

E-Voting: International Developments and Lessons Learnt

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Abstract: Countries worldwide are carrying growing interest in e-voting. The paper gives a brief overview on recent developments. The countries are joined in their interest by industry and international organisations. All three groups of actors - and individual actors within each group - have different and sometimes diverging reasons for their interest, and thus different goals. The paper focuses on remote / i[n]ternet]-voting. Member states of the Council of Europe (CoE) are in their final phase of standard-setting on e-voting. The paper provides a preview on a possible CoE recommendation. As the number of e-voting tests is growing, so are the lessons learnt. The paper contains a list of suggestions on ways how best to introduce (remote) e-voting.

1 Growing attention to e-voting

E-Voting has been attracting considerable attention during the last years. This fact is based on the one hand upon interest and attention devoted to e-government, e-democracy, e-governance, etc. On the other hand, interest in e-voting is founded in problems with domestic election systems, e.g. lacking flexibility with respect to timeframes and physical accessibility of polling stations, which progressively prevent citizens to cast their vote at these places.

Interest in e-voting exists in various quarters: government, parliaments, electorate, academia and industry - with each having sometimes conflicting interests. They can differ with respect, e.g., to speed, *individual* leadership, safety, user friendliness, etc.

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E-voting is, however, no main priority of governments, even of those which are at the forefront of implementing e-government. It is not even mentioned in the EU *eEurope* action plans. International institutions started involvement in e-voting as well. While the Council of Europe (CoE) has taken the lead, elaborating legal, operational and technical standards, the EU has been focusing on supporting small pilots as well as financing targeted research. International QUANGOs, too, are active in the field.²

A generally accepted understanding of e-voting, let alone such a definition is missing. The same applies to remote e-voting. The term e-voting is being used from casting the vote by electronic means to asking the internet community for an opinion on a political issue, as well as from tabulating the votes by electronic means to integrated electronic systems from voters' and candidates' registration to the publication of election results. Other terms, like e.g. e-elections and i-voting have been introduced in order to clarify the specific contents of e-voting. The term e-voting should encompass only political elections and referenda, not initiatives or opinion polls or selective citizens participation between elections or referenda (e-consultations).

In general, two main types of e-voting can be identified

- e-voting supervised by the physical presence of representatives of governmental or independent electoral authorities, like electronic voting machines at polling stations or municipal offices, or at diplomatic or consular missions abroad; and
- e-voting within the voter's sole influence, not physically supervised by representatives of governmental authorities, like voting from one's own or another person's computer via the internet (i-voting), by touch-tone telephones, by mobile phones (including SMS), or via Digital TV, or at public open-air kiosks - which themselves are more venues and frames for different machines, like, e.g., PCs or push-button voting machines, with or without smart card readers.

By this summary categorisation, advance voting of some Nordic countries at postal offices, or kiosk voting at municipal offices can fall, according to specific circumstances, in both of the above cases.

This paper will focus mainly on remote and internet e-voting.

Remote e-voting links the possibility of quick and reliable counting to that of voting outside of polling stations and traditional polling times as well as to the possibility of voting from abroad irrespective of locations of diplomatic and consular missions as well as unreliable postal services.

i-voting is of special interest to study as it is both most globally and convenient to use as well as most challenging with respect to legislation, technology and operation, and to understanding and trust by the electorate.

² e.g. the *Association of Central and Eastern European Election Officials (ACEEEO)*

As a working hypothesis, remote e-voting, *i.e.* casting an e-ballot without the physical supervision of a government official, can be regarded in many instances, from a legal perspective, similar to postal voting, as remote e-voting represents only a different channel of transmission of the ballot: the ballot is transmitted by electronic means instead of by post. There are, however, some differences in particular in the technical domain, *e.g.* on the audit trail and the scale of possible breakdowns.

Concluding this introduction, the author proposes to regard remote e-voting as a means by which government / administration can and indeed should provide citizens with an easier access to government services (e-administration, e-government) and thus enhance the possibilities for citizens' participation in democratic decision-making (e-democracy, e-governance).

2 An international overview

A number of countries, worldwide, has started or considered starting thinking and experimenting as well as implementing e-voting. In Europe, a variety of e-voting schemes is developed, tested and piloted across the continent. Outside of Europe, e-voting at polling stations is widely practised in the USA and Brazil - progressively followed by Mexico and considered by other Central and Latin American countries -, in some countries of the former Soviet Union and in India.

