Introduction of e-voting in Bulgaria

JANET ZAHARIEVA
BTC AD
115, Tzarigradsko shosse Blvd., Sofia
BULGARIA
janet.zaharieva@vivacom.bg   http:// www.vivacom.bg

ELISSAVETA GOUROVA
Faculty of Mathematics and Informatics, Sofia University
125, Tzarigradsko shosse Blvd., bl. 2, Sofia
BULGARIA
elis@fmi.uni-sofia.bg   http://www.fmi.uni-sofia.bg

Abstract: The rapid development of Information and Communication Technologies in last decades influenced deep changes in economy and society world-wide. It provided new tools for democratic participation of citizens and faced governments with the challenges to rapidly change and respond to the emerging demands of the information era. Since the adoption of the Council of Europe Recommendation on legal, operational and technical standards for e-voting (electronic voting) in 2004, many countries have undertaken steps for implementing it. In Bulgaria, the government recently introduced new legal provisions in order to provide citizens opportunities for casting their votes by electronic means. The paper initially provides background information on the attempts for e-voting in other countries, and afterward presents the Bulgarian case.

Key-Words: electronic voting, democratic participation, legislation, Bulgarian case

1 Introduction

The rapid development of Information and Communication Technologies (ICT) in last decades influenced deep changes in economy and society world-wide. It provided new tools for access to information and interaction at a distance and influenced deep changes in the ways of working, leaving, doing business or entertaining. The high speed of adoption of ICTs by businesses and citizens faced public authorities with enormous challenges to respond to the requirements of the information era and the demands for new electronic services. In parallel with the adoption of new technologies and new ways of public services delivery, an adequate legal framework had to be put in place, as well [1].

ICTs provide great opportunities to facilitate the interaction of governments with other stakeholders, and especially, to boost democracy and bring decision-making closer to the citizens. The emerging e-democracy is based on the usage of electronic means that enable citizens to actively participate in public life – access public information, provide opinion on public consultations, handling complaints, interact with public officials or vote [2].

Since the adoption of the first strategy on Information Society in 1999, the Bulgarian public authorities have introduced several changes in the legal framework for enabling electronic tools usage, as well as have developed a variety of online services offered to citizens and businesses. While e-government initiatives are facilitating the interactions of citizens and businesses with public officials, the recent parliamentary decisions on electronic voting will pave the way for harnessing the democratic potential of ICTs and enhancing participation in elections.

The aim of this paper is to present the Bulgarian e-voting case. Initially, it provides background information on the attempts for e-voting in other European countries. Next, are presented the recent changes in Bulgarian legislation for provision of e-voting and for compliance with the Council of Europe (CoE) Recommendation on legal, operational and technical standards for e-voting (Rec(2004)11) [3].

2 Electronic voting in Europe

The right to vote is one of the primary foundations of democracy. Voting on elections or referenda

provides citizens mechanism to actively participate in public life and democratic processes. With the wide spread of ICTs, and especially, the Internet, new opportunities emerged for citizens empowerment and challenges for preservation of human rights. The Council of Europe responded to the changing environment with the adoption on 30 September 2004 a Recommendation on legal, operational and technical standards for electronic voting [3]. Some of the reasons for e-voting as pointed out in the Recommendation are: enabling or facilitating citizens to exercise their rights (especially people with disabilities of leaving at a distance for polling places), increasing voter turnout, decreasing the public costs for organizing voting, raising the reliability of delivering voting results, etc. The legal standards are based on the principles of: universal, equal, free and secret suffrage. Subsequently, the procedures should ensure transparency, verifiability and accountability, reliability and security. For observing these principles will help the operational and technical standards presented in the Appendixes of Rec(2004)11.

A comprehensive review of the actions undertaken by the CoE and its member states is provided by Stein and Wenda [4]. On the one hand, the CoE is regularly reviewing the progress by implementation of the Recommendation and its possible revision due to the technology changes. On the other side, it is clear that most countries have faced problems with their e-voting pilots. Many countries (Belgium, Bulgaria, Finland, France, Germany, Ireland, Netherlands, Russia, Spain, UK) have introduced voting machines at polling places, while others (Albania, Azerbaijan, Austria, France, Norway, Slovenia, Switzerland) have launched pilot projects for e-voting [4]. As pioneer in Internet voting is largely accepted Estonia which has established the necessary technology conditions - highly developed infrastructure, 86% of the citizens have electronic ID-card, and has conducted Internet-voting with binding results more than 5 times in local, parliamentary and European Parliament elections [5].

