ESTONIA

An enthusiastic proponent of digital sovereignty, which offers much to this highly digitised nation.

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Key issues in the Estonian debate on digital transformation

Since it achieved independence in 1991, Estonia has arguably become best known for its rapid digital transformation, which began with the 'Tiger Leap' programme in 1996. Launched by President Lennart Meri, this connected all schools to the Internet by the year 2000 and was combined with large government-backed investments in computer networks and infrastructure.[28] The culture of innovation resulted in Estonia being hailed as the 'world's most digital society' by Wired magazine in 2015.[29] Estonia became known for technology-based start-ups, with Skype, Taxify (now Bolt), and Transferwise becoming global brands.

Although other countries have since caught up with Estonia in terms of digital transformation, the country still ranks highly in the European Commission's Digital Economy and Society Index (DESI).[30] Most notably, Estonia ranks first in the digitisation of public services with over 99% of transactions with the government authorities available online, 24 hours a day. This is possible due to a national identification card, which is paired with a digital signature that has the same legal status as a hand signed written document. This enables Estonians to pay taxes, vote, conduct banking transactions and access their health records online. The advantages of this system is acknowledged by the population, with 95% of taxes filed online using information stored in a pre-filled form.[31] E-services are only unavailable for marriages, divorces and real estate transactions, although as a result of COVID-19, there is an initiative to conduct some of the initial procedural elements remotely as well.[32]

The introduction to the digital society starts at school with web applications enabling parents, teachers and students to collaborate and organise information. Teachers enter grades, attendance information, homework and message individual pupils or entire classes. This information is also accessible by parents who stay closely involved with their children's progress. Due to this technology, Estonia was able to quickly switch to remote learning during the COVID pandemic and as a result fared better than many other countries.[33] With a quarter of a century of digital innovation and a culture that constantly seeks to improve and modernise, Estonia is in a prime position to lead Europe's path to digital sovereignty.

Estonia's contribution to Europe's digital sovereignty

With a society already well aware of the benefits of digitalisation, Estonia has been quick to recognise and promote the advantages of European digital sovereignty. From a national perspective, the country will benefit significantly from more Europe-wide digital transactions. As a small nation of only 1.3 million situated on the north-eastern edge of Europe, Estonia is disadvantaged in several ways. Although space for manufacturing industries is plentiful, geographically long supply chains and limited personnel resources provide unfavourable conditions when competing in traditional markets against other central European countries. With time and space constraints not an issue in the supply of digital services, Estonia is in a prime position to exploit the opportunities presented by greater European digital sovereignty.

Keen to increase the progress towards what has been termed a 'digital single market', in March 2021, the Prime Minister of Estonia joined Heads of State of Finland, Denmark and Germany in writing a joint letter to the President of the European Commission. Highlighting that Europe is falling behind its international competitors, the letter emphasised the advantages of greater digital transformation. Drawing parallels to the established norms in the trade of physical goods between nations,

the Prime Ministers emphasised the need for digital policies involving governments, society, and the economy.[34] With its co-signatories, Estonia highlighted three key steps to strengthen the EU's digital sovereignty. First is to identify the critical technologies and strategic sectors that will clarify the EU's strengths and weaknesses in the digital environment. Secondly, the EU must strengthen its approach to critical technologies and strategic sectors. This requires open markets and supply chains to prevent dependencies on single suppliers. Finally, the leaders noted the need for a monitoring system that should be permanent, repetitive, and based on social, scientific, and economic principles. This would encourage innovation and development in order to ensure European sovereignty, security, and competitiveness in the development of digital technologies.[35]

At the same time that the Estonian Prime Minister signed the joint letter to Ursula von der Leyen, the EU itself presented a vision for its digital transformation by 2030.[36] Termed the 'digital compass' due to its four components (Skills, Government, Infrastructures and Business), the Tallinn government has been a strong supporter of its proposals as they already align with Estonia's own digital ambitions. The first aim of the EU's vision is an increase in Information Communication Technology (ICT) specialists and to ensure that a minimum of 80% of the population have basic digital skills. Estonia has had a programme to attract more young people into ICT running since 2012. Termed the 'ProgeTiger', this programme aims to improve the technological literacy and digital competencies of teachers and younger students. Courses available include robotics, 3D technology and programming with pre-schoolers learning the basics of coding.[37] Familiarity in all forms of ICT is encouraged, with increasing emphasis on cybersecurity a feature of more recent programmes.