The reasons for the growing interest in e-voting may not be identical in all cases. In the draft CoE Recommendation, the following reasons are listed:

- enabling voters to cast their vote from a place other than the polling station in their voting district;
- facilitating the casting of the vote by the voter;
- facilitating the participation in elections and referendums of all those who are entitled to vote, and particularly of citizens residing or staying abroad;
- widening access to the voting process for voters with disabilities or those having other difficulties in being physically present at a polling station and using the devices available there;
- increasing voter turnout by providing additional voting channels;
- bringing voting in line with new developments in society and the increasing use of new technologies as a medium for communication and civic engagement in pursuit of democracy;
- reducing, over time, the overall cost to the electoral authorities of conducting an election or referendum;
- delivering voting results reliably and more quickly; and
- providing the electorate with a better service in pursuit of democracy, by offering a variety of voting channels.

As early developments with e-voting are well documented, we will concentrate in the following brief overview of individual countries on developments in 2003 and early 2004.

Germany started e-voting tests and pilots already in 1999, and is steadily continuing them, only at non-political/parliamentary elections, like at universities - students' bodies elections (Osnabrück, Bremerhaven) -, at local advisory level - youth community and senior citizens councils - as well at public and private employees councils. An elaborate set of - governmentally commissioned - requirements for on-line election systems is expected in the first half of 2004.

Switzerland - a country where postal voting is widespread because of the high number of referenda put to the electorate - has been undertaking remote e-voting pilots at local level, with respect to referenda, using different methods, and may enlarge the number of persons and types of polls involved, in the coming years - before deciding if e-voting will be definitely introduced. The conduct of e-referenda in 2003 and 2004 in Anières, Cologny and Carouge (a suburb of Geneva) has attracted considerable participation - higher than expected - as well as international attention. [Gen04]

The United Kingdom has been piloting, *inter alia*, i-voting at a large scale at municipal level, primarily in England, and *was* expected to extend these pilots at the 2004 EP election to a few million electors. While already in July 2003 the *Electoral Commission* stated that "we are clearly some way from the prospect of an e-enabled general election" and requested from government a road map and changes in legislation as well as a focus on electronic voting kiosks [UKEC03], in its recommendation for the electoral pilots at the 2004 elections, it did not recommend that an e-enabled element be included in any pilot schemes, as no region was ready for such innovation [UKEC04].

All French expatriates residing in the USA were given the possibility to validly elect via the internet their representatives to the French 'High Council of French Citizens Abroad' (*Conseil supérieur des Français de l'étranger - CSFE*), a public law body designating 12 members of the Upper House of Parliament (*Sénat*), in May 2003. This was well taken up and led, amongst other consequences, to a marked reduction of work by French consulates on election day - more than half of the votes were cast electronically in any district - but not to a general rise in participation [CSFE03].

Spain, too, has started testing e-voting in polling stations, kiosks and via the internet, in 2002, *inter alia*, through a 'body salinity identification'. An i-voting test for Catalonians abroad, in parallel to the November 2003 election to the regional parliament was conducted in Argentina, Belgium, Chile, Mexico and the USA. Participation was high (730 persons) and all requirements plus additional advantages were met [SCYT03]. Furthermore, on 14 March 2004, on the occasion of parliamentary elections, voters of three municipalities (Lugo (Mosteiro-Pol), Zamora and Toro (Zamora)) were given the possibility to test i-voting with smart cards after having cast their votes at a polling station. The Spanish Ministry of Interior stressed in its report the extraordinary acceptance of this channel by the population, the high number of participants, the ease in using the system and the necessity to legislate in this direction. [MinE03]

In the USA, the *Secure Electronic Registration and Voting Experiment* SERVE [SERV04], designed for expatriates participation in the US presidential elections of November 2004, was shelved in spring 2004 based upon a report of four members of a review group financed by the Department of Defence. They recommended shutting down the development of SERVE immediately and expressed the view that there "is no good way to build such a voting system without a radical change in overall architecture of the Internet and the PC, or some unforeseen security breakthrough" [JRSW04] The pilot was initially directed towards 1 million overseas electors, of whom 100.000 were expected to participate.

Since 2000, Ireland was carefully planning and testing kiosk e-voting for introduction at *all* polling stations at the EP and local elections of 11 June 2004, by a system which has been in use for years in two other European countries. Based upon a critical paper by two scientists [McGi03], reinforced by opposition action, and finally upon the negative "interim" report of a government-sponsored independent *Commission on Electronic Voting* [CEV04], e-voting at polling stations was not introduced for the mid-2004 elections.

