

eGovernance and Online Service Delivery in Estonia

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ABSTRACT

Estonia's use of Information Communication Technology (ICT) in the public sector is regularly highlighted as an innovative model worth emulating. Despite this, research into the Estonian governance and inter-governmental cooperation model is limited, with most being 5-10 years old. In addition, recent literature reviews point to a limited understanding of technology use in public service delivery and the role played by governance, inter-governmental decision making and cooperation when introducing ICT solutions and online services to citizens.

As part of a larger qualitative, multi-country comparison, this article analyses the Estonian approach to electronic governance (eGovernance) and inter-governmental cooperation. Initial findings highlight the strength of the Estonian tradition of politically driven and motivated public sector modernisation, a consensus seeking and inter-governmental approach to eGovernment, trust between actors, the role of informal networks and cooperation with the private sector. The Estonian case thus supports academic arguments in favour of a strong eGovernance model and a high level of inter-governmental cooperation and decision making. While successful in relation to ICT infrastructure, standards, roll-out to key enablers and internet voting (iVoting), the article highlights the potential benefits of formalising informal networks and streamline the governance model to minimize the risk of failure if consensus cannot be reached, if personal and institutional capacities and contacts does not exist.

CCS Concepts

• Information systems

Keywords

eGovernance; eGovernment; eService; use; inter-governmental corporation; evaluation; Estonia

1. INTRODUCTION

Two images are often associated with Estonia: pictures of the picturesque capital of Tallinn and articles on the innovative use of ICT (Information Communication Technology) in public administration. From internet voting (iVote), broadband access and government IT infrastructure, tech savvy business, innovation and the ability of non-Estonian residents to be electronic residents and set up their businesses in less than five minutes online, the ICT

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successes are many. But how has a small middle income country in northern Europe seemingly succeeded where others have not?

From public administration (PA) [1-6], to information systems (IS) management [2, 3, 7-10], to electronic government and governance (eGovernment and eGovernance) [11-16], academics have highlight the failures of IT and technology use in the public sector. Mistakes include blindly digitising current processes [13, 16, 17], focusing on technology and supply [18-20] rather than value-adding outcome and impact of ICT [4, 21, 22] – not only in relation to IT and technology use in public administration but even more so in relation to online services (eService) for citizens [20, 23].

Since the late 1990s, the so-called stage and maturity models have been the primary focus and tool for academic, private sector consultants and international organisations in assessing the relative success of countries in eGovernment and online public service delivery. Multiple authors – including Meyerhoff Nielsen's 2016 review of public sector reform, IT governance, and eGovernment literature [23] – finds that the current maturity models only address supply-side and technology issues, but do not fully understand public service delivery and production, and only a few organisational issues. Similarly, the maturity models and current research do not adequately address the role of governance and cooperation in ensuring the successful supply and use of online eServices. [8, 20, 23-25].

In fact, front-office service provision and back-office integration are mixed-up in numerous maturity models. One-stop shop portals do not constitute a form of transaction, but are an indicator of the degree in which authorities cooperate and integration in the provision and production of services via a portal [20, 23]. Heeks attempt to address this by proposing a two-dimensional matrix model distinguishing between the front- and the back-office [26]. Unfortunately, Heeks does not account for eGovernance or take-up [25].

Similarly, none of the analysed maturity models addresses governance directly [23, 25]. Davison [27], Iribarren et. al. [8], Janowski [28], Kalambokis et. al. [29], Shareef et. al. [30] and Waseda [31] models highlight management and coordination issues, such as the existence of chief information officers (CIO). Cooperation, on the other hand, is indirectly addressed in most models. This is manifested in terms of vertical and horizontal integration, and the existence of one-stop shops, the sharing of information and data between different authorities and levels of government – even private and third party stakeholders [25, 32, 33].

There is therefore a need to look at eGovernance and inter-governmental cooperation in isolation from the mechanisms of public service delivery and how ICT is used in this regard. While *eGovernment* refers to “the use of ICT and its application by government for the provision of information and public services to the people” [34], *eGovernance* comprises the processes of governing, whether undertaken by a government, market forces, social networks (e.g., families, tribes, professionals), formal or informal organisations, a geographical territory, or via laws, norms,

power, or language [34]. Thus, *eGovernance* refers to the governing bodies responsible for the successful introduction of eGovernment solutions like online public services. By comparison, *cooperation* refers to activities engaged by various parties toward a shared purpose.

