

Stumbling Blocks of Electronic Voting Revealed by U.S. and European Experiences



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INTRODUCTION

The question of electoral participation has today become a major issue for the future of democratic systems. In the USA and Europe, voter turnout continues to fall. Faced with this strong erosion of political participation, the watchword is mobilization.

In this connection, several proposals, chiefly technical in nature, have been put forward to curb this rising voter absenteeism. For example, several projects have been developed with a view to putting in place new voting procedures, including among others, telephone voting, postal voting, computer voting, Internet voting, using pre-perforated cards, mobile phones or digital terminals installed in public places (shopping centres, public buildings, etc.).

BACKGROUND

In the face of this multiplication of new experiences, it is in the interest of democracy to examine, in a rigorous and objective way, such developments, based on empirical material provided by the political entities that have tested one or more new voting methods. However, the relevant information is often dispersed among various governmental and electoral authorities and available solely in the political entity that initiated the experiment. It is therefore appropriate to summarize the main experiments carried out and the main lessons to be learned from them.

It is not possible, however, to review all the experiments or to cover every new possible voting technique, as this would require far more than a short article. Consequently, we will focus solely on USA and Europe, and on two forms of e-voting that are computer voting and Internet voting. Actually, there is a debate on the validity of this distinction. For some, the appropriate distinction

is between attended e-voting and unattended e-voting. The previous supposes that the voter go to a polling station to cast a vote, while, for the later, the voter can cast his vote from any place where there is an electronic device connected to a network transferring the vote to the electoral authorities.

In this article, we do not follow this line of argument. The core distinction is between computer voting and Internet voting. In the previous, voters go to a polling station to cast a vote on a computer that is not connected to any network. In the latter one, the vote is cast through any electronic device connected to a network transferring the vote to the electoral authorities. Unlike unattended e-voting, the connected electronic device used can be in a polling station. The choice in this article is related to the fact that when there is a connection to a network (in the polling station or not), it has crucial consequences for the security of the system.

Within this framework, we will address only the most interesting experiments in terms of the issues involved in such changes. To that end, we have used public and semi-public documents¹, as well as scientific studies, for the purpose of our evaluation. On that basis, we will set out the details of the main experiments in this area, before highlighting the lessons learnt and problems revealed by those large-scale tests.

COMPUTER VOTING

The most significant breakthrough in the use of NICT in the electoral process concerns computer voting. In numerous countries, regions and cities, its use is becoming increasingly widespread.

In The Netherlands, computer voting has become common practice for voters. At the last Dutch general election in May 2002, 95% of the Dutch municipalities

provided electronic voting machines (Nederlandse Ministerie van Binnelandse Zaken, 2003). Citizens in the Netherlands use touch panels to vote. In Belgium, since 1994, computer voting is used in several municipalities. At the last federal elections in 2003, computer voting had replaced paper-based voting in 34.1% of the country's cities (44% of the population)². Florida is also noteworthy in this regard. A touch-sensitive screen was one of the voting solutions used in that state in the 2004 presidential elections to avoid the voting imbroglio of 2000. Finally, in various countries, including UK, computer voting is one of the new voting methods currently being tested (Office of the Deputy Prime Minister (ODPM), 2002)¹.

The success of computer voting cannot be explained in terms of convenience, since voters still have to go to a polling station to cast their vote. Therefore they do not save any time, or very little time. Moreover, observers agree that computer voting does not improve strongly the level of voter turnout at elections (MORI, 2003). Moreover, it is even possible that the queues caused occasionally by technical problems have discouraged certain electors.

The main advantages of this new voting technique correspond to objective such as ensuring the accuracy of counting and avoiding errors and spoilt ballots. With regard to the risk of fraud or malpractice when counting votes, computer voting is considered less vulnerable to "rigging" than paper-based voting or voting using pre-perforated cards. This security criterion is particularly important in countries where trust in the authorities is far from absolute (Saltman, 1998). In addition, and that is undoubtedly the main argument, computer voting avoids the problem of votes being invalidated because of voter errors such as double voting and spoilt ballots (Independent Commission on Alternative Voting Methods (ICAVM), 2002).

Nevertheless, those positive arguments are sometimes called into question by the assessments made in countries using computer voting. As regards the security and secrecy of the ballot, various problems have arisen. First of all, the elector identification and voting processes are often linked, which undermines the principle of ballot secrecy. Consequently, in Belgium and the Netherlands, the authorities have decided to separate the two processes. In Belgium, voters identify themselves to the chief returning officer of the polling station and are then given a magnetic card to vote. After they have cast their vote, the card is transferred to an electronic ballot box before being wiped and reused (Federal Ministry for the Interior, Belgium, 2003).