It is interesting to note that among the motivation for e-voting pilots are considered the provision of opportunities to vote for nationals living abroad or for people with disabilities. For example, in Switzerland were introduced different pilots for e-voting of their nationals abroad facilitated by the cantonal organisation of elections and referendum votes [6]. The online voting was determined by the federal structure of the country and three distinct online voting systems were independently set-up in the cantons of Geneva, Neuchâtel, and Zurich. Since the first binding on-line vote in a small town in 2003 internet voting was provided to citizens living abroad in 12 out of 26 cantons [6]. Other pilots are reported in Norway [7], the UK and the Netherlands [8]. An important precondition for the introduction of the Norway e-voting is considered the availability of national PKI infrastructure and electronic ID cards [7]. Keeping voting up-to-date with daily life of people, offering more convenient ways of voting or increasing the turnout – were some of the reasons for the pilots in the UK and the Netherlands [8], whereas in the Netherlands were made several attempts to ensure online voting for citizens abroad instead of the postal vote. Some of the general concerns in the three cases are related to ensuring the security of the voting systems when using non-trusted computers at home, overcoming authentication and verifiability problems.

3 Legal bases for E-voting in Bulgaria

Bulgaria acknowledges that electronic delivery of public services is a key driver for improving the business environment and for democratic participation of citizens. An annual growth of e-services offered by public administrations, both central and regional ones, is notices in the last few years. It is interesting to note, however, that the Bulgarian government emphasises on business stakeholders in the provision of online services with the aim to facilitate business interactions with public authorities, and to diminish bureaucracy, inefficiency, and response time [1].

3.1 Motivation and governance

Bulgaria similar to many European countries is faced with the decreasing participation in elections. It is, subsequently, considered that remote internet voting might be a driver for increase the electoral activity, especially among younger, disabled and Bulgarian citizens living abroad.

The results of the National Referendum carried out in October 2015 showed that Bulgarian citizens are quite supportive to the e-voting - 1 883 411 voters said "yes" for implementation of remote electronic voting. As a result National Assembly adopted amendments in the Election Codex by which remote e-voting shall be introduce within 24 months. In addition, in compliance with the e-voting standards set by Rec(2004)11, a new package of amendments in Bulgarian legislation was made, namely in: Bulgarian Personal Documents Act,

Electronic Documents and Electronic Signature Act, and the new Electronic Identification Act.

According to the Amendments in the Elections Codex a newly established Remote e-voting Committee shall be responsible for setting up the system for remote e-voting. Members of the Committee shall be appointed by the Central Election Commission (CEC) after public hearing of the nominees.

The establishment of a dedicated body in charge for e-voting process follows the Estonian model. Nevertheless, the Committee is appointed by and accountable to CEC, it is quasi-independent with broad empowerments. No doubt, the biggest advantage of the existence of the Committee shall be timely and adequate decisions-making, obeying the principle "make assurance double sure". On the other hand, a detached body may lead to lack of institutional integrity. CEC is the state body in charge of the voting process as a whole, and e-voting should not be treated separately. If not directly responsible, CEC might not "recognize" the on-line voting and consider it like experiment that is out of its own responsibilities.

Besides other duties, the Committee shall be directly responsible for adherence of the mandatory standards for e-voting, established by Rec(2004)11.

3.2 Legal provisions compliance

As it was pointed out above, Rec(2004)11 considered specific principles for e-voting. The Universal suffrage focuses on [3]:

- voter's interface of an e-voting system to be understandable and easily usable;
- registration requirements not to impede participation in e-voting;
- design of the e-voting systems to be done in such a way so as to maximise the opportunities that such systems can provide for persons with disabilities;
- remote e-voting shall stay additional and optional means of voting till it became universally accessible.

Introduction of the e-voting in Bulgaria doesn't repeal the paper voting. On the contrary, the amendments include interrelations between all means for casting the votes. Amendments in the Elections Codex, related to the online voting envisage two trials to be carried out before effective launch the e-voting as a legitimate mean for suffrage, together with the paper ballot and machine voting.

Pre-registration for participation in remote vote-casting is mandatory. Possession of an e-ID shall be a condition precedent for casting a vote online. According to the draft amendments in the Bulgarian Personal Documents Act, all Bulgarian ID plastics, issued in 2018 and beyond shall contain e-ID data, unless a given person expressly refuse it (opt-out principle). Until 2018 the Ministry of Internal Affairs shall be deploy national infrastructure for e-IDs' issuance and verification. This package of measures supposed to provide equal opportunity to every Bulgarian citizen to participate in the elections by voting online. The law goes even further by setting out that each personal ID plastics may contain also e-signature, if required by the applicant (opt-in principle). Personal e-ID and e-signature might be stored in more than one device – personal ID card plastic, token or smart phone, provided the later are certified and in conformity with applicable standards.

