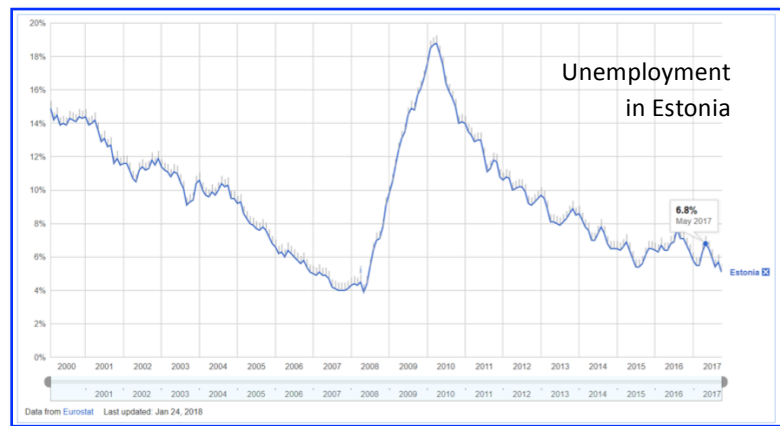
The Economic Financial crisis of 2008 affected Estonia deeply due to its dependency on foreign investors, especially ones coming from the Scandinavian. This was the case in most countries of Europe that depend on foreign inversion, in the case of Estonia, most of it came from Scandinavian countries.

Economic Reforms

Most countries followed one of two different paths in order to survive the crisis. One was the increase in taxes or the cut in public spending. Many countries from the Mediterranean, such as Italy or Greece, decided to increase taxes. This however does not work and most of these coun-

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tries finally decreased their spending with high taxes, which destroyed the level of life. Because of their highly liberalized economic tradition, the Reform Party refuses the first option and started to cut spending.

In 2008, the government of the Prime Minister Andrus Ansip, which had as Financial Minister a man called Jürgen Ligi since 2009, reduced massively government spending, avoiding the increase in taxes. This made the Estonian unemployment rate grow to 18.5% in March 2010 from a 3.9% in May 2008, according to the Eurostat. Nevertheless, this fell down to the 8.1% in May 2013 and 5.1% in October 2017. Many of the newly unemployed in 2010 were functionaries and other little government officials. Thanks to that, Estonia maintained its economic fiscal advantages and many unemployed started to run their own business, most of them related to programming and technology. With this, Estonia went back to the levels of the welfare state that it had before the crisis in a very brief period, especially comparing it with other States that even today are not able to leave the crisis behind.

E-Residency

In 2014, the Estonian government, led this time by the young Taavi Rõivas, created the biggest technological advance: the **E-Residency** or digital residency, for that they took the former CEO of the Nortal company, Taavi Kotka. He had also been involved with the digitalization of the Government and this is because there are very similar characteristics between Nortal, the E-Residency and the E-Government: *simplicity*.

As it was said before, Estonia has been able to digitize all the bureaucratic process and the relation between the Administration and the citizens. With the E-Residency, they share those advantages with the rest of the world, again by a Digital ID. The process is described as being fast and simple, where first, there is the Application to be an E-Resident, and then being reviewed by the Estonian government and becoming automatically an E-Resident.

The **E-Residency** does not give the Estonian nationality, as it is not a passport or can not be used as a passport. The Digital Residency gives non-Estonians some of the rights that the Estonians have about business and taxation. The E-Residency gives you the permission of opening a company in Estonia and access to the services that Estonia gives to its companies, as well as banking or the signing of a contract. It also provides many other services for the administration of the company such as a trusted network of financial services, accountants, marketing specialists, payment providers, and other business services recommended by other e-residents and access to many government's services for entrepreneurs.

The question is, why would someone want to establish a company in Estonia? The first answer that many people would think is that Estonia is a physical paradise, but this is not the case. Estonia has a Legal person's income tax rate of a 20%, similar to other countries in the region, like Finland or Sweden. This gives people from any part of the world the ability to open a business in a country under the European Union. This guarantees the economic stability of a European country and gives the opportunity to trade with other European nations. It also makes it possible to open an account in an Estonian bank and do international banking transferences, which is very useful for people in countries with political instability like Venezuela, Russia or Ukraine. There is was difficult to achieve either because it is forbidden or because the banks are not able to do so. In fact, the biggest nationalities that are applying for E-Residency are Ukrainians and Russians, but there are also Americans, Finns, and Swedes.