The second component of the digital compass is having secure and sustainable digital infrastructures. This is a particularly important issue for Estonia, which has fallen behind its competitors in this area. Although the DESI report indicated that Estonia has more than 120 mobile subscriptions per 100 people, the introduction of 5G technology is lagging. While some European cities already have deployed the technology, Estonia's 5G roadmap seeks to introduce the capability by 2023.[38] The same is true to a certain extent in the introduction of Gigabit internet speeds. Despite having almost universal Internet access, Estonia's low population density outside of the main cities has resulted in a reduced programme of network upgrades in the countryside. In 2020 the country was only rated as 47th in the world in terms of fixed broadband speeds.[39] This factor may also explain the state of digital transformation of some of Estonia's businesses. The digital compass refers specifically to EU companies using so called 'cloud' services as well as Artificial Intelligence (AI) and the use of 'Big Data'. However, the DESI report noted a 'relative weakness' as regards connectivity and the digitisation of Estonia's businesses, hindered perhaps by the lack of high-speed services.[40] The final component of the digital compass is the digitalisation of public services in which Estonia excels. In a June 2021 meeting of EU telecommunication ministers, the Estonian minister of entrepreneurship and IT commented on the use of digital services across Europe. He stated that the digital services of EU Member States must be made available to all European citizens – a principle at the heart of digital sovereignty.[41] Significantly, he also emphasised that digitisation is not a goal in itself but creates practical solutions and added value from which businesses and citizens will benefit. Supporting this view, the European Commission also introduced its own vision for the newly announced European Digital Identity. This will enable EU citizens in one country to access the same e-services that are available to other European nationals and vice versa.

Of particular relevance to Estonia's contribution to Europe's Digital Sovereignty programme is the European Commission's recently presented framework for a trusted and secure digital identity for all Europeans.

This includes the provision of a digital wallet for Member States' citizens and businesses. This will enable the digital identification to be linked to other forms of identification and facilitate the switch from paper documents to digital ones. As the intention is for the digital wallet to be built on existing digital identities issued by Member States, Estonia's own ID cards and electronic ID solutions would not be replaced. Instead, all states would be obliged to make their own compatible digital forms of identification available to their citizens. To assist with this aspect of digital sovereignty, Estonia has unique experience and capability in the form of the 'X-tee'. This system is at the heart of Estonia's digital society and is based on the premise that data is only stored once in a single location at its point of creation. When needed, other approved agencies can access the data without having to download or create their own versions, which could then become outdated if the original data changes.

Estonia's X-tee environment includes the full range of public and government services with each having its own information system connected to the network. Currently there are nearly 3000 different services that can be used by the X-tee and in 2020 over 1.5 billion data requests were made.[42] To ensure that all transactions are secure, outgoing data is digitally signed and encrypted and incoming data is authenticated and logged. As well as enabling citizen to readily access public services, it also provides a high level of trust in the system. This is because all users are able to identify which agencies have accessed their personal data. Although the X-tee is currently only used by a small number of countries, it is an ideal system to support the EU's wider data sharing aspirations. This is due to its compatibility with multiple types of information systems, its ability to transmit large data sets, and its capability to perform searches across several information systems simultaneously.[43] The X-tee software was designed to be scaled up as new e-services and platforms become available, as multiple instances can be federated. Members of federated systems can publish and consume services with each

other as if they were members of the same ecosystem. This enables easy and secure cross-border data exchange between these networks and ecosystems.

Finally, no discussion of digital sovereignty can be complete without including another unique Estonian contribution - that of the Data Embassy. This is an extension of the government's network infrastructure, but the server resources are located outside the country's territorial boundary and is protected at the highest accreditation level for data facilities.[44] In June 2017, the governments of Estonia and Luxembourg entered into a bilateral agreement in which Estonian data and associated systems were to be stored in Luxembourg's government-owned data centre.[45] Luxembourg was chosen as the first data embassy location because of its facilities and willingness to enter into what was then a new concept in national security. By protecting essential national data that is only available in digital form, this initiative mitigates the risk of loss due to natural disaster or cyber, terrorist, or military attack. As this is not an embassy in the traditional diplomatic sense, it is a completely new concept under international law, but does take into account the Vienna Convention on Diplomatic Relations. This includes having the same rights as physical embassies, such as diplomatic immunity from interference. Based on this model, a future component of Europe's digital sovereignty could be leveraging further bilateral relationships to increase the community's data resilience through the use of data embassies.

