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Analyzing Preconditions to Introduce Internet Voting in Portugal: Insights from the Estonian Model

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Abstract: Internet voting has been trialed or introduced for several countries, including Norway, Portugal, United States, United Kingdom and Switzerland as an additional voting channel to increase voter turnout and, also to modernize the electoral process. However, only Estonia has successful introduced internet voting, deploying e-enabled elections in general governmental levels. This paper aims to provide an exploratory study on the Estonian internet voting model to identify pre-conditions for internet voting introduction in Portugal, addressing legal, technical and technological considerations. For doing so, it includes a cross-country comparative analysis in two perspectives. Firstly, an analysis in the Estonian electoral framework, highlighting the most important legal adaptations that make possible internet voting introduction to identify potential transformation for the Portuguese context. Secondly, to provide a technological overview towards the Portuguese e-government ecosystem to seek similar conditions that can make internet voting possible in Estonia.

Keywords: Internet voting, Voter turnout, Portugal, Estonia, e-Government.

1. Introduction

While internet voting for remote voting has potential in the future, it is a new approach that has only been successfully implemented in very few cases. Internet voting is still a developing technology when it comes to security and trust; many countries have chosen not to use it after conducting feasibility studies or pilots due to these concerns (Applegate & Basysty, 2020). Some countries as Spain, India, Netherlands have done a limited adoption but decide to discontinue and few others countries as France, Switzerland and USA use Internet voting as an additional voting channel, especially, for expatriates voters, however, Switzerland suspended the use of Internet voting in 2019 due political pressure to verify potential vulnerabilities and to improve their system (Killer & Stiller, 2019). In the same line, Norway had trialed Internet voting with success, however, the project was also discontinued due political parties opposition to the new voting channel implications on electoral process (Cortier & Wiedling, 2017). However, the only country that fully introduced

Internet voting with success was Estonia that since 2005 have been binding more than e-enabled elections, allowing voters to vote remotely by Internet. The introduction of Internet voting is based on the advantage of the increase of voter turnout focusing on young voters (Mendez & Serdült, 2017), modernization of the electoral system and voting process and the efficiency and cost (Krimmer, Duenas-Cid, Krivonosova, Vinkel, & Koitmae, 2018). However, the main challenges rely on the legal, operational, technical, social and technological perspectives which include the building of trust by voters, security issues, lack of common standards, and legal provisions adaptions into digital forms for voting in an uncontrolled environment (Okediran & Omidiora, 2011).

2. Estonia: a Brief Overview

The Republic of Estonia is a small northern European country with 1.3M people (e-Estonia, 2020), located at Baltic sea, bordering Russia, Finland, Sweden and Latvia. Estonia got its independence from Russia recognized in 1920 at the end of World War I, but only became a democratic republic after its de facto independence in 1991, after the collapse of the Soviet Union (Adeodato & Pournouri, 2020), and joined the European Union and NATO in 2004, and the Eurozone in 2011.

2.1 Electoral System and Legal Framework

The electoral system of Estonia is based on proportional representation and like those of many other European nations. In national level, the Presidential elections (*Vabariigi Presidendi valimised*, in Estonian) and Parliamentary elections (*Riigikogu valimised*, in Estonian), and in level local, Municipality Elections (*Kohaliku omavalitsuse volikogu valimised*, in Estonian), and a transnational level election, the European Parliament elections. The Estonian legal framework provides the right to vote in free elections, the minimum age for Estonian citizens to vote is 18 years old and they are allowed to participate as candidates if they have attained 21 years old as well as long-term residents and EU citizens can vote in the local and EU elections. It also offers seven different voting channels where are available during the early and advance voting as well as on election day. These channels are a) early voting at county centers; b) advance voting at county centers; c) advance voting at ordinary Voting District Committees; d) custodial voting; e) Internet voting; f) home voting; and g) election day voting. For instance, the voting channels for voting from abroad are a) by post; b) at the diplomatic missions or consulates; and c) Internet voting. However, before the introduction of Internet voting in Estonia raised a huge discussion and questions whether it was legally acceptable according to the constitutional principles, especially, regarding its legitimacy, privacy, vote secrecy, voter coercion and equality (uniformity).