To cast light on the role of eGovernance and inter-governmental cooperation in the successful supply and citizen use of eServices, this article presents and analyses the often mentioned and influential Estonian case. The aim is two-fold: to *identify the Estonian features and lessons learned in relation to the role of eGovernance and inter-governmental cooperation* and to *add the Estonian lessons to a future cross-country comparison*.

The article is structured as follows: the methodology and conceptual framework for the case is outlined (section 2), the Estonian context and case is presented in relation to the conceptual framework including background indicators and preconditions (section 3), the national approach to governance, cooperation model and eGovernment (section 4), key enablers and services in place, effect measurements and achievements (section 5), before the discussion and conclusions are presented (section 6).

2. METHODOLOGY

To address the research gaps in relation to eGovernance and inter-governmental cooperation [23], a classical exploratory, qualitative, multi-country case study methodology framework [35-37] is applied to enable a with-in case analysis.

An adapted version of Krimmer's context, content, process model (CCP model) [28] is used as it provides a framework for the individual cases across four relevant macro-dimensions: Background socio-economic indicators (section 3.1) and ICT related pre-conditions (section 3.2); national governance and cooperation model (section 4.1); national approach to eGovernance and eGovernment (section 4.2); and effect measurements (section 5). Each dimension explains a key area that influences processes, choices and outcomes in relation to eService supply and take-up. Using the framework for the with-in case analysis help isolate the eGovernance and inter-governmental cooperation mechanisms in play and to draw out specific aspects and lessons.

The consistent application of the conceptual framework across multiple cases allows for the future cross-country comparison to determine the correlation (i.e., the more of Y, the more X) between a strong cooperative eGovernance model (cause) and the introduction of online services (effect 1) and subsequent citizen use of the online service delivery channel (effect 2).

Using the conceptual framework, this article identifies Estonia's respective strengths and weaknesses in relation to the country's approach to eGovernance and its eGovernment experiences since 1991, but with a particular focus on the period since 2010.

Estonia has been chosen for three main reasons: it is an often cited and is an influential example of successful government use of ICT and online public service delivery; it is a small, centralized, middle-income country complementing the Faroese [38], Danish [39], Georgian [40], and Japanese cases [41] analysed by the author, but is also a relatively under-analysed governance model [35, 37, 42].

Primary sources used include relevant academic literature and international references from EU and OECD, relevant policy documents, national and international statistical sources, e.g. Eurostat [43] and International Telecommunications Union (ITU) [44] and UNDESA's eGovernment Readiness Index [34, 45, 46].

3. BACKGROUND

As a result of history and culture, countries operate in different contexts and offer different perspectives and experience when it comes to online service provision for citizens. Similarly, population size, income levels, administrative systems and complexity of these systems varies. It is therefore important to put things in context.

3.1 Socio-economic background

Estonia is, in socio-economic terms, a small and sparsely populated country. While an OECD member – the first former communist country to gain membership – it is a middle-income country. Estonia is an open-export orientated economy with productivity and GDP growth and a start-up mentality. Considered a nation state with a strong identity, Estonia also has a large Russian-speaking minority and an ageing population (due to immigration and low birthrates) [47]. For details see key statistics in Table 1.

Table 1. Key socio-economic statistics 2016 [47]

Population	1,258,545 (July 2016 est.)
Territorial size	1.399 km ²
Population density	34 per km ²
Official languages	Estonian
Ethnic groups	Estonian 68.7%, Russian 24.8%, Ukrainian 1.7%, Belarusian 1%, Finn 0.6%, other 1.6%, unspecified 1.6% (2011 est.)
Median age and life expectancy	42.4 and 76.7 years
Population growth	-0.54%
Urbanization	67.5%
GDP 2015 (est.)	€ 35.64 billion
GDP per capita 2015 (est.)	€ 25,433.46
Unemployment 2015 (est.)	6.2%
Imports 2015 (est.)	€ 12.52 billion
Exports 2015 (est.)	€ 11.62 billion

3.2 Internet access and use

For online service delivery to succeed, internet access and a minimum level of digital literacy and competences are essential pre-conditions. As an indicator of the level of digital literacy, the actual use of the internet, online banking and shopping sites are used (eBanking and eCommerce, respectively). To put Estonia in context, average for the EU's 28 member states is include in Table 2.