The Netherlands – besides its traditional e-voting at polling stations – decided to run valid pilots on i-voting and telephone voting at the EP elections of mid-June 2004, also from abroad, while e-voting at polling stations would be eased. This country, thus, remained the only country, which was willing to conduct an important e-voting pilot in the course of the year 2004.

Italy and France have been testing an e-voting system in polling and police stations on small scale, with smart cards and fingerprint recognition, and which will be tested again in both countries at the EP elections of 2004 where the elector can choose to vote for the MEPs of the country of residence or of citizenship. From a technical point of view, this method could also be used on private internet computers.

On the project side, Slovene and Hungarian draft provisions for e-voting were elaborated which, in 2003, did not find the approval of the respective parliament. The Czech Republic may test e-voting in 2005/06.

Estonia, having the legal provisions already in place, is planning to pilot (advance) i-voting with smart cards and electronic signatures, at local elections in autumn 2005, with tests in autumn 2004.

3 The Austrian case

In Austria, like in many countries, too, e-voting is not a first priority of the government. The reasons for this state of affairs in Austria are varied: first of all, the Austrian Federal Constitution sets as election principles one more than the international "average" of the universal, equal, free, secret and direct suffrage [EC02]. It adds the personal exercise of the vote. In addition to this constitutional requirement, on the one hand, election provisions need a qualified - two thirds - majority in Parliament to be adopted. On the other hand, the Federal Constitutional Court held in 1985 that postal vote was contrary to Austria's Constitution.³ According to that decision, the physical presence of the voter appearing before a governmental authority is required.

A first test of remote e-voting by internet was undertaken *in parallel* to the elections of the *Austrian Federation of Students*, in May 2003, at an institute of the Vienna University of Economics and Business Administration, by a team of scientists led by Alexander Prosser, of Vienna University of Economics and Business Administration, which had developed the e-voting system used, itself.

As the *Austrian Federation of Students* is a public law body, its elections are governed by federal legislation. For such elections, as for those of the Federal Economic Chamber, legal provisions for e-voting already exist – while e-voting (like remote voting by post) is currently excluded for elections of the first layer in Austria, *i.e.* those of the head of state, the federal parliament, regional state parliaments and the European Parliament as well as for referenda.

According to reports by the organisers the i-voting test at the Vienna University of Economics and Business Administration was a complete success. [PKKU03] Out of 979 eligible persons, 355 e-“votes” were cast – which represents a participation rate (36,3%) which was 40% higher than those who cast paper ballots at polling station (25,9%). The - political - “results” were similar to the votes cast on paper ballots.

On May 13, 2003, the Austrian Federal Council of Ministers approved an *e-government strategy*. This decision includes a provision that Austria will attempt to be ranked amongst the top five countries in a benchmarking on the EU *action plan eEurope 2005*. In the annex by the Foreign Ministry to the government strategy on e-government, e-voting is listed as a project. [EGOV03]

³ G18/85, VfSlg. 10.462

On July 29, 2003, a number of Austrian academics, including Prosser's team, presented during a meeting with the media, well reported, the request for creating the political and legal frames for e-voting in Austria, given its technical feasibility, and presented an *action plan for e-voting* [OCG03]. It contains a 4-step-approach, by which target groups for e-voting should be identified - first with respect to elections with small participation, including by Austrian citizens residing abroad - and the legal bases (re)considered; the necessary infrastructure requirements be created (including a centralised electronic voters register, the 'citizens card' designed according to data protection requirements, and the availability of the 'citizens card' assured to the target groups⁴); then a number of tests as well as pilot elections be conducted in order to accumulate the necessary information and feed-back; and finally the legal frame be adapted according to the necessities for e-voting in Austria.

Additional movement on discussing e-voting in Austria was brought in summer 2003 by the setting up of the 'Austria Convention' (*Österreich-Konvent*) - somehow similar to the past EU Convention - which is tasked to overhaul the Austrian constitution, and which included election issues including e-voting in its work programme.

The Austrian *Federal Act on E-Government* [EGOV04] entered into force on March 1, 2004, and provides - besides the residents' register - for the setting up of a *supplementary electronic register*. In order to electronically prove their identity, persons who are not included in the residents register, the commercial register or the associations register, can be registered in the *supplementary register* upon their request. To this end, data similar to those for residence registration are required.