According to Rec(2004)11 [3], the equal suffrage principle requires: One voter – One vote:

- voter shall be prevented from inserting more than one ballot into the electronic ballot box;
- every vote deposited in an electronic ballot box shall be counted, and each vote cast in the election or referendum shall be counted only once;
- where electronic and non-electronic voting channels are used in the same election or referendum, there shall be a secure and reliable method to aggregate all votes and to calculate the correct result.

Subsequently, Art.214e of the Election Codex is definite: only the last cast shall be counted – either the last remote vote or the paper ballot, casted in the Election Day. Within the period of remote voting – 4 to 7 days before the Election Day, a voter may cast a vote as many times as wished. The software system for remote voting shall be designed in such a way, so as to disregard the previous votes and to store only the last one.

The Committee shall extract the lists with voters that have voted remotely and shall send these to district electoral committees in 24-hour term before the Election Day.

The Rec(2004)11 free suffrage principles focuses how to prevent voters from coercions [3]:

- The organisation of e-voting shall secure the free formation and expression of the voter's opinion.
- The way in which voters are guided through the e-voting process shall be such as to prevent their voting precipitately or without reflection.
- Voters shall be able to alter their choice at any point in the e-voting process before casting their

vote, or to break off the procedure, without their previous choices being recorded or made available to any other person.

- The e-voting system shall not permit any manipulative influence to be exercised over the voter during the voting

There are voices in Bulgaria arguing that remote e-voting facilitates the illegal practice of votes buying. However, the practical steps considered will make it a tool to fight this malicious practice:

1. Mandatory pre-registration shall timely warn the authorities for suspicious concentration of applicants for remote-voting in non-typical areas
2. Mass-voting from few IP-addresses, should be also a trace for security services.
3. Biometric data stored in the personal documents as part of the identification shall defend against mass collecting of smartcards for voting.
4. The opportunity for repeated voting gives anyone a chance to oppose to corporate or social misuse of his/her freewill by re-voting (online or on paper). The Election Codex (art.214г) authorizes change of vote by repeated remote voting during the prescribe term. The number of repeated votes is not limited. According to art.5 new paragraph 2 the duration of remote voting is "at least 4 days but not more than 7" and shall end 4 days before the Election Day. In Estonia the term is 6 days, ending 1 day before the Election Day.

And last but not least, if the remote e-voting increases the number of voters as it is expected, the significance of buying votes shall be diminished.

The other problematic issue with free suffrage is the so called "family voting" when the influence how to vote is not a matter of criminal offence like vote-buying or corporate coerce, but pressure by members of the family. The results of 2011 census showed that more than 1/3 of citizens had counted themselves via Internet. In most of the cases younger and digitally literate members of the family (including the author of this article) had done the job for their elder relatives. Casting a paper ballot might be the solution of this moral problem, although shall be difficult to apply in small villages.

Many concerns raises the secret suffrage of Rec(2004)11 which stipulates that [3]:

- e-voting shall be organised in such a way as to exclude at any stage of the voting procedure and, in particular, at voter authentication, anything that would endanger the secrecy of the vote.

- the e-voting system shall guarantee that votes in the electronic ballot box and votes being counted are, and will remain, anonymous, and that it is not possible to reconstruct a link between the vote and the voter.
- the e-voting system shall be so designed that the expected number of votes in any electronic ballot box will not allow the result to be linked to individual voters.
- Measures shall be taken to ensure that the information needed during electronic processing cannot be used to breach the secrecy of the vote.

Secrecy of the vote is the leading principle in the election process. The amendments in the Election Codex have built precautions against reveal of personal votes. Procedure for erase of public keys and archiving are established in art.296. The rules and detailed proceedings shall be further developed in the secondary legislation.

In practice the double-envelope approach, used in postal voting, is applied to electronic voting. Experts proposed the so-called "blind signature" where voting process is carried in two steps. First, the election committee, using cryptography, "stamps" the vote without seeing it and counts the voter. On a second step voter sends his/her stamped vote, without the identifying information.

Usage of anonymous credentials are also debated.

Which of all these method shall be used in Bulgaria is not determined yet.

Ensuring transparency and procedural safeguards are other essential issues of Rec(2004)11 [3]:

- Member states shall take steps to ensure that voters understand and have confidence in the e-voting system in use. Information on the functioning of an e-voting system shall be made publicly available.
- Voters shall be provided with an opportunity to practise any new method of e-voting before, and separately from, the moment of casting an electronic vote.
- Any observers, to the extent permitted by law, shall be able to be present to observe and comment on the e-elections, including the establishing of the results.