In 2005, before the first e-enable elections, the Estonian Supreme Court reviewed the Internet voting process. In Estonian case, the legal norms comply with the constitutional provisions, because electronic identification enables secure remote identification, the digital ID-card has complete penetration, all advance voters (both electronic and paper) are placed under the same conditions, and the "virtual voting booth" (the right to replace an Internet vote with another Internet vote or a paper ballot) and the virtual double-envelope system ensure the freedom of anonymous voting and the uniformity of elections (Solvak & Vassil, 2016, p. 126). This debate has been maintained throughout the years and principle of the "virtual voting booth" as a guarantee of freedom and the

understanding of teleological voting secrecy have become the cornerstones of the Estonian system. A consideration is regarding the adaptation of Internet voting into the electoral process. In Estonia, the election Acts or the Referendum Act also provides for opportunities to vote before the election day. The election week starts on Monday, and it consists of six advance voting days and the election day on Sunday, when the election week ends. Internet voting opens on the sixth day before the election day (on Monday) at 9 a.m. (Estonian State Electoral Office, 2020a), and closes on the day before the election day (on Saturday) at 8 p.m. An Internet vote can be annulled by voting with a ballot paper on the election day until 8 p.m. The opening of the Internet ballot box as well as tallying and counting is made in parallel with other traditional paper voting process, i.e., after closing the polling station at 8 p.m. (Estonian State Electoral Office, 2020a).

The Estonian electoral management body is composed by eight entities that are responsible to organize, operate, conduct and manage elections in Estonia. These entities are a) National Electoral Committee (NEC); b) State Electoral Office (SEO); c) Voting District Committees; d) Vote Counting Committees; e) Ministry of Interior; f) Rural Municipality or City Secretaries; g) Information System Authority (RIA); and h) Internet Voting Taskforce. Both entities responsibilities are complementary in a legal, administrative, operational, technical and technological perspectives. The NEC and SEO are responsible for the legal and manage the electoral process, however, only SEO and RIA are responsible for the conduction of Internet voting. RIA is responsible for technical and technological background, including the administration of the information electoral systems and the state information infrastructure, and SEO for ensuring the accountability and monitoring of whole process.

2.2 e-Government Ecosystem and Digital Transformation

The Estonian plan was also that Internet voting could be viewed as other e-government service and this strategy was developed in parallel to the implementation of the e-government in Estonia as a digital transformation agenda in the country in early 2000s, when the government in that time stimulated governmental departments and agencies to find open-source solutions to develop their systems which enforced each of them to establish their own digital agendas (Kattel & Mergel, 2019, p. 146), and it contributed particularly to design the base of the Estonian e-government ecosystem foundation, the X-Road, digital identification, digital signatures, governmental e-services portal (including services as e-tax, e-education, e-police, e-law, e-prescription, Internet voting and so on). X-Road is a secure Internet-based data exchange layer that enables the state's different information systems to communicate and exchange data with each other (Solvak & Vassil, 2016, p. 126) and it is the core basement of the Estonian e-government ecosystem and technological infrastructure. Once X-Road was ready to ensure the interoperability of the systems, the next step of the Estonian government in 2000s was to develop an innovative legal framework - Identity Documents Act1 and the Digital Signatures Act2 - to enable an efficient and secure digital identification and digital signature based on usage of e-ID cards for all Estonian citizens, where about 1.24M of these cards were issued in 2002. In 2011, the Estonian government launched a new digital identification service

[1] Estonian Identity Documents Act. See, https://www.riigiteataja.ee/en/eli/504112013003/consolide

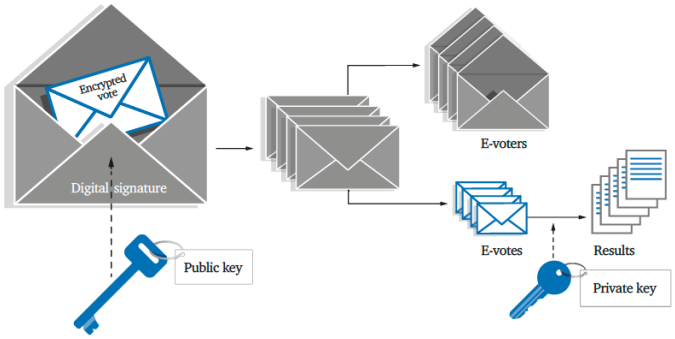
[2] Estonian Digital Signatures Act. See, https://www.riigiteataja.ee/en/eli/530102013080/consolide

'Mobile-ID' that enabled the same e-ID cards functionalities via a SIM card inserted into a mobile phone, and it allowed people to use a mobile phone as a form of secure digital identification, and additionally, introduced other e-ID tool called smart-ID in 2017. The combination of X-Road and e-ID systems enabled to develop the one-stop governmental portal 'Eesti.ee' as the backbone of the e-government environment (Duenas-Cid & Cepilovs, 2020), achieving more than one billion of digital signatures used so far and 67% of Estonians use e-ID cards regularly for identification and authentication into e-government services (RIA, 2020).

