

1) Title of the case

Internet voting in Estonia

2) General description of the organisation and/or project

In 2002 the Estonian parliament created the legislative basis to conduct e-voting in all national elections and referendums and the Estonian National Electoral Committee thereafter launched the Internet voting project. National Electoral Committee is the highest electoral body in Estonia that conducts elections, verifies election results, exercises supervision over other electoral committees and resolves complaints.

3) Main content of the case

Internet voting was used in Estonia during the October 2005 municipal elections. For the first time the new voting system was applied countrywide with binding results. Internet voting followed all the principles characteristic of traditional voting but did not replace the traditional methods.

ID cards were used for voter authentication. Only authenticated persons with the right to vote were able to vote, meaning that a database of eligible voters was compiled prior to elections on the basis of the National Population Register.

The main principle of the e-voting system laid in double-envelope scheme illustrated in Figure 1. The scheme is familiar from the postal voting in some countries. A voter seals his or her choice into inner blank envelope (encrypts it) and puts this envelope into a bigger one, writing his or her name and address on it (digitally signs it). These bigger envelopes are collected to the counting centre. Prior to vote counting, outer envelopes with personal data (digital signatures) are removed and anonymous white envelopes (encrypted votes) are sent to counting process which produces summarized voting results.

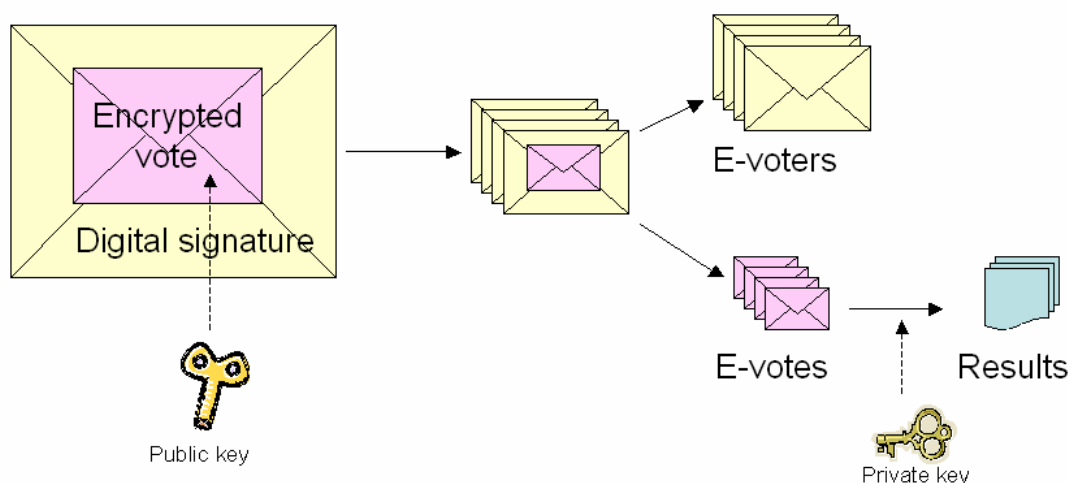


Figure 1. The envelope method¹

¹ General Description of the E-Voting System, National Electoral Committee 2004; <http://www.vvk.ee/elektr/docs/Yldkirjeldus-eng.pdf>

The e-voting system architecture consists of several elements illustrated in Figure 2. The voter uses a Voter Application, which is downloaded from Vote Forwarding Server, to carry out all necessary selection/encryption/signing/sending activities. The received votes are immediately forwarded to Vote Storing Server which is inaccessible from outside. Counting of votes takes place off-line with Vote Counting Application and Hardware Security Module. All central components have extensive logging mechanisms – every transaction in the system leaves a track. The key management requires extra attention here as the security and anonymity of e-votes lie solely on encryption and decryption of votes.

