

e-Estonia

What will the future of a digitised society be?

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Summary

When Estonia started building its information society at the end of the 1990s, 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. Two decades later, the country has one of the most advanced e-governments in the world, where more than 90% of public information is managed in digital form and most public services, ranging from pet registration, to medical prescriptions, and property ownership, are delivered in a “digital by default” manner. However, with such widespread digitisation of a society comes the responsibility to ensure that the vast amount of digital information being gathered on a daily basis continues to be available for decades to come in a secure, trusted and sustainable manner.

This paper provides an overview of the origins and core aspects of the e-government approach in Estonia, and the effect it has had on the lives of ordinary people. Based on this introduction the paper discusses future challenges in regard to the long-term availability, trust and security of an extensive e-government.

Key words: e-government, long-term availability, Estonia, no-legacy, once-only

Introduction

Named ‘the most advanced digital society in the world’ by Wired¹, Estonia benefits from an advanced e-government ecosystem which is efficient, saves time and money and provides its citizens with hundreds of seamless and easy to use electronic services covering most of their needs, ranging from registering their pets to dispensing medical prescriptions.

The success story began in the late 1990s. Estonia had only recently gained its independence from the Soviet Union, and the young country’s economy was barely able to manage itself. Furthermore, Estonia is one of the least densely populated countries in Europe with just about 1.35 million people living in

¹ <http://www.wired.co.uk/article/estonia-e-resident>, last visited 16.10.2017

roughly the same land area as Switzerland or the Netherlands. As the 1990s saw also the emergence of the internet boom, the nation's government made a conscious decision to prioritise the digitisation of its processes. Following these political decisions, the early 2000s saw the creation of Estonia's national interoperability requirements, and the according X-Road infrastructure², and the establishment of the national digital identification and e-signature framework. These two core components facilitated the development of a huge ecosystem of interoperable institutional information systems over the next few years. To date there are about 500 information systems connected to the X-Road, collectively offering businesses, citizens and the government more than 5,000 digital services (including around 850 web services for citizens and businesses from the central access portal eesti.ee). In total, more than 99% of public services are currently being offered online, most of which in a 'digital-by-default' manner. To name just some additional facts, Estonia was the first country in the world to introduce nationwide digital elections (2005), 98% of companies in Estonia are established, 99% of banking transactions are carried out and 95% of tax declarations are filed online.

Of course, such widespread digitisation and interoperability requires that careful attention is paid to digital literacy and security. In parallel to developing the digital infrastructure Estonia has concentrated on widespread education initiatives for all age groups, and has developed some of the most rigorous security mechanisms in its public-sector operations. For example, Estonia was one of the first countries to introduce hash chain based security mechanisms on some of the most sensitive data (2008). In addition, the country is currently implementing a nationwide 'no-legacy' policy, meaning that no IT component in active use should be older than 13 years, helping to ensure that all security mechanisms are always up to date.

e-Government sustainability issues

As mentioned above, much of the extensive digital infrastructure in Estonia was developed about 15–20 years ago. This means that, by implementing the 'no-legacy' policy, most of the core components have gone through two or three migrations into newer generations of technology, and the first issues in regard to long-term sustainability are becoming apparent.

Most significantly, the leading way of thinking in IT development in the early 2000's was the so-called 'technology first' approach. This means that information systems were developed with a focus on the effective implementation of available technological components, rendering questions around information lifecycle (including retention, destruction, long-term accessibility and usability of data) of secondary importance or giving them no thought at all. In practice, this has led in a number of cases to the development of information systems

² <https://e-estonia.com/solutions/interoperability-services/x-road/> (last visited 16.10. 2017)

where much of the data was only usable with the help of complex programmed logic, specific to a given technological platform and/or version. This approach was reinforced by the perception of ‘storage is cheap’, with the effect that it was common to develop systems which allowed for the constant addition and creation of new information, and had almost no reasonable means to export or delete data in a controlled manner.