Table 2. Individual and household access to, and use of the internet, 2010-2016, selected years (EU28 country average in brackets) [43]

	2010	2013	2016
Household internet access	67% (70%)	79% (79%)	85% (86%)
Individual with mobile internet	33% (21%) (2011 data)	33% (24%)	26% (27%)

Individual using the internet (at least once a week)	71% (65%)	77% (72%)	85% (79%)
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Data shows that the vast majority of Estonian households choose to pay for internet access and that most Estonians are online almost daily. The key pre-conditions for introduction online government services and citizens subsequent use of them therefore exist in Estonia.

4. eGOVERNMENT AND GOVERNANCE

Public sector use of ICT has been actively pursued in Estonia since independence in 1991. A political willingness to innovate, work with the private sector and transform the public sector has been key [48-51]. The strategic focus and governance model in place is therefore helpful for understanding the Estonian context and eGovernment outcomes.

4.1 Strategic focus since 1991

The Estonian eGovernment focus has consistently focused on five core areas. The first two, infrastructure such as affordable internet availability and digital literacy are essentially preconditions for any form of large scale digital transformation, information society and digital economy. The next three includes: electronic identification (eID), which contains the secure authentication of users by digital certificates embedded in ID or SIM cards; digital information covers information systems and databases at all levels of government, and lastly the formalized exchange of content through the X-road data exchange service layer for connected databases [52, 53]. Over time the importance and strategic emphasis has naturally shifted, as described in Table 3.

Table 3. eGovernment in Estonia, 1998-2020 [52-55]

1998-2003 Principles of the Estonian Information Policy	The first eGovernment strategy focus on the: promotion and entrenchment of democracy, development and roll-out government ICT infrastructure; increase competitiveness esp. through de-monopolisation; increase the speed post-Soviet property restitution, develop eCommerce and eBanking; sustaining Estonian culture and language, and; improve State defence utilising ICTs.
2004-2006 Estonian Information Society	Aligned to the EU Europe 2002 and 2005 action plans the objectives incl.: introduction and promotion of citizen, business and intra-government eServices; roll-out of ID-card (incl. eID); promote internet access and use through training (incl. reaching EU average, 1 PC per 20 students in schools); increase public sector productivity through ICT (incl. document management and archiving, improved registries and data, launch of X-road); economic growth and export capacity of the ICT sector; promote ICT security, and; international promotion and improved “eGovernment position”.
2007-2013 Estonian Information	Closely aligned to the EU i2010 eGovernment Action Plan the focus is on infrastructure underpinning the

Society Strategy 2013	promotion of a knowledge-based society and economy. Objectives incl.: multi-channel service delivery, WCAG compliance of government websites, more transparent and user-centric eService’s; improve digital literacy with 70% of Estonians using the internet; 80% user satisfaction for citizens and 95% for business; 15% of GDP is generated by the ICT sector and productivity levels are at least 75% of the EU average. Separate broadband and cyber security strategies were launched in 2011 and 2012 respectively, as well as for local government (2008-2011), a programme for increased awareness (2007-2011)
2014-2020 Digital Agenda: Estonian Information Society Strategy	Focus on: smart solutions and enabling infrastructure such as, 100mb per second internet country wide; 60% of Estonians use the internet daily; 20% of the population use eID/eSignature; update eService usability standards and uniformity across government; provide technical and organisational infrastructure for citizens to use and control their personal data; increase cross-border cooperation on data exchange, eID, eSignature etc.; promote eResidency, and; improve policy and decision making framework. Health care (2014-2020), education, business environment and cyber security (2014-2017) are set out in other strategies.

Policy wise, Estonia is an early mover, launching its first eGovernment related strategy in 1998. Related eGovernment legislation is found to be introduced neither earlier nor in a distinctly different form or quality than other central and eastern-European countries [48-50, 56]. The initial strategies are closely aligned to the 2000 Lisbon Agenda and EU policies aiming to make Europe the most competitive knowledge and information society in the world by 2010. The focus has very much been on infrastructure roll-out, key enablers and use including broadband access, digital literacy, backend IT systems, eID, eSignature, iVoting and the supply of online services. Since 2014, the use of eServices and user-centricity, artificial intelligence, data and once-only principles, eParticipation and the governance model – all have traditionally received relatively little strategic attention – are in focus.