Open source exit code is mandated by the amendments in the Election Codex. Open source by definition is a mean of transparency and accountability, on top it secures re-usage: scientific analyses, non-governmental control. Keeping in secrecy systems' functioning is not beneficial either for its security or for confidence of the general public.

The law also obligates the Committee for remote electronic voting to make its sessions publicly available. Observers shall be given with access to the informational centers where systems are functioning.

Another Rec(2004)11 concerns are related to verifiability and accountability [3]:

- The components of the e-voting system shall be disclosed, at least to the competent electoral authorities, as required for verification and certification purposes.
- Before any e-voting system is introduced, and at appropriate intervals thereafter, and in particular after any changes are made to the system, an independent body, appointed by the electoral authorities, shall verify that the e-voting system is working correctly and that all the necessary security measures have been taken.
- There shall be the possibility for a recount. Other features of the e-voting system that may influence the correctness of the results shall be verifiable.
- The e-voting system shall not prevent the partial or complete re-run of an election or a referendum.

According to the Riigikogu Election Act Estonian voters are able to verify their e-votes with a smart device (mobile phone or a tablet) equipped with a camera and Internet connection.

In Bulgaria preliminary audit of the e-voting system shall be done before each elections.

Most likely a verification process similar to Estonian's shall be put in practice in Bulgaria: a receipt that can be verified against a central system, without containing the actual vote. The receipt can be issued via a smartphone app, sms, the screen, or any combination of those for a higher level of assurance.

3.2 Remaining problems

Technical solutions and software decisions shall be found, trials and audits shall manifest bugs, omissions and drawbacks; hardware and software infrastructure shall be deployed.

Deployment of high speed broadband in rural and remote areas is of a crucial importance to overcome the digital divide between urban and rural areas. The revival of small abounded villages and their settlement with younger is directly related with establishment of high-speed BB that gives connectivity with public e-services and

This might be done by:

1. Public-Private Partnerships between municipalities and private communications companies in the small towns and villages
2. Incentivize the growth of mobile internet that is the fastest way to cover rural and remote areas, where investments in fixed networks are financially unjustified. To boost deployment of 4G/5G networks in Bulgaria, the Government shall release the spectrum band in 800 MHz as soon as possible. The issue with occupation of these valuable frequencies for military purposes is pending already for years and it's about time to make a progress.

The major problem in using remote e-voting in our view shall be the Human Capital. In terms of Internet use by its citizens, a digital economy is also fuelled by its citizens' trust in the online channel.

Digital skills gap: Bulgaria is among the laggards in the EU regarding usage of public e-services and computer literacy. With Human Capital score 0.33 according to DESI [9] for 2015, Bulgaria is the last among the 28 EU countries: only 31% of the population has basic digital skills, only 55% of the individuals use internet at home. Bulgaria needs to address its severe digital skills gap. Some may argue that remote e-voting is only for younger and they are well aware with new technologies. But the e-voting statistics in Estonia shows that percentage of online voters is equally spread among all ages groups. We believe that none of the groups in the society shall be a priory excluded from potential participants in remote casting of votes.

Package of suitable measures should be taken to:

1. Educate scholars in secondary schools with practical digital knowledge. Introduction of contemporary teaching methods by using modern technologies – tablets, interactive blackboards, shall contribute not only for gathering the digital skills, but for caching the interests of scholars to education as a whole.
2. Dedicated groups of volunteers may work with elders
3. Interface of remote e-voting has to be simple, easy to use, following some of already known services, for example POS-terminals

Increase the percentage of ICT specialists: The demand for software specialists is three times higher than the supply by educational institutions (2000 as against 6000 needed per year), with a trend to increase in the medium and long term. However, the share of ICT specialists in the workforce in Bulgaria is the second lowest in the EU countries. On the positive side, the number of STEM (science, technology and mathematics) graduates slightly increased (1.4% up from 1.3% in DESI 2015) [9].

4 Conclusion

At present, the most widely spread means for voting is paper ballot, cast with personal presence at dedicated polls. The legislation in some countries allows voting via proxies or via postal services. Remote e-voting is the tool that slowly shall get power and most probably shall be preferable in near future.

The pilots for e-voting are step-by-step overcoming the technical problems. As it was stressed above, the security and trust are the main concerns on which researchers and companies are actively working. The question remains when the technology is in place, and adequate legal provisions, if the expectation for increased participation of citizens will be achieved. In Bulgaria, at least, the large diaspora will have a suitable tool for exercising the right to vote. For younger technology-savvy people the e-voting will be a stimulus to spend some minutes for casting. The most essential challenge in Bulgaria is to make efforts to bridge the digital divide gaps, and to ensure equal opportunities to people in large cities and remote villages to grasp the opportunities of the information era and the participate in e-democracy.

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