In the explanatory memorandum to this Act, the provision mentioned above is explained as "*a first step towards enabling Austrian expatriates in a further future e.g. to be given the possibility of casting votes at Austrian elections in electronic form.*"⁵

Following-up to the first test on remote e-voting by internet in parallel to the elections of the *Austrian Federation of Students* in 2003, the same project team conducted a second test of its system in parallel to the Austrian presidential elections of 25 April 2004,⁶ amongst the 20.000 students of the Vienna University of Economics and Business Administration. 1.786 students participated, and the political result was extremely similar to that of all Austrian voters. [PKKU04]

In late spring 2004, the Federal Ministry of Interior established a working group on e-voting with broad participation, in order to study and establish a report, on various aspects of e-voting.

⁴ A massive roll-out of these smart cards is foreseen from mid-2004 onwards first by banks (exchange of ATM cards) and later followed by social security institutions when the Austrian social security cards will be issued.

⁵ explanatory memorandum to the (government) bill, in German:
http://www.bka.gv.at/datenschutz/v3/egov_erl.pdf accessed on 2004-03-30)

⁶ At the presidential election, participation by expatriates while being the highest so far at any presidential election, declined with respect to the previous parliamentary election. Of those expatriates who are - optionally - registered with Austrian embassies and consulates and regularly informed on elections procedures, only one quarter has registered as voters, of which only one third participated in the elections. These voters represented 7,6 percent of those registered as expatriates at embassies and consulates, and 4 percent of the estimated total number of all Austrian expatriates.

4 Council of Europe's standard-setting

In addition to e-voting activities by countries, the most remarkable development on e-voting by international organisations is the standard-setting exercise within the framework of the Council of Europe (CoE). Upon initiative of the UK and a few other member states, the CoE took up the issue of e-voting as first and so far only international institution to do so in depth. The CoE has such not only the first right but also - so far - the monopoly on this issue – from an international organisation's perspective.

After a brainstorming meeting of national experts on 21 and 22 November 2002 [CoE02], terms of reference were adopted for an intergovernmental committee of experts⁷ charged to develop an *”intergovernmentally agreed set of standards for e-enabled voting, that reflect Council of Europe member states’ differing circumstances and can be expected to be followed by the ICT industry”* in the form of a draft Recommendation for adoption by the CoE Committee of Ministers.

Two meetings of the expert group were held in 2003 and two are scheduled for 2004, bringing the work of the group to a close in summer 2004. Two sub-groups - one on legal and operational standards (EE-S-LOS), and the other on core technical standards (EE-S-TS) - held meetings in between those of the (plenary) expert group.

The governmental experts' work proved to be much more difficult than initially expected. Different countries had - besides different voting schemes, different basic views on e-voting, different definitions of e-voting, different experiences with e-voting and experts with different expertise - different expectations for the expert group to deliver. Issues of levels of security, legal vs. technological leadership, government vs. industry orientation, and technological neutrality were repeatedly at the heart of the discussion. Quick progress was also hindered by specific existing election provisions in one or very few countries which were not only substantially different from those of others but seemed in some instances contrary to the commonly accepted European election standards. The main challenge, however, well mastered, was the necessary close co-operation of and mutual understanding between, legal and technology experts, on almost any issue of e-voting. On the other hand, the number of countries engaged in the whole process was small. While on legal and operational issues, possibly only a dozen or even less (of the 45) member states was continuously participating in the discussion, on technical issues the number was even smaller than that.

⁷ *Multidisciplinary Ad Hoc Group of Specialists on legal, operational and technical standards for e-enabled voting (IPI-S-EE)*

The probable outcome of this work will be intergovernmental standards, which will serve as *minimum* standards for legislation and product requirements for member states and for third parties, in particular the ICT industry. E-voting may in the forthcoming Recommendation be broadly defined as e-election or e-referendum that involves the use of electronic means in at least the casting of the vote. Numerous provisions in the draft Recommendation relate to e-elections in general, which are understood as political elections in which electronic means are used in one or more stages. On a possible definition of *remote* e-voting, consensus was evolving on e-voting where the casting of the vote is done by a device not controlled by an election official. The Recommendation will most probably not contain a view on the usefulness or necessity to introduce e-voting but an *indicative* list why individual countries are embarking on a course towards e-voting. In the legal and operational field, starting from and based upon, relevant international obligations and commitments, only e-voting specific provisions will be included.

5 Lessons learnt

On lessons learnt from e-voting tests, a division into a number of categories of cases may be useful:

- early (private) pilot projects (EC-funded)⁸;
- countries hastily trying to introduce e-voting (H, SLO, US, ...);
- academic work and its field tests (D, A);
- election administrations of countries, regions or municipalities with advanced pilots (CH, UK).