2.3 Internet Voting System

The Estonian Internet voting system was intentionally designed to be used only with e-ID cards, for being able to simulate traditional voting process, i.e., the postal voting method. The e-ID card introduced in early 2000s, was viewed as a secure identification and authentication method for enabling Estonian voters to cast their votes using smart-card readers with the same e-ID cards PIN codes often used to access online services (Solvak & Vassil, 2016), which became possible in 2005 when e-ID cards became available by law for all Estonian citizens. In this year, Estonia became the first nation to hold legally binding general elections over the Internet during the advance voting period, with a pilot project for the local elections where 9317 voters voted using Internet voting, representing 1.9% of voter turnout. After more than seven elections using Internet voting as an additional channel, the participation of Internet voters increased from a mere 1.9% in 2005 to 43.8% in last Parliamentary elections in 2019 (Estonian State Electoral Office, 2020b).

Figure 1: Two-envelope concept behind the Estonian Internet voting system.



Technically, the conceptual setup of the Internet voting system is derived from the traditional way a person votes from outside of the polling district of their residence, i.e., the postal voting method (see Figure 01). As postal voting procedure, a two-envelope system is used to cast a vote. The inner envelope contains a ballot with the voter's vote choice but has no identification markings, and the outer envelope contains the voter's identification information. When sent to the ballot station, the information on the outer envelope is used to verify the voter's eligibility to vote and if confirmed, the inner envelope will be separated from the outer envelope and put into the ballot box for counting (State Electoral Office of Estonia, 2017), in other words, the same processes are replicated, however this is made by using a software that ensure the whole procedure by Internet.

3. The Portuguese Context

Portugal or Portuguese Republic is a country located on the Iberian Peninsula, in south-western Europe, bordering Spain, with a population around 10M people (PORDATA, 2021b). Portugal got its re-democratization in 1975 after a long period of dictatorship between 1933 and 1974, and consequently, developed a new constitution. Portugal was also one of the founding member of OTAN and became a European Union member in 1986.

3.1 Electoral System and Legal Framework

The electoral system of Portugal is based on proportional representation based on Hondt method. The elections take place in each four years. In national level, there are the presidential elections, and parliamentary elections (*Assembleia da República*, in Portuguese). In local levels, two municipality elections (*Autárquica Geral and Autárquica Intercalar*, in Portuguese), and two parliamentary of the autonomous regions of Madeira and Azores and a transnational level election, the European Parliament elections. The Portuguese constitution establishes the voting principles to be universal, equal, direct and vote secrecy and free elections suffrage, and for citizens aged over 18 years, i.e., this legal framework is very similar to other European democracies.

The constitutional prerogative to vote in Portugal is that the vote must be cast in person, in a controlled environment, under an electoral official supervision to ensure the integrity and the secrecy of the vote. Foreign voters who have the permanent residency permission can vote in local and national elections. The election acts provide the opportunities to vote before the election day, and the advance voting period starts fifteen days (two Sundays) before the election day, and the voting process is between the fourteenth and tenth day before the election day. It also offers four different voting channels where are available during advance voting period and on election day voting for voters who live in Portugal, covering: a) advance voting at ordinary Voting District Committees; b) custodial voting; c) home voting; and d) election day voting. Furthermore, the voting channels for voting from abroad is possible only vote by paper, using postal voting in an uncontrolled environment and only available for Parliamentary (*Assembleia da República*) elections, or at the diplomatic missions or consulates. The prerogative is that postal voting can be used without supervision for other types of election, but the vote must be cast in person in the case of presidential elections. Internet voting or any kind of electronic voting is not provided (Portuguese National Electoral Commission, 2021).

The electoral management body is composed by eight entities responsible for the organization, conduction, operation and administration of elections. These entities are a) the Ministry of Internal Administration - SGMAI; b) National Electoral Commission - CNE; c) Constitutional Court; d) Voting District Committees - VDC; e) Vote Counting Committees VCC; f) Local Municipality Councils - LMC; g) City Secretaries; and h) The College of Representatives of the Candidacies CRC. Both entities responsibilities are complementary in a legal, administrative, operational, technical and technological perspectives. The CNE, Constitutional Court are responsible for the legal and manage the electoral process. The City Secretaries, VDCs and VCCs are connected to operational and technical activities, and SGMAI is responsible for the management of all electoral process, including responsibilities in the technical, operational and technological background, including the

administration and update of the information electoral system. Regarding voter turnout, 932,464 voters stopped to vote in presidential elections (comparing 2001 and 2016), 308,546 in parliamentary elections (1999 to 2019) and 13,585,037 in European parliamentary elections (PORDATA, 2021a). The voter abstention has been increasing, especially in the last European parliamentary elections in 2019, where almost 65% of Portuguese voters who is living in Portugal did not participate in the electoral process. This scenario increased in the last presidential elections when around 70% of Portuguese voters decided to not vote in 2021, and from 1.549,380 expatriates voters, only 29,153 voted (PORDATA, 2021a), meaning a significant negative impact in the electoral process and for democracy in Portugal.