There are 4,272 companies established by E-Residents. The most numerous ones are the Business management and consultative activity ones, but there are many more such as Software development.

People with e-residency

Taavi Kotka, the man that directed the project, assures that in 2024, one million e-residents will be located in Estonia. Nowadays, over 27,000 E-Residents, from 143 countries are registered and this number has a growth rate of 200-300 people per week. Between all of these people, there are characters of high status like Japan's Prime Minister Shinzo Abe.

The first E-Resident was Edward Lucas, Senior Editor of *The Economist*. He gave a very favorable opinion about the programme of **E-Residency**:

"Estonia's e-Residency is a game-changer. Anyone in the world can now apply for a rock-solid digital ID, giving

them what Estonians have taken for granted for years: the ability to identify themselves online, to make binding agreements and to communicate securely. This turns the internet from a confusing Wild West into an environment where trustful interaction is frictionless and ubiquitous."

In the United Kingdom, the Estonian digital residence has gained a lot of interest by British businesses, since the possibility of not having a trade deal with the EU is still on the table. This is the case of a woman named Ella Romanos, a business owner from the UK that is staying in the EU after the Brexit. She wrote on the official E-Residency page:

"Signing up for e-Residency is an easy process and with the current situation, I believe it is worth considering, even if you don't yet know if you will need to use it."

Mr. Kotka says that Estonia aims to do for identity what American Express cards did for international travel in the 1960s: to simplify life. But the bigger point is that government-verified identity has been divorced from the location. If Estonia's scheme takes off, some other countries may well decide to follow its lead. Some may aim at volume; others, to target the top end, as with the market in non-resident investors' passports. Soon, multiple satellite citizenship may even become the norm.

Tehnopol

Tehnopol is what the Tallinn Science Park is known by. As it is said in their official page: *"The Tallinn Science Park foundation is a science and business campus which aims to advance technology-based entrepreneurship in Estonia, bring scientists and entrepreneurs together and provide suitable conditions and a suitable environment for the realisation of breakthrough business ideas"*. Nowadays, it is the biggest tech-park in all the Baltic.

As early as 1991 there were attempts to start a business district adhering to the principles of a science park close to Tallinn University of Technology (TUT), but the plan took off only in 2003, when the Republic of Estonia, TUT and the City of Tallinn founded the Tallinn Technology Park development foundation, known today as Tallinn Science Park Tehnopol. Nowadays, over 200 companies are established there and many of them have gone on to become sources of wider prosperity and economic growth launched in science parks around the world. Many of those





companies are either little startups or companies like Skype, which has one of its five offices in this city. Among all of these companies there is also Nortal.

The complex has two laboratories, over 14,000 students and 1,300 scientists and 3,500 employees working there, 55,000 m2 of space, 10 conference and meeting rooms and 5 research and development centres.

Tehnopol has many relations and shares the area both with **the Tallinn University of Technology** and with the **Estonian Information Technology College**. In less than ten minutes it is possible to go from one complex to the other. They usually work on many projects together. In fact, many of the students in the TTÜ end up on the Tehnopol.

The complex offers a series of different services like the first prototyping found in Europe, called **Prototron**, which has over 20 teams and over 350,000 euros in Funding. They give to the startups' equity free funding. Also, they have a **Start-up Incubator**, with over 30 startups, 100,000 euros worth of expertise, 50 events, and over 25 coaches, in order to help the new projects. As well as over 200 coaching hours, over 30 seminars and over 500 beneficial contacts.

Tallinn University of Technology

One of the main reasons for the high implication of its society on the economy has to do with the second biggest University of Estonia: the Tallinn University of Technology (TTÜ). The University was founded as the Estonian Engineering Society in 1918 by many intellectuals. At

that time, Estonia was occupied by the Germans and as a consequence this society had a lot of German influence. When Estonia gained its independence the same year, the Society was refunded as a private school with the name of Tallinn College of Engineering. Because of the high need, architects and engineers became very prosperous. It was nationalized and became a Public University in 1920.

The University was, with the one of Tartu, the best University in the country. The name change again with the Soviet occupation, this time to Tallinn Polytechnic Institute. For many years it became the leading science University in the whole territory of the Soviet Union. The TPI also had a lot to do with the opposition against the rule from Moscow. With the fall of the Soviet Union, the University changed names which it nowadays has, the Tallinn University of Technology.