Historically, Estonia has spent a minimum of 1% of the annual budget on ICT and information society related activities [48, 51]. More than €62.6 million were spend in the period 2007-2013 and €200+ million is expected for the Digital Agenda 2014-2020 [52, 55]. Interestingly, an estimated 85% of government spending on ICT comes from EU Structural Funds [52]. The use of EU funding as provided the necessary investments by an otherwise cash strapped government, especially in the first decade of post-Soviet independence. The use of EU funds is possible due to the close alignment between European and Estonian strategic objectives in the eGovernment. The strategic alignment of early strategies to EU policies is a natural consequence of the 1991 independence from the Soviet Union, the political drive for an ICT supported modernization of the public administration, facilitating growth in

an already established technology sector and promise of future EU membership [48, 49, 51].

The Estonian strategic focus on infrastructure roll-out, accessibility, digital literacy, standards, key enablers, backend systems, and subsequently eService supply and subsequently take-up reflects similar patters seen in Europe, the former Soviet Union and beyond (albeit at different pace) [34, 41, 45, 46, 53, 57-60].

4.2 Governance model and institutional framework

Estonia is in many ways a small and highly centralized country. The central government institutions are few and provide most public services for citizens. The country has no regions as such, and its counties do not provide any citizen services of note. Except the four main urban centers (Tallinn, Tartu, Narva and Pärnu), local authorities have limited capacities and provide only a few services. This is not expected to change despite the 2017 structural reform of local government, which will merge 183 rural municipalities, often with less than 3,000 inhabitants, and 30 city municipalities. While the guided minimum is 5,000 but ideally 11,000 inhabitants [61] the new municipalities will continue to have limited financial and human resources to provide more than limited portfolio of citizen services, let alone any number of online services. Table 4 summarises the general approach to public service delivery in Estonia.

Table 4. General governance and institutional framework [53, 54, 62]

	Estonia
National institutional framework and governance	Centralized. Small size of country, service delivery and ICT related issues concentration on a few key national ministries and agencies. High number of municipalities with limited service delivery capacities.
Decentralisation of government authority	Limited, due to small size of country, high number of municipalities with limited capacities.

Like governance in general, Estonia’s approach to ICT reflects the country’s context, experience and public sector capacities, including decision making processes, the degree of cooperation between authorities and different levels of government, the private sector, civil society and research community.

Politically, Estonian policy has since 1991 been dominated by a center-right laissez-faire attitude to the role of government and public finances, but simultaneously been influenced by the Nordic approach and welfare model. The result has been a relatively small public administration, a focus on public private partnerships, outsourcing, a high level of fluidity between the public and private spheres, consensus seeking and a high level of trust [48, 49, 51].

Historically, policies, strategies, action plans and institutionalized processes have often been fragmented or lacking. Focus has been on implementation rather than on formal processes or system documentations – exemplified the overly complex pre-2014 eGovernance organigram in Figure 1 [49, 54, 62]. The success of Estonia has been based on the political vision and willingness to innovate, replace legacy systems, scrap old processes and legislation. This has been facilitated by the informal networks, personal contacts and trust which characterize Estonia’s public sector [49-51].

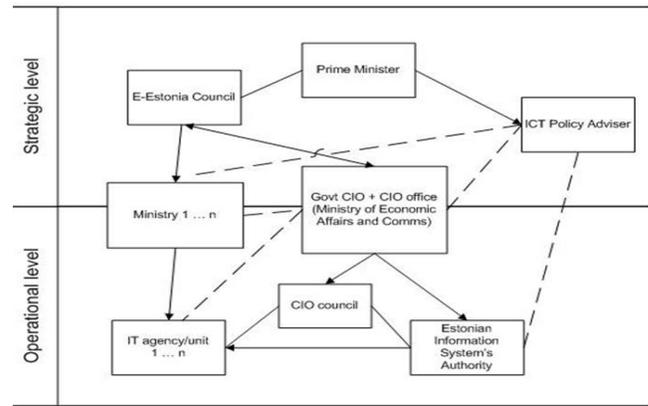


Figure 1. Pre-2014 eGovernance and coordination model [63]

(Note: Full and broken lines represent formal and informal network structures, respectively)

Table 5 summaries the Estonia approach to ICT and its governance set-up introduced with the 2014-2020 Digital Agenda.