3.2 e-Government Ecosystem

The Portuguese e-government development has started in the end of 90s and the beginning of 2000s, being the extinct entity UMIC the responsible for the digital government services development in Portugal. In 2007, a new entity AMA was created to be the responsible for the promotion of the public administration services modernization in Portugal, developing new solutions for the improvement and establishment of the interoperability of the public system. The iAP, the interoperability infrastructure, is a middleware that interconnect data from several departments and entities systems of the Portuguese e-government services, including e-ID systems, governmental portal 'eportugal.pt', digital signatures, population register, e-tax, e-justice and so on. The introduction of e-ID cards (Cartão de Cidadão) in 2007 and the mobile identification using smartphones (Chave Móvel Digital - CMD) in 2011, enabled the Portuguese citizens to access e-government services in a secure method through PIN codes or PIN tokens using CMD. For instance, the CMD became the most used e-ID means in Portugal, corresponding 44% of the authentications into public e-government services (AMA, 2021).

3.3 Internet Voting Experiment

In 2005, a trial of Internet voting was introduced in the general Portuguese Parliamentary (Assembleia da República) elections. The Internet voting experiment was aimed at all citizens who were allowed to vote abroad using postal vote. From a total of 148.159 electors outside Portugal who were registered, only 4.367 voted through the Internet (12% of mailed votes) (Cunha, Leitão, & Faria, 2006). The experiment was voluntary and not valid for official elections results. Although the voters who used I-voting had a good experience (around 98%) (Cunha et al., 2006). The voter authentication and identification processes (credentials using a token with username and password) to access the Internet voting system (through a web browser) were sent by post to the registered voters (Cunha et al., 2006). Despite the good acceptation towards the usage by voters, the Portuguese government decided to discontinue the Internet voting experiments due the lack of interest by politicians and political parties at that time.

4. Methodology

The methodology is based on descriptive comparative analysis, meaning that available information and data about the Estonian and Portuguese contexts have been collected from reliable

and credible official reports, electoral process, laws, regulations from entities connected to electoral administration in both countries. Additionally, other exploratory research was conducted regarding the e-government ecosystem, including statistics of usage and penetration of digital identification tools.

5. Comparative Analysis

This comparison is focused on the identification of pre-conditions for Internet voting in Portugal based on the Estonian model, seeking for challenges and opportunities on electoral system and legal perspectives, and technological - e-government tools - for supporting Internet voting process.

Regarding e-government infrastructure, both countries have a positive factor in this point due the availability of digital identification services as e-ID cards, mobile ID (using mobile phones), digital signatures to access government online services and other external and private online services. However, according to the last E-Government Development Index (EGDI) published by United Nations in 2020, Estonia is ranking the 3rd position and Portugal ranked the 35th position, but both are included in the very high group established by the EGDI. Therefore, Estonia belongs to the V1 class group and Portugal V2 class, meaning that Portugal needs to improve their e-government development agenda, and which have been strategically made in the last three years through the "Portugal Digital" program. In Estonia, the penetration and usage of digital IDs in Estonia is around 70%, meaning that Estonian residents use regularly e-ID tools to access online services, i.e., 17% use mobile ID, and 35% smart-ID. The relative trust in government services is a positive factor for the consolidation in Estonia, contributing also to the acceptation of Internet voting as secure voting channel among the Estonians. For instance, Portugal has been increasing the usage of digital identification tools by citizens to use e-government services. The evolution of authentications using digital certificates in the e-government services access increased from 147.796 in 2014 to 12.876.733 in 2020, i.e., 47% using CMD and 33% using e-ID cards through digital cards readers.

6. Discussion, Findings and Conclusions

When seeking for the pre-conditions that make possible Internet voting in Estonia in a Portuguese context, the results sound to be motivating, taking in consideration, especially, both e-government environment due the technological similarities on the availability of e-ID systems tools, however, with technical differences regarding the mobile ID in Portugal. Unlike the Estonian mobile ID that needs an especial SIM card to have the same validity than an e-ID card on a legal perspective, the Portuguese model only needs a previous registration process/request by the citizen in her/his e-government portal area. Digital signatures are available in both countries, using similar technologies and technical standards according to e-IDAS (electronic identification, authentication and trust services) regulation established by European Union. On legal and electoral system perspective, Portugal has the advance voting period which is, according to the Rec(2017)5, one of the pre-condition to introduce Internet voting as such Estonians have done. Other consideration about this point, is the fact that Portugal provides postal voting channel to expatriate's voters, in an uncontrolled environment, like the Estonian postal voting model which is an opportunity to

implement an Internet voting system in the Portuguese context, modernizing the electoral process using digital tools, however, the constitutional principles seems to be a barrier for its introduction and implementation. Although some of pre-conditions to introduce Internet voting based on Estonian model in Portugal can exist, an investigation regarding the implications of this modification needs to be developed for seeking general conditions, observing and analyzing considerations based on electronic voting international standards, voters behaviour to accept new technologies in the electoral process and so on.

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