This University has been the intellectual birthplace of people like Taavi Kotka, co-founder of Nortal or Priit Kasesalu, Ahti Heinla and Jaan Tallinn, founders of Skype and Kazaa. It is the third best University in the Baltic

countries with the Universities of Vilnius and Tartu and the best technical University of the Baltic according to Times Higher Education World University Rankings 2016-17.

It is also a very international University, having dealt with Universities like Stanford (US), Edinburgh (UK) or Groningen (Netherlands). It has also dealt with the tech-park Tehnopol and with the Estonian Information Technology College.

Many people consider this University as one of the motors to Estonia's modernization process, especially on the technological aspect. Nowadays with over 70 000 students, it still forms many great programmers, engineers, and scientists.

Technological companies

We have other important high tech companies developed in Estonia. As said before their activity generates the 15% of the GDP. Most of them have been created or are managed by people related to each other in many ways.





Skype

The most famous platform developed by Estonians is clearly Skype. The company was founded by the Dane Janus Friis and the Swede Niklas Zennström, collaborating with Priit Kasesalu, Ahti Heinla and Jaan Tallinn, all of whom were TTÜ alumni. This software was created in 2004 and supposed a total change in the internet communications. The three of them had already created a quite famous and important software for music sharing called Kazaa. Skype was founded in 2003, with the base in Luxembourg, and it has changed owners two times, bought by E-Bay for 2,6 billion in 2005 and by Microsoft in 2011 for 8,5 billion. Although the exact numbers have not made public, the sale brought hundreds of millions of Estonian kroons (€0.06) to stakeholders in the country. It has one of its five bases, the development center, on Tehnopol, and Tallinn and it had one on Tartu, which is now closed. Indeed, it was the first one. There, over 200 workers perform during different tasks related to the development of the company. The company has never been an Estonian company, as it has always been a very international venture. Even so it was born Estonia and it still has a lot of importance. In 2014, the former CEO of Skype Estonia, Tiit Paananen, said that only about 20% of the company's workforce remains Estonian, which makes a total of 100 people.

Nevertheless, many Estonians have worked with Skype and from the experience taken there, they have founded their own companies. A good example of it was the company founded by the original three developers of Skype: Tallinn, Kasesalu, and Heinla. This was an investment firm called Ambient Sound Investments (ASI), set up to hold a minority stake in Skype. Since selling its stake to eBay in 2005, ASI has been a private investment vehicle, managing 100 million euros of its partners' assets. In 2007, they founded a startup, Inkspin1, which develops communication service called Vispel with the goal of bringing video calls to any TV set and TV-connected device.

One of the original Skype developers, Jaan Tallinn, has been backing innovative projects in very different fields. He co-founded the Centre for the Study of Existential Risk at the University of Cambridge, a multidisciplinary research centre dedicated to the study and mitigation of risks

that could lead to human extinction. In 2012, he also co-founded a medical consulting firm called MetaMed, which provides personalised medical research services and was backed by entrepreneur Peter Thiel. He also was an early investor and advisor in London-based deep learning startup DeepMind, which was sold to Google in the end of January for about 400 million dollars.

In 2011, Skype's first employee, Taavi Hinrikus, went and co-founded peer-to-peer money transfer service TransferWise, which allows users to transfer money between countries and make foreign payments cheaper and faster than through the traditional banking system. TransferWise has received millions of dollars in seed funding and investments from IA Ventures, Index Ventures, Peter Thiel's Valar Ventures, and PayPal's co-founder Max Levchin, among others.

The former CEO of Skype Estonia between 2007 and 2012, Sten Tamkivi, joined Andreessen Horowitz last year as an in-house entrepreneur. Though living in Silicon Valley, he still keeps an eye on his homeland and frequently writes on economic and social topics regarding the future of Estonia.

According to a research made by Tamkivi, there are more than 50 former Skype people (many Estonian) who have since gone on to set up a new business or found a startup.

A good example of such a startup is Vitalfields, which is led by an Estonian ex-Skype engineer Martin Rand. The company provides farm management software that already helps over 1,500 farms to forecast plant diseases using field-based weather forecasts and also helps keep records on the fields. In January 2014, it raised 500,000 euros in follow-on funding – from investors including Ahti Heinla.

The founder of Skype's data research team, André Karpištšenko, co-founded a really interesting startup called Marinexplore, which is developing the world's first ocean big data platform. The company offers repositories of data on the world's oceans, where users can create custom datasets in minutes. While the company, which collected 1.4 million euros in seed funding, operates in Silicon Valley, its development team is still situated in the Estonian capital of Tallinn.