Table 5. eGovernance and cooperation actors and responsibilities [52-54, 64]

	Estonia
Responsible authority for eGovernment strategy	On the strategic level, the Information Society Council (ISC) (sometimes known as the e-Estonia Council) is chaired by the Prime Minister and provides the strategic vision, direction and overall horizontal and vertical coordination. On the operational level, the Ministry of Economic Affairs and Communication (MKM) is the mandated and regulatory authority, with a dedicated Department of State Information Systems (RISO) for initiating, coordination, monitoring and auditing the strategy. The national (e)government CIO and office is also housed in the MKM.
Responsible authority for action plan	On the strategic and operational level, MKM and RISO is responsible for initiate, drafting, coordinating and monitoring the action plan, but is accountable to the ISC for strategic direction and horizontal coordination (if so required). MKM/RISO is supported by thematic work groups and networks which are formed to coordinate individual action plan initiatives on a daily basis (in line ministries etc.).
Responsible authority for initiating and coordinating new eGov strategies and action plans	MKM and RISO is responsible and mandated to initiate and coordinate new strategies and action plans but must follow the direction given by the ISC. MKM/RISO is supported by thematic work groups and networks which are formed to coordinate individual action plan initiatives daily (in line ministries etc.).

Chairperson organisation	Prime Minister chair the ISC and is supported by the vice-chair, the Minister for MKM.
Hosting organisation and secretariat	Prime Minister's office, supported by MKM/RISO.
Member organizations	Prime Minister's Office, MKM, national CIO, Ministers of Entrepreneurship, Minister of Education and Research, Minister of Public Administration, Estonian Association of IT and Telecommunication. Other ministers and representatives invited if relevant.
National governance and cooperation model	Hybrid model, i.e. centralized in relation to strategy and policy development, but decentralized and uncoordinated in relation to municipalities – not represented in the ISC or in MKM/RISO. MKM/RISO has the regulatory responsibility for eGovernment including initiating, drafting, coordinating, monitoring strategy, action plan, legislation, budget etc., with Department of Information Society Service Development (ITAO) providing service quality standards and channel strategies and the Estonian Information Systems Authority (RIA) responsible for the national portal www.eesti.ee, the Public Key Infrastructure (PKI), EEBone network, State information system, X-road data exchange, some legal aspects.
Process of eGovernment strategy and action plan development and approval (from idea to approval by government)	Centralized, initiated and coordinate by RISO, but hybrid as MKM/RISO is responsible to the ISC which provides the vision and strategic direction. Intra-ministerial co-operation group provides input to ensure stronger links between the ICT policy and other national policies that influence the development of the information society (e.g. entrepreneurship and education policy). Additional input from the work groups of the Information Technology and Telecommunication Association and the eGovernance Academy.
eGovernment strategy legality	Yes, partially, as part of the government programme.
Action plan (i.e. is the strategy underpinned by an action plan)	Yes, but generally in 2-year intervals and adjusted annually. KPIs been introduced with the Digital Agenda 2014-2020. From 2015 underpinned by the mandatory provision of a business case analysis for ICT initiatives budget approval.
Action plan legally binding	No.

As outlined in table 5, the Estonian eGovernance and inter-governmental cooperation model retain a relative level high level of complexity. It can nonetheless be boiled down to three layers: The strategic level, the operational level and the daily implementation level.

At the strategic level the eGovernment strategic direction and vision is defined by the Prime Minister, the Minister of MKM – in practice the mandated and responsible authority for eGovernment – the national CIO, key ministers and stakeholders from the private sector within the ISC. Key responsibilities include: discussing and approving the draft and final strategy, action plans, terms of reference, draft and approve policy and legislation, and; regular and final evaluation and monitoring reports incl. EU Structural Funds use on ICT [52, 53, 55].

At the operational level, MKM and RISO are key. Their roles were redefined with the 2014-2020 Digital Agenda. While individual authorities are responsible for the actual implementation and daily management of programmes and projects, this is supported by the CIO network. The aim is to ensure everyday cooperation in the execution of activities laid down in the national eGovernment strategy and action plan. The CIO network is led and hosted by RISO, while members include relevant officials responsible for the ICT development in all ministerial areas, as well as the representatives of local authorities and the ICT sector. The CIO network is responsible for the overall coordination, cooperation, conflict resolution and exchange of information related to ICT projects and action plan initiatives. MKM/RISO and the CIO network may establish thematic or task-based work groups and networks if required by the deemed necessary to a successful implementation of the action plan or if required to ensure the individual programmes and projects are coordinated appropriately. MKM/RISO may also initiate bilateral or multilateral meetings with ministries to harmonise the execution of sectoral strategies with ICT components (e.g. in education and healthcare) which are not covered by the eGovernment strategy and action plan. MKM/RISO may also agree or report on actions laid down in the work programme and can escalate issues to the ISC [49, 53-55].