On lessons learnt from these e-voting events, a number of reports are available and need a comparative analysis. To this, the problems arisen within the CoE standard-setting exercise may be worth analysing as well, in order to draw conclusions for individual countries' or possible harmonised e-voting.

Other lessons are those learnt from legal expertise of national or international bodies. Here, the French National Commission on information technology and fundamental rights - *Commission nationale de l'informatique et des libertés (CNIL)* - has to be mentioned. It issued a recommendation on the safety of e-voting systems on 1 July 2003 [CNIL03], based upon two decisions on individual cases on the admissibility of e-voting systems. Focus is given to requirements on the technical side including specific requirements that a system must be able to prove *ex post*.

Besides a German set of - governmentally commissioned - requirements for on-line election systems expected in the first half of 2004, the Geneva "11 commandments for internet voting" are of special interest as they incorporate experiences with i-voting:

⁸ papers and links via the EC-sponsored *eDemocracy Seminar* (Brussels, 12-13 February 2004): http://europa.eu.int/information_society/programmes/egov_rd/events/edemocracy_seminar/agenda/index_en.htm

- (1) Votes cannot be intercepted nor modified;
- (2) Votes cannot be known before the official ballot reading;
- (3) Only registered voters will be able to vote;
- (4) Each voter will have one and only one vote;
- (5) Vote secrecy is guaranteed; it never will be possible to link a voter to his/her vote;
- (6) The voting website will resist any denial of service attack;
- (7) The voter will be protected against identity theft;
- (8) The number of cast votes will be equal to the number of received ballots;
- (9) It will be possible to prove that a given citizen has voted;
- (10) The system will not accept votes outside the ballot opening period;
- (11) The system will be audible. [Chev03]

On the compatibility of remote voting and electronic voting with the standards of the Council of Europe, the *European Commission for Democracy Through Law (Venice Commission)* has issued a report in spring 2004 [ECDL04]. According to its conclusions, remote voting is compatible with CoE standards if certain preventive measures are observed. For non-supervised e-voting, in order to be compatible with CoE standards, the system has to be secure and reliable. To this end, technical standards must overcome threats different from those existing with postal voting, the secrecy and transparency of the system being keys to that goal.

6 How best to introduce e-voting

While the following cannot be exhaustive or argued in detail here, we wish to present a few suggestions how best to introduce (remote) e-voting.

- suggest e-voting as additional, optional voting channel;
- start with identifiable group(s) of persons who wish / *need* e-voting, *e.g.* persons away from polling stations on election day(s), handicapped and bedridden persons incapable of going to polling stations, and mobile and busy people unwilling to go to polling stations but interested in participating in elections;
- go for added-value schemes which may be different in individual countries, with respect to *existing* voting channels and procedures;
- full understanding and trust by voters and lawmakers - including of the opposition⁹ - are absolutely necessary;
- only a step-by-step approach leads to success: *election tests* separate from or parallel to, elections are to be held *before* valid *test elections (pilots)* can be, and small *before* big numbers of electors should be involved;

⁹ In May 2004, five of the ten registered political parties in Kazakhstan requested the postponement of the introduction of e-voting because it was regarded by them as premature "when the transparency of voting with regular ballots has not been guaranteed ... and creates conditions for various manipulations" (Interfax 21.05.04 09.57 MSK).

- in countries where postal voting is practised, extending postal voting to remote e-voting eases the introduction of e-voting;
- the best, as most reliable way, is identification with the help of electronic signatures / smart cards (not PINS);
- in order to avoid risks through postal transmissions, *any* transmission related to e-voting shall be possible / offered by electronic channels.

7 Conclusions

No universal trend towards a definite introduction of e-voting can be detected, not even by countries where first steps were undertaken on such a way.

Countries which hastily tried to implement large-scale e-voting without sufficient testing and public debate witnessed effective resistance by various quarters.

The implementation of e-voting has been undergoing ups and downs recently, from which, respectively, conclusions have to be drawn in order to introduce e-voting correctly and effectively.

In many countries considering the introduction of e-voting, legal, technological and political challenges still have to be solved and overcome, and this step, once achieved, subsequently explained to the interested public.

Meaningful advances on the way to e-voting can be achieved - besides trans-border exchange of views and experiences - only by close co-operation of and mutual understanding between, first of legal and technological experts, then by lawmakers and experts, and finally by politicians, experts and the public.

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