Skype can be compared to Estonians. Born and raised there, left home for more opportunities abroad, but still has a relation with the home country connected through the Internet.



Nortal

Nortal, based on Tallinn and since 2009, is the biggest software company in the Baltic. Nortal is a multinational company that works as a consulting, software developing, specialize in technological, business and political affairs around the world. In 2017, it was recorded with over 600 employees and in 2015 had a refund of 44 million dollars. It can be considered the most important high tech company in Estonia.

It was founded by Priit Almae, the actual CEO of the company and by Taavi Kotka, who was CEO from 2005 to 2012, and an old student from the TTÜ. Back in 2000 it went by the name of Webmedia, and in 2009 it was declared the second-best IT company in the Baltic. In 2008, Webmedia opened its first office in a foreign country, in Qatar. In 2010, Webmedia acquired the healthcare unit of Cybernetica AS, adding laboratory information system to eHealth product line. In 2011, coinciding with the purchase of a Finnish software company called CCC Corporations and with the beginning of business in Oman, Webmedia changed its name to Nortal, a mixture of two English words, “Nordic” and “Talent”. By that time the company was being directed by Taavi Kotka and collaborating with the project of e-Estonia with the Estonian government. The same year, in 2011, Taavi Kotka left the direction of the company. In 2013, the company launched the development of an investment portal, Invest Easy, which was recognized later as one of the world's best government-business communication portals. Nortal and Fast Enterprises also won a tender of 226 million euros for the Finnish Tax Board to develop a new tax system. In 2017, a new office was opened in Seattle.

Apart from that, Nortal has made business in many parts of the world as well as expanded a lot over the last years. Nowadays it has projects in almost every continent in the world, in 20 countries, including countries far away from Estonia such as Nigeria, Botswana, Saudi Arabia and many more. One of its biggest victories was when, thanks to Nortal Oman, it escalated 127 places in the World Bank's Ranking on places where it is easier to do business. It has 530 employees in 10 branches in 20 different countries. Among its many partners, there is Microsoft. Nortal is specialized in giving data-based business process simplification services for both public and private sector companies. Nortal is specialized in three specific areas: Data-

driven Technology, Change management and Strategy, policy and legislation. At the same time there is a division based on more specific areas of technology:

Public finance management, electronic identity, data protection and cybersecurity, hospital information system and electronic health data, industry 4.0, revenue science, and large data annalysis.

The reason why Nortal has such a big importance for Estonia is simply on the basic principles of the company. One of the most important things for Nortal is that every software, programme or service they make must be simple. That is not just the principle of Nortal but also from Kotka who founded it. This is very important because

Nortal had a very big role to play on the digitalization of the government back in the 2000s. At that time, Webmedia was a very successful company and the Government of Andus Ansip called them many times to col-

laborate on e-Estonia. Like it has been said before, the many processes like voting by internet or paying your taxes by the internet, or signing contracts are very simple and fast procedures that lack on bureaucracy, which makes it less expensive and even more effective. In fact, after the role of collaboration with the E-Government, many people from Nortal will officially create the E-Residency.

It is also described as being very “plural” in a way that many of the employees have shareholders of the company, as Almae explained. It uses to be own by 34 of the employees but now that number has increased to 10 more. As Almae explained, “The growth of Nortal is thanks to the work and talent of their employees”. A big part of the company is also owned by LHV Group, which is the largest domestic financial group and capital provider in Estonia.

Other companies

ZeroTurnaround that has headquarters in Tartu and in Boston is a software developer founded by Jevgeni Kabanov, CEO and President of the Republic of Estonia's Academic Advisory Board and Toomas Römer in 2007. Even if it's not a company as big as Nortal, it has had projects with companies like HBO, H&M, Volvo, Volkswagen and Bosch. The same people designed **Ridango**, an application that provides international transit tickets. Other companies are **Joost** and **Kazaa**, programmes made by the same programmers that designed Skype. Joost is a TV Internet Service while Kazaa is made for music sharing.



There has been a lot of debate on why Estonia has developed such as big attraction to the technological industry. One of the reasons might be that Finland (another technological power on the Baltic, home of Nokia) has influenced them a lot. It is the nearest democracy for them and they both share a lot cultural and political ties as well as a similar language.

Another reason being that once the Soviets left they left nothing behind them, without past the Estonians could only see to the future. A final reason could be a need of communication that could not be reached on conventional manner.