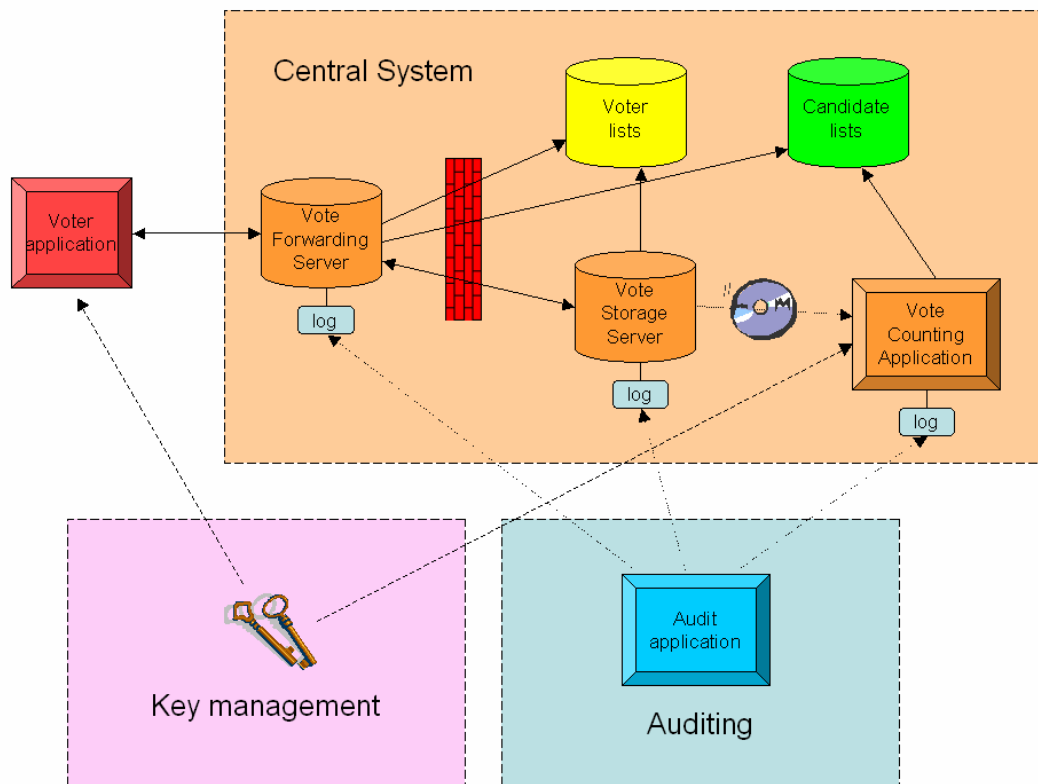


Figure 2. System architecture²

To vote electronically a voter needed an ID-card and a computer connected to the Internet, with an installed card-reader. From the user's perspective the voting procedure was the following:

1. The voter inserted his or her ID-card into the card reader and opened the web page for voting (<http://www.valimised.ee/>).
2. The voter authenticated himself or herself by using the PIN1 of the ID-card.
3. The server checked whether the voter was eligible (using the data from population register).
4. Candidate list of the appropriate electoral district was displayed.
5. The voter made his/her voting decision; the system encrypted it.

² General Description of the E-Voting System, National Electoral Committee 2004; <http://www.vvk.ee/elektr/docs/Yldkirjeldus-eng.pdf>

6. The voter confirmed his/her choice with a digital signature (by entering the PIN2-code),
7. The system confirmed retrieval of the vote.

In order to avoid influencing the voters there was a possibility of electronic re-vote – e-voter could cast his or her vote again electronically and only the last vote was counted. Additionally, priority was given to the traditional means of voting with a paper ballot – if the voter went to polling station during advance polls and cast a vote, his or her e-vote was deleted.

Internet voting took place during advance polls from sixth to fourth day before Election Day. After the electronic voting and advance polls ended the list of voters who had voted electronically was compiled and sent to polling stations in order to prevent voters from voting more than once on Election Day. When controlling procedures were over the votes and voters' personal data were separated and the members of the National Electoral Committee collegially opened the anonymous e-votes and counted them.

4) Reasons behind the case

Technology enables citizens to take an active part in policy making and is thus becoming an integral part of the democratic process. Thanks to technology, representative democracy can be strengthened by making it easier to hold elections and public consultations. The Estonian Internet voting project serves the government's goal to make the public sector more efficient and customer-friendly through technology. Considering also that the voting turnout trend is declining and that one reason behind this is the low participation of younger people, Internet voting serves as an instrument to attract more people to vote.

In 2002 Estonian Parliament created a legislative basis to conduct Internet voting in all elections and referendums. After the political decision the National Electoral Committee launched the project to implement Internet voting from year 2005, as the law had foreseen.

In order to ensure the efficiency of the implementation of e-services, both in terms of time and money, the government initiated in 1998 a national ID card project. The smartcard, compulsory for every Estonian resident, was introduced. ID card may be a physical document, but it also functions as an electronic identity, enabling to give digital signatures and to use services online conveniently and securely. The Public Key Infrastructure necessary for secure use of ID cards was developed in Estonia by the end of 2001.

The widespread use of national ID card was vital for introducing the Internet voting. ID cards have been issued for 4 years now and by February 2006, the respective figure was about 900,000; thus, most of eligible voters (1.06 M in municipal elections) already hold the card.

5) Actors behind the case

Internet voting project was lead by the National Electoral Committee. The other actors were:

- Ministry of Internal Affairs as maintainer of the population register;
- City of Tallinn as the organiser of the first public trial;
- AS Sertifitseerimiskeskus as maintainer of the infrastructure necessary for issuing and using ID card;
- Chancellery of the Riigikogu as provider of the operational and administrative support to NEC;

- Cybernetica AS as software developer;
- KPMG Baltics AS as auditor.

6) Process leading to success

It is important that citizens have trust and interest in the new technological solutions. According to Information Society Benchmarking Report ³ Estonia has the fourth highest ranking of EU25 in online availability of basic public services. Nationwide communications infrastructure is developing fast in Estonia. 40% of households have a computer at home and 81% of home computers are connected to the Internet⁴. The eagerness with which the Estonians apply new IT solutions clearly points to a high level of e-readiness of the people.