While not illustrated in the pre-2014 eGovernance organigram in Figure 1, the daily implementation has always been decentralized to responsible line-ministries and authorities. From 2014, a co-ordination mechanism has been introduced in the form of thematic or task-based work groups and networks (e.g. records management council, expert group on interoperability, etc.). Each thematic work group and network is responsible for the implementation of their respective action plan initiatives and report to the CIO network on progress, risks and for potential conflict resolution. That said, it is not clear if the individual networks can escalate unresolved issues to the CIO network or MKM/RISO, and who in turn may escalate issues to the ISC. While thematic work groups and networks report to the national CIO network, their number and focus is decided by either the CIO network itself, the MKM, the ISC or the government cabinet (based on proposals from the Council or the Minister) [55].

With the 2014-2020 Digital Agenda, a vision-network has been introduced in Estonia. The role of the vision-network is to identify new trends and patterns at home and abroad, monitor and recommend adjustments to achieve the national eGovernment and information society vision across government and all sectors. The vision-network consists of invited key opinion makers and experts from the public and private sector, academia, and civil society. The vision-network generally exchanges ideas and works on an *ad hoc* basis. The vision-network is hosted jointly by the ISC and the MKM [55]. The relationship between the national CIO (embedded

in MKM and a member of the ISC) and RISO is unclear, but there seems to be a division of labour, with the CIO focusing on the eResidency programme and international corporation. The model is summarised in Table 6 and illustrated in Figure 2 below, and also illustrates the overlapping authority and mandates for implementation of the action plan and initiatives, coordination in relation to the eGovernment strategy and the wider areas of the information society.

Table 6. eGovernance and coordination model since 2014 [55]

	Co-ordination of the implementation of strategy	Wider co-ordination of the development of information society
Vision		<i>Vision networks</i>
Strategy	<i>Information Society Council</i>	
Implementation of action plans	<i>Information Society Council and MKM / RISO</i>	<i>Discussions between ministries</i>
Daily implementation and everyday work	<i>CIO network and Thematic work groups / networks</i>	

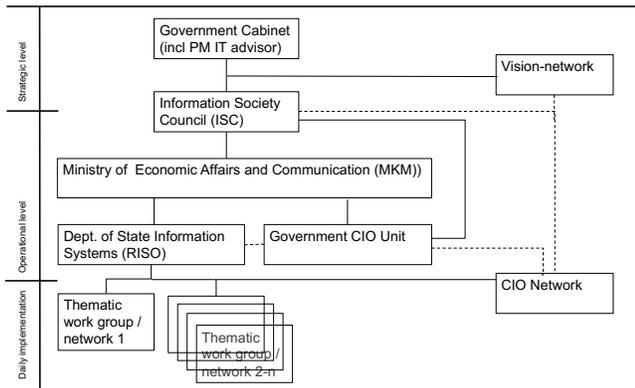


Figure 2. eGovernance and coordination model (by author)

(Note: Full and broken lines represent formal and informal network structures, respectively)

5. KEY ENABLERS, CITIZEN eSERVICES, THEIR USE AND IMPACT

Having confirmed that the required infrastructure and digital literacy exists (section 3), outlined the strategic eGovernment focus over time and described the governance and cooperation model (section 4), what has Estonia achieved in terms of the roll-out (supply) of key enablers and citizen eServices, actual outcomes and impact (i.e. demand and use)?

The availability and use of eIDs, digital signatures and eServices constitutes an effect and impact measurement of eGovernment activities but also the efficiency and effectiveness of the eGovernance model applied and the level of inter-governmental cooperation. eIDs and digital signatures are important as key enablers for government provision of more advanced online service provision such as personal and proactive service provision and not

least citizens eService. They allow for the secure and reliable identification of individuals, secure completion, submission and storage of information and data provided during an online transaction, and the legally binding signature of electronic documents and transactions. The type and number of service areas in a country vary depending on a natural context or a given service areas. To trace the impact over time and in real terms, and allow for the future cross-country comparison, the EU 12 benchmarking citizen service is used as a basis for the effect measurement. The EU benchmark consists of high-frequency, high-volume services, relevant in most national contexts and to a majority of citizens or specific target groups.

The existence of key enablers, such as eIDs, digital signatures and various eService's is relatively easy to verify through the national one-stop portal (www.eesti.ee) and relevant government websites. The role of early EU wide strategies and action plans (i.e. the 2000 Lisbon Agenda, Europe 2002 and 2005, i2010 and later Europe 2020) should not be underestimated and means that 12 citizens and 8 business orientated, high-volume, high-frequency (some may say universal services) are available online in most European countries, including Estonia. The existence of eID/eSignature, digital post box solutions and a few select number citizen service areas are confirmed in Table 7.