Russia and the cyberwar

Estonia has improved and modernized a lot the life-quality of its citizens by the digitalization of many parts of the life and society. But this, at the same time, could be a weakness and it has to do with a cultural problem.

After 46 years of Russian occupation, the country (like many other old Soviet republics) of Estonia has a Russian speaking population that is not well integrated, and it has been taken away from the high ranks of society that they used to occupy. In fact, out of all the Baltic countries, Estonia has the biggest percentage of Russian speaking population: 26%.

This, and the fact of being very close to Russia as well as being a very westernized country, has brought tensions with Moscow that could see an Estonia closer to Scandinavia and the EU as a threat, considering the country being in front of St Petersburg. This has led to force showings by Russia who back in August 2017 sent armed jets near Estonian airspace and NATO had to interfere.

Nevertheless, the biggest attack from Russia to Estonian sovereignty came in 2007 when the first hacking terror attack happened. That year, the Estonian government retired a Russian WWII monument, which for many Russians symbolizes the victory against Hitler, but for many Estonians symbolized Russian occupation. This resulted in the anger of the Russian-speaking population that ended up in riots on the 26th of April 2007. As a result of these riots, 154 were injured by the police, one person died and 1,000 were arrested.

After this, on the 27th some Moldovan hackers organized the first cyber-attack in history against Estonia. Nevertheless, there are suspicions that the Kremlin, led by Vladimir Putin, was behind the attack as a punishment against Esto-

nia. This led to the government being paralysed for weeks. Estonia, being fully digitalized, lost its government for days without the Hospitals even working.

The response of Estonia was very fast and proactive. As said before, Ilves, who was President of the country at the time, was a very influential figure in the international community. His contact with both Bush President of the US and with Rasmussen, Secretary General of the NATO, became crucial in order to defend the country. This made NATO put the Cooperative Cyber Defence Centre of Excellence in Tallinn and assure to Russia that an aggression to Estonia was an aggression to NATO. In 2012, the EU's newly founded IT Agency also set up shop in the city.

Security became very important, especially after the cyber-attack of 2007. So the government, in 2010, created a group of volunteers under the command of the Ministry of Defence called the Cyber Defence League. The Estonian Police and Border Guard also have their own Cyber Crimes Unit, which investigate and prosecute online criminal activity.

Estonia also created the Estonian Information System Authority (EISA) that existed to guarantee the cyber protection of all companies, public and private.

Also, the TTTÜ started to offer a master's degree in cybersecurity. An opportunity for companies to gain workers with the correct preparation.

Also, the European Parliament adopted a report by Tunne Kelam, an Estonian member of the European Parliament, calling for the development of a comprehensive cybersecurity and defence strategy on all levels in the EU.

"We need better co-ordination and more coherence. The EU is currently missing an exhaustive overview of the existing cybersecurity challenges and is also lacking common definitions, standards and a united approach to these threats. Politically motivated cyberattacks are targeting not only the information systems but also critical infrastructures of the member states."

Kelam argued that the new cyberwar will be crucial for the North Atlantic Alliance; nowadays it is not hard to give him the reason.



Conclusion

Estonia may be the **Silicon Valley** of Europe. The reforms and modernizations, thanks to an intelligent policy, have resulted in a stunning victory. Even so, it could be wrong to say that everything has become perfect.

The simplicity of the system has made it very fragile and Estonia, even if it has a very high quality of life and a big security, still is in the first line against Russia and that could easily become a problem if the NATO gets weakened.

Nevertheless, it can be agreed that it is a victory, just one that will be difficult to be preserved. The need of stability is crucial if Estonia will continue its digitalization. This could not be the case and if the system is tampered with, nothing will stop the Estonians from migrating to other countries like many are doing today.

But the question could be, is there anything to learn from Estonia?

The response is in the title: "*Tulevik*," an Estonian word that means both future and tomorrow. Having an eye on the future and being ready to start again could move a country towards modernization.

Important Actors

In a play, what is important is to have good actors that will make each scene flow correctly. All the modernization, especially in the economic area to Estonia, was created thanks to four main people, each one contributing to a different aspect. Mart Laar reformed the economy of Estonia after 45 years of socialism, Toomas Hendrik Ilves started the technological development that was followed by Andrus Ansip, who restored the economy during the crisis and finally Taavi Kotka, a software programmer who has been the author of most of the biggest renovations such as the E-Residency.