These assumptions and approaches were certainly reasonable and justified in their day, as they allowed for the quick development of new state-of-the-art services and there were hardly any best-practices or scientific research available to prove the contrary. However, it has become clear that, particularly as regards the embedding and accumulation of data into specific software components, this approach presents significant issues. First, and most obviously, is the difficulty of migration. If data is highly dependent on its underlying software platform, the migration of the data into newer platforms can become extremely difficult and costly, as there is the need to re-programme much of the original logic. It has also become clear that data structures cannot be relied upon to be constant over time but, rather, their semantics and syntax evolve along with the evolution of thinking around service provision, data collection and reuse, and with the fresh opportunities offered by innovative new software platforms. The net effect is that in the long run, any act of technology refreshment includes the need to take into account that the system includes data originating from different eras in terms of data semantics and structures, resulting in a situation where an ever larger amount of resources must be spent on data migration. In the worst cases, this means that available funding will only cover the data migration exercise and will not stretch to the research and development of more effective service models. Looking decades ahead, we can predict with some certainty that, through numerous ‘semantic translations’ so much of the original context of some older data will be lost, that the data itself will become virtually unusable.

Road towards a long-term e-Government

Given the grim outlook voiced in the previous section one might question whether it is reasonable to undertake digital transformation at all? The unequivocal answer in the Estonian case is, yes. The main reason for this claim is that the general public has become so accustomed to the availability of seamless services delivered straight to their computers or mobile phones. There is also no denying, that despite the issues raised above, in general the digitisation of public processes has greatly benefitted the transparency and efficiency of the government, with some reports claiming an annual save of 800 working years thanks to the use of digital³.

However, we cannot ignore the problems which we are facing presently, and we must find appropriate and cost-effective solutions.

³ <https://e-estonia.com/solutions/e-governance/> (last visited 16.10.2017)

One of the most important aspects of the journey towards long-term e-governance is a change in how we think about technology and its evolution. In short, we need to embrace change and see it as natural, rather than something to be resisted. We also need to understand that change is not only something happening right now, but is something that will continue to happen in the future. In terms of e-government longevity, we have to take into account that, even if we have already identified the problems associated with previous technology generations, we need to understand that there are potentially many other issues which we do not yet know about embedded into the platforms we implement today. The implication of this is that anybody who is serious about managing their processes digitally in long-term needs to make sure that service development and delivery is not only managed by IT, but must also include an understanding and discussion around data and service lifecycles. This realisation was ‘made official’ in Estonia in 2017, when a new government regulation⁴ was issued to make agencies responsible for assigning a ‘chief information governance officer’ (CIGO) next to the more regular data protection officers and CIOs. Furthermore, the regulation describes a set of measures which public authorities can use in order to closely monitor and proactively manage their service portfolio. Another, more technical, aspect is the change in the way how IT is thinking about system development. A growing number of projects take a ‘data-first’ approach, meaning that the core focus in system development is data standardisation and interoperability, and that any given technological component is just a temporary solution in order to deliver services, keep information secure and well managed in the current point in time. Though many of the practical details of implementing such an approach remain to be discussed and tested to date, first examples of ‘data-first’ system implementations seem promising.

Finally, it is worth mentioning that the e-government issues outlined above have also changed how public sector digital archives are perceived and have to be implemented. While archives are, and will continue to be, the guardians of most important aspects of documented cultural heritage there is also a growing importance in digital archives as the knowledge centres for digital longevity issues. For example, the digital archives of the National Archives of Estonia has for the last ten years been actively involved formal groups working with principles for information governance, IT design and interoperability frameworks. Additionally, national archives has the mandate to review any newly proposed system development or update in the public sector in order to make sure that individual information systems are also considering and implementing methods for data retention, destruction and/or export.

In more practical terms digital archives are increasingly taking on the role of not only providing tools and specifications for information of archival value, but

⁴ Principles for Managing Services and Governing Information, <https://www.riigiteataja.ee/en/eli/507072017004/consolide>

also for keeping long-term valuable information within agencies. For example, since 2012 the National Archives of Estonia has the legal mandate to offer agencies a ‘digital deposit service’, which allows public agencies to transfer their legacy data to the safe long-term storage of the national archives, therefore reducing the amount of data kept in live information systems, and ultimately significantly reducing the cost of technological migrations following the ‘no-legacy’ principle.

Conclusion

The establishment of a digital ecosystem can provide great benefits to the efficiency and transparency of a state, but at the same time presents also many problems in regard to the cost and complexity of keeping the ecosystem available and evolving through extended periods of time. In the case of Estonia, where extensive digital transformation began in early 2000s, the first of these issues are starting to be recognised.

Though there is still a lot of ground to cover it is worth mentioning that the country is going through a transition where systems and digital services are not only delivered for the ‘now’ but aspects of information lifecycle management are also taken into account. Based on the Estonian experience, any long-term sustainable e-government has to make sure that overall system design and development takes place in close cooperation between IT and information governance specialists, with significant input from digital archiving specialists.