Table 7. Individual use of the internet 2014-2016, selected years

	eService availability	Degree of digitization (i.e. % of service delivery volume online)		
		2010	2013 (2015)	2016
eID/eSignature [65]	Yes			1,277,786 "
Digital post [66]	Yes		(255,669)	294,689""
Tax declaration [67]	Yes	92%	92% (96%)	96%
Register for school [68]	Yes*			670.054
Register for university	Yes**			
Apply for student grant	Yes			
Change of address [66]	Yes		(75,719)	81,919
Housing subsidy	Yes#			
Apply for pension	Yes#			
Report vermin (FixMyStr)	No			
Report theft	No			

“N. of active cards. “”No. of redirections to other mail servers. All ID numbers have a digital post box on eesti.ee. *Depends on municipality. **Depends on university. #Multiple service types from different authorities, not all transactional eServices.

What is harder to assess is the actual volume of public service delivery online – or degree of digitization (i.e. % of service delivery volume online). Where available, the degree of digitization is included in Table 7.

Available data shows that the vast majority of Estonians have activated and use their eID and digital signatures, almost all tax returns are pre-filled and approved by citizens online, most children are registered for primary and secondary school online and that many change their addresses online too. By contrast to the successful introduction and high usage of eServices in some service areas, others such as social benefits and municipalities service are fragmented, not available as a transaction service online or not widely used [49, 53, 54, 56, 62]. Similarly, both citizens and authorities seem unaware of the potential efficiency by sending messages digitally via the joint-governmental digital post infrastructure provided by www.eesti.ee.

Considering the limited data availability for eService use, statistics for the proportion of citizens use of online banking (eBanking), shop online (eCommerce) and their level of online interaction with public authorities is a useful substitute and presented in Table 8.

Table 8. Citizens use of eBanking, eCommerce and interaction with public authorities online (at least once per year) 2010-2015, selected years (EU28 country average in brackets) [43]

	2010	2013	2016
Online banking	65% (36%)	72% (42%)	79% (49%)
Online commerce	17% (40%)	23% (47%)	56% (55%)
Interacted with government online	50% (41%)	48% (41%)	77% (48%)
Obtained info. from a gov. website	49% (37%)	45% (37%)	66% (42%)
Downloaded a form (for submission)	39% (26%)	30% (25%)	41% (29%)
Submitted a complete form (eService)	38% (21%)	30% (21%)	68% (28%)

Despite the fragmented online service offers (depending on the service areas), the data in Table 8 highlights that the Estonian usage of both private and public sector eServices are higher than the EU28 average on all parameters – and over time. With the exception of eCommerce, the use of eBanking and various forms of online interaction with public authorities are all between 12 and 40%-points higher in Estonia than the EU28 average in 2016. An interesting aspect is the percentage of Estonians using the internet (85%) in 2016. This is close to the number of citizens actively using eBanking (79%), citizens who interact with government online (79%) or use transactional eService’s (68%) – a stark contrast to the EU28 average but which mirrors the patterns of other successful eGovernment service providers like Denmark and the Netherlands [39, 41, 43, 57]

6. DISCUSSION AND CONCLUSIONS

While Estonians household propensity to purchase of internet and citizens general use of the internet in Estonia (see Table 2) is similar

to the EU28 average, the use of online banking services – which by concept are comparable to those of the government – is by comparison vastly higher in Estonia than for the EU28 average (see Table 8). This points to a number of influences related to eGovernance and inter-governmental cooperation.