MART LAAR

Mart Laar was the first democratic prime minister of Estonia and the author of the Estonian economic development of the 1990s. He was born in Viljandi, studied philosophy at the University of Tartu and taught history at Tallinn, and he even wrote books about the Estonian resistance during the Soviet era.

He joined the Fatherland Union, a conservative party, which had opposition towards the Soviet Union. After the collapse, he became Prime Minister in 1992, when he was only 32 years old. In barely two years, from 1992 to 1994, the radical reforming of the Estonian government occurred. Mart Laar was the first in Europe to introduce the flat tax, privatized most national industry in transparent public tenders, abolished tariffs and subsidies, stabilized the economy, balanced the budget, and perhaps most crucially, restored the pre-war kroon and pegged it to the stable Deutsche mark. He based all this on the book *Free to Choose*, by Milton Friedman.

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He was expelled from office by a non-confidence motion in 1994 because of a gun trade with Israel, and his own party members took him out. He became Prime Minister again in 1999 and continued his liberal policies in order to enter his country to the European Union. He resigned in 2002. The last time he held any office was in 2011, when he was appointed as Defence Minister. Despite many scandals, he is considered one of the builders of modern Estonia. Nowadays, he is still in politics and writes books.

ANDRUS ANSIP

Andrus Ansip is an Estonian politician that served as Prime Minister from 2005 to 2014. He was born in Tartu in 1956 where he studied chemistry and served as mayor from 1998 to 2004 as head of the centre-right Reform Party. He became the Party's Chairman in 2004 after the resignation of the former leader.

The reason why Ansip is important is because of the ability of his government to solve the economic crisis and complete the digitalization of the government. In 2008, Estonia saw all the foreign investment return home because of the economic crisis. He even tried to maintain the level of the taxes but his cut on spending affected the society a lot in Estonia. Even so, as we have seen earlier, for 2013 things were being solved at a very high speed. The digitalization of the Government also was done during his administration, reducing more of the public spending as all the procedures were done by computer; for 2008, most of the country was online. His administration also took a more aggressive term with Russia that resulted in the 2007 cyber-attack. Nowadays, he is the European Commissioner for Digital Single Market.

TOOMAS HENRIK ILVES

Toomas Hendrik Ilves is a very international figure, maybe the most influential Estonian abroad. He was raised up in New Jersey as a son of two Estonian immigrants. He studied in the Universities of Columbia and Pennsylvania.

He worked in Munich as a journalist in the Free Europe Radio and after the independence of Estonia in 1991, he was appointed as Ambassador to the US. At that time he presented an idea for a plan that had the objective of modernizing the telecommunications of the country apart from connecting all institutions to the Internet. This plan was called the Tiigrihüpe, and the result of this plan has deeply changed Estonia. He also encouraged the creation of the e-Government Academy. He then served as Foreign Minister from 1996 to 2002.

He was elected President of the Republic in 2006 and served for the next ten years. His ability to deal with foreign leaders bestows him a high international status. This helped in 2007 when Russia performed a cyberattack against the Estonian government. Thanks to his relation with George W. Bush and with Anders Fogh Rasmussen, he was able to guarantee a hard response by NATO.

Ilves always tried to motivate the technological advance in Estonia. He encourages Ansip and Rõivas to continue

both with the E-Government and the E-Residency programmes. He is also considered the father of the Estonian E-State.

TAAVI KOTKA



Born in 1979, Taavi Kotka has been one of the biggest figures of the actuality in Estonia. He has been appointed many times by the Estonian government in order to do a series of projects that will take to the digitalization of the country. He started his own business called Webmedia, which later will be called Nortal. From 2000 to 2006, he was the Owner and Chief Development Officer of the company, and he became CEO from 2006 to 2011 and continued as Member of the Board until 2012, when he left the company. From 2013 to 2014 he made a Master of Science and Engineering at the Tallinn University of Technology.

During this time, Nortal had been collaborating with the government of Andrus Ansip in order to digitalize the government, in the so-called Country in the Cloud. He did all this while simultaneously working in Nortal. This is because many of the characteristics that Nortal offers are included in the Government's programmes.

The biggest moment for Kotka, independently from Nortal, was when the Government of Andrus Ansip started to prepare the new E-Residency. He became the Deputy Secretary-General of the Ministry of Economic Affairs and Communications, and Head of the Estonian E-Residency council. In 2014, he was appointed as Chief Information Officer. Since 2015, he is an advisor to Andrus Ansip in the European Commission, in Digital-Market issues.



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