One major problem which needs to be overcome for e-democracy to be successful is that of citizen identification. For secure elections and other secure citizen-to-government transactions, citizens must have some form of identification that preserves privacy. Estonia has implemented ID card as the primary document for identifying its citizens and alien residents living within the country. The card, besides being a physical identification document, has advanced electronic functions that facilitate secure authentication, and a legally binding digital signature for nationwide online services. The card is meant to be universal and its functions are to be used in any form of business, governmental or private communications. It is helping people to make everyday communications more convenient. The widespread use of national ID card was vital for starting the Internet voting project.

In Estonia government has centralised all main national registers. It enables to interconnect the registers and develop them more purposefully. For many years the centralised National Population Register has served as a database of eligible voters. Thanks to the continuous register there is no need for additional registration of voters prior to the elections as in many other countries.

At the beginning of the project National Electoral Committee involved as many specialists in the field of IT and its security as possible to elaborate a commonly acceptable approach and thereby to raise public trust in Internet voting. Trust, amplified through media, is an important part of successful Internet based solutions.

An important aspect of organising elections is the cost efficiency. If there would not have been a national population register or an authentication system using ID cards, Internet elections in Estonia would have been very costly. Thanks to following the concept that public sector IT systems must function as a whole, the government economised financial resources.

7) Results indicating success

In October 2005 Internet voting was applied for the very first time. The new additional voting method did not increase the turnout at once, but despite the relatively low percentage of e-voters, the experiment is to be considered successful – all systems and procedures worked and there were no security problems.

³ Information Society Benchmarking Report, European Commission 2005

⁴ Survey „E-Seire”, TNS Emor Sept-Nov 2005

A survey of Estonian voters carried out in December 2005 at the initiative of the Council of Europe⁵ showed that voters who decided to vote electronically preferred the new voting method mostly because of its convenience. Internet voting was chosen over voting at polling station because of trust in e-voting and sufficient computer knowledge. An important conclusion of the survey was that voters' age, gender, political views, income and education did not have a significant impact on the decision whether to vote over the Internet or at the polling station. It undermined the fear that Internet voting would widen the digital divide.

Internet voting is just one part of the whole concept of e-government. Voting is one of the most attractive mechanisms of democracy and thereby it may attract people to use more e-services as well as the existing technology. In Estonia's case it is important to notice that over 60% of Internet voters were using their ID card electronically for the very first time.

8) Main obstacles of the case

Despite the fact that the Estonian parliament regulated Internet voting in 2002, controversy over Internet voting arose between the parliament and the president some months before its first implementation. The decision of the Supreme Court finishing the debate was made only a few weeks before voting started in September 2005. In consequence, from the voters' point of view, the campaign as well as the training to introduce the new voting method was short and disturbed by confusing messages.

According to the abovementioned survey of the European Council, people who did not choose Internet voting were afraid of the technological complexity of the voting process and found the current voting system sufficient. The main technical obstacle for voters was the insufficient knowledge of using the ID card electronically, and the lack of card readers.

9) Main sources of inspiration behind the case

The idea of Internet voting came along with the national project of ID card. Once a secure and widespread means of authentication through Internet has been introduced in a country, why not use it in as many applications as possible? In the beginning of this millennium Estonian government's priority was to develop IT-based solutions. Also the parliament approved the ideas of the government and in 2002 adopted the law to legalise Internet voting.

In Estonia the use of digital channels is steadily spreading and different e-services provided both by the public and the private sector are used extensively. Parallels are frequently drawn between Internet banking and voting, for instance, to justify the self-evidence and necessity of Internet voting. Internet voting has been seen as a key element in the process of making public services more convenient.

10) Most important lesson learned

It is essential in every country to accept that technology is becoming an integral part of the democratic process. Technology changes the direct means of participation but not the nature of democracy. We should therefore seek a compromise between old traditions and new solutions.

⁵ E-Voting in the 2005 local elections in Estonia, A.H. Trechsel, F. Breuer 2006 (http://www.ega.ee/public/Trechsel_17.02.2006.ppt)

Internet voting is just one part of a whole concept of e-government. Thanks to Internet voting, accessibility has improved and voting is made more convenient. Internet voting may also attract citizens to other e-services and technology. However, it takes time to change voters' habits and attitudes, to widen the technological knowledge and, eventually, to increase turnout at elections. Internet voting in particular may encourage the participation of the always e-ready Estonians and younger generations.

Existence of a reliable and secure authentication system is vital and raises public trust in e-government solutions, together with transparency of the whole election process. Good cooperation between different parties, public or private, is crucial to launch a successful project, and a common approach has to be found.

Elections in October 2005 were historic, since it was the first time that Internet voting with binding results was applied countrywide, and pursuant to law it will also be implemented in all the future elections and referendums. Internet voting will not replace the traditional methods in the near future, but in the long perspective Internet voting will become as natural as voting with paper ballots. Besides, the new voting method can be used not only in elections but it also enables to put direct democracy into practice more easily and efficiently.