Conclusions

Estonia was one of the first nations to embrace digital transformation and the country has reaped the economic and social benefits of the progress that has been made. Estonia's transformation was the result of both the foresight of its leaders and a population willing to accept the surrender of their personal data in return for improved public services. Europe's own digital sovereignty will need similar inspired leadership, particularly as countries that are

more reluctant to transform may require some persuasion. Estonia is rightly proud of its digital society and is keen to export its knowledge and technology to the rest of the EU as part of its programme of digital sovereignty. A digitally sovereign EU will lay the framework for increased economic growth, reduced bureaucracy and a more convenient and secure form of data exchange. A commonly recognised form of digital identification will reduce cross-border crime and illegal migration as well as improve access to time sensitive services such as in medical facilities.

A more connected Europe will bring potential benefits to Estonia as a digital free market will enable data driven services to be marketed throughout the community. Thus, any initiative to encourage and promote European digital sovereignty is one that will be fully supported by the Estonian Government. As a leading digitised nation, Estonia can expect to enhance its reputation as a digital nation by providing advice and it will benefit from a wider implementation of digital services. However, for European digital sovereignty to be widely accepted, it must be trusted by its citizens. This requires confidence that personal data will not be abused by official authorities and that it cannot be accessed or interfered with by unauthorised parties. As such, Europe's digital democracy cannot be rushed and should be sufficiently funded in its implementation, while security concerns must be foremost in the considerations of its developers. A single data breach, poor configuration incident or successful cyber-attack by a state actor or criminal group may cause an irrevocable loss of trust. However, achieved properly, a combination of the European Commission's policy directives, with Estonia's experience and technology, bodes well for the future digital sovereignty of the EU.

Endnotes

28. *Global lessons from Estonia's tech-savvy government*, Mari Roonemaa, UNESCO, https://en.unesco.org/courier/2017-april-june/global-lessons-estonia-s-tech-savvy-government

29. *Concerned about Brexit? Why not become an e-resident of Estonia*, Ben Hammersley, *Wired*, https://www.wired.co.uk/article/estonia-e-resident

30. *The Digital Economy and Society Index (DESI)*, European Commission, https://digital-strategy.ec.europa.eu/en/policies/desi

31. *Digital Estonia – Leading Digital Society in the World*, Estonian Convention Bureau, https://www.ecb.ee/destination/digital-estonia-leading-digital-society-in-the-world/

32. *State wants to move marriages, divorces online*, Roberta Vaino, *ERR*, https://news.err.ee/1608138256/state-wants-to-move-marriages-divorces-online

33. *Estonia offers an ideal example of Remote Learning*, Abe Post-Hyatt, Veriff, https://www.veriff.com/blog/estonia-can-teach-a-lesson-in-remote-learning

34. *Estonia, EU countries propose faster 'European digital sovereignty*, Helen Wright, *ERR*, https://news.err.ee/1608127618/estonia-eu-countries-propose-faster-european-digital-sovereignty

35. *The Heads of Government of Germany, Denmark, Estonia and Finland: Europe's digital sovereignty gives us the ability to determine our own future*, Estonia Government Communications Office, https://valitsus.ee/uudised/saksamaa-taani-eesti-ja-soome-valitsusjuhid-euroopa-digitaalne-suveraansus-tagab-meile

36. *Europe's Digital Decade: digital targets for 2030*, European Commission, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

37. *ProgeTiger – Estonian way to create interest in technology*, Education Estonia, https://www.educationestonia.org/progetiger/

38. *Eesti 5 g Teekaart*, Estonian Ministry of Economic Affairs and Communications, https://www.mkm.ee/sites/default/files/eesti_5g_teekaart.pdf

39. *E-state Estonia has some of the slowest internets in Europe*, Sten Hankewitz, *Estonian World*, https://estonianworld.com/technology/index-e-state-estonia-has-some-of-the-slowest-internets-in-europe/

40. *The Digital Economy and Society Index (DESI)*, European Commission, https://digital-strategy.ec.europa.eu/en/policies/desi p.14

41. *Estonian minister: Digital services must be made available to all EU citizens, The Baltic Times*, https://www.baltictimes.com/estonian_minister__digital_services_must_be_made_available_to_all_eu_citizens/

42. *X-tee factsheet*, X-tee, https://www.x-tee.ee/factsheets/EE/#eng

43. *Data Exchange Layer X-tee: How does X-tee work?*, Republic of Estonia Information System Authority, https://www.ria.ee/en/state-information-system/x-tee.html

44. *Data embassy*, e-estonia, https://e-estonia.com/solutions/e-governance/data-embassy/

45. *Case Study: The world's first data embassy– Estonia*, OECD, https://www.oecd.org/gov/innovative-government/Estonia-case-study-UAE-report-2018.pdf