Public awareness and channel strategies for public service delivery are directly related to eService take-up but seem to be influenced, both positively and negatively, by the eGovernance model, the level of cooperation and, the coordination between authorities in Estonia. First, the single national portal (www.eesti.ee) was launched in 2003, but the decision to channel users to a central portal is diluted by the launch of the rural municipality portal (www.kovtp.ee) in February 2011. The initial impact of cooperation on a single one-stop shop is thus eroded by a decision to deploy a second portal focusing on rural municipalities with no links to city municipalities or the national portal. Second, in the 3 years the author has been living in Tallinn, only a welcome letter has been sent to the eesti.ee mailbox which all Estonian ID numbers are born with. This indicating that authorities are not taking advantage of the portal and key infrastructure components which have the potential of creating a critical mass and usage of government online service offers akin to eBanking or has seen in the Danish eGovernment strategy 2012-2015 [39, 69, 70]. Third, while distributed responsibility is common in most countries, there seems to be a potential for further cooperation and compliance with the national eGovernment vision in Estonia. For instance, RISO is responsible for drafting and monitoring compliance with the national eGovernment vision, strategy and action plan, ITAO is responsible for service quality standard and the channel strategy choices, while RIA is running the national portal (www.eesti.ee) – and thus the most appropriate organization to ensure compliance with e.g. eService, single-sign-on, data and privacy standards. Similarly, the lack of letters, receipts and reminders sent to the national mailbox from authorities responsible for tax, pension, social services etc. points to a need for a more consolidated and joint-governmental approach to channel choices, online service delivery and re-use of key infrastructure components.

Roles, responsibilities and mandates are at times ambiguous in the Estonian approach to eGovernance and inter-governmental cooperation. For instance, who does the vision-network report to and which authority ensures that the network is consulted? On the strategic level, how proactive can MKM/RISO or the Government CIO and CIO network be vis-a-vis the ISC and the MKK/RISO, respectively?

With MKM/RISO being the responsible authority on the operational level, how strong is the mandate vis-a-vis the implementing thematic work groups and networks? Can the thematic work groups and networks side-step MKM/RISO by going directly to the government CIO or even the ISC or the cabinet office? Similar overlaps exist in relation to the thematic work groups and networks, as the government cabinet, the ISC and MKM/RISO all have the mandate to establish such daily implementation organs. While the CIO network represents a practical forum for decision making and problem solving in relation to daily implementation, its links to RISO and the ISC is fuzzy. This type of fragmentation is also exemplified in the existence of the Association of Estonian Cities and the Association of Municipalities in Estonia, both representing local authorities, albeit with different members.

It is clear that eGovernment and online service supply and use has been a success in the Estonian context. Pre-conditions like internet availability and the digital skills of citizens are in place. eServices,

one-stop portals and key enablers, such as eID and digital signatures, have developed and rolled out in line with national strategic objectives, eGovernment strategies, and action plans. Citizens use of eServices is positive but following a slow start.

The success has been based on a tradition of politically driven and motivated public sector modernisation, a consensus seeking approach, trust between actors, informal networks and cooperation with the private sector [49-51, 54, 62].

That said, the degree of cooperation between authorities and the level of integration between entities in the provision and production of services vary. Initial successes, such as the launch of eID and digital signatures (in cooperation with the private sector), and online tax applications provide new evidence in support of the positive role of inter-governmental cooperation play in the introduction and take-up of eService – as proposed by authors such as Heeks [5, 26], Lee & Kwak [32] Chen & Mingsins [71].

Similarly, the less than optimal use joint infrastructure like the www.eesti.ee portal and digital postbox are an example of how benefit realization and value creation of ICT investments may not be maximized if authorities do not comply with, or support, key strategic objectives. Thus, the Estonian case highlights the importance of good management and coordination of government eGovernment activities in support of authors such as Davison [27], Iribarren et. al. [8], Janowski [28], Kalambokis et. al. [29], Shareef et. al. [30], Waseda [31] and organizations such as the OECD [72].

In conclusion, *the Estonian case supports the initial question asked i.e. that that is a positive relationship between a strong cooperative eGovernance model (cause) and the introduction of online services (effect 1) and subsequent citizen use of the online service delivery channel (effect 2)*. That said, the Estonian experience also highlights the importance of a formal eGovernance model with clear and recognized mandates to ensure that decisions are made, conflicts are resolved, and the strategic visions, objectives and outcomes are achieved. For instance, the existence of a national CIO or specialized government entity for eGovernment does not guarantee success. The Estonian case shows the positive impact of informal and personal networks and the role of individuals in driving a vision, ensuring coordination and inter-governmental cooperation, but this also illustrates the potential risk of confusion and failure if there are overlapping or conflicting responsibilities and mandates in place. While successful, the Estonian approach to eGovernance and inter-governmental cooperation would benefit from a streamlining of potentially overlapping mandates and the formalisation of informal networks. This will help minimize the risk of failure if consensus cannot be reached, if personal and institutional capacities and contacts does not exist (or fail), e.g. in relation to social benefits and services, to authorities' compliance with strategic decisions, the use of joint infrastructure, but also current strategic focus areas such as data re-use, artificial intelligence, eService usability, and eParticipation.

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