In addition to those initial technical reserves, there is the problem of the material impossibility of checking

votes. In most cases, votes are counted by the computer as soon as the vote has been validated. That helps considerably to speed up the vote counting process and reduce costs in terms of human resources. However, recounts are then impossible. In order to overcome that problem, various solutions have been proposed, notably the "ticketing" solution, where a voting ticket is printed by the computer and collected in a sealed ballot box. Ticketing has been tested for instance in Belgium. It makes it possible to have a recount, either in the case of a problem or on a random basis in respect of a small percentage of votes. In other countries, the source code is given to the electoral authorities to allow the auditability of the voting system.

Finally, voting machines remain subject to technical uncertainties. Any failure can result in long queues, which may dissuade citizens from voting. In that case, the result is, of course, the opposite of that desired by the authorities (Detry, 2001).

From this initial survey, it can be observed that experiments with computer voting have dampened slightly the enthusiasm of the supporters of this new voting technique which is supposed to enhance considerably the security and rapidity of electoral arrangements.

Moreover, in addition to the reserves regarding counting, secrecy and accuracy highlighted during the various computer voting experiments, it also imposes a heavy financial burden on the authorities, because of the need to invest in equipment. Furthermore, the equipment cannot be used for other purposes (ICAVM, 2002). In addition, the changeover to computer voting cannot be seen as a purely technical operation. It is necessary, in any event, to adapt electoral laws accordingly (Bourgau, 2001). However, that stage is very often neglected (Detry, 2001). As a result, in Belgium, legal proceedings have been instituted on several occasions against the legislator. (EVA, 2003).

In addition, the introduction of computer voting has an impact on the electoral results themselves. Research carried out by the *Vrij Universiteit Brussel* (VUB) has shown that the positioning of candidate lists in columns on the screen tends to favour the candidates placed at the top and bottom of the column (Deschouwer, Buelens, & Heyndels, 2000). For example, the 2004 Brussels regional elections, when there were sometimes as many as 88 candidates on each French-speaking list, highlights the pertinence of that aspect.

It appears from a survey of the public and private reports on computer voting in Belgium, the Netherlands and UK, that the success of this method does not necessarily mean that this change in voting methods has been accepted unreservedly.

INTERNET VOTING

Of all possible uses of NICTs in the electoral process, Internet voting is undoubtedly the one which carries the most hopes. However, it is also the most debated and the most controversial. At the current time, Internet voting, or remote electronic voting, is not used widely in any country. In most cases, only limited experiments with pilot projects have been conducted. Nevertheless, the number of such projects is sufficient to provide a very satisfactory empirical basis from which some initial lessons can be learned.

In Europe, The Netherlands carried out Internet voting tests during the 2004 European elections (Figueiredo, 2003). In Spain, 15 000 voters from the village of El Hoyo de Pinares (Avila, North of Madrid) used Internet voting for a referendum (Mohanty, 2003). Three different tests were carried out in France in 2002 and 2003 (McMahon, 2002). Some Swiss cantons have also experimented with the use of remote Internet voting, notably Neuchâtel, Zurich and Geneva (Trechsel, Mendez, & Kies, 2003). As part of the Cybervote project, financed by the European Union, three Internet pilot projects have been carried out in Germany, Sweden and France (Cybervote, 2003). Finally, in the United Kingdom, Internet voting was part of the new voting techniques tested recently. Outside Europe, it is mainly in the United States that Internet voting is being tested. In 2000, democrats in Arizona also used Internet voting during their primary election.

In this regard, three types of Internet voting can be distinguished (Internet Policy Institute, 2001). First, there is Internet voting at the polling stations, which is very similar to electronic voting, apart from the collection of data. The second method concerns Internet voting using kiosks installed in public places, such as libraries, schools and supermarkets. Finally, Internet voting from any computer connected to the Web is the freest method currently being tested.

The first problem related to Internet voting, concerns security. The principal risk is vulnerability to viruses and hacking, highlighted in particular in the Netherlands (Figueiredo, 2003). The second main problem concerns identification. As mentioned above in the case of computer voting, experience has demonstrated the need to separate the voter identification operation from the voting operation strictly speaking. Although that is possible when a voter goes to a polling station, the same separation is not possible in the case of remote voting. There is, therefore, a real risk of identify theft and various options are currently being examined in order to reduce that risk. For example, in UK, the recommendations are based on multiplying identification criteria (PIN code, date of birth, digital ID certificate). However, none of those procedures

can guarantee absolute security in the case of remote voting.

In addition, from a technical point of view, several authors have stressed that a transitional period will be necessary for the introduction of Internet voting. Given the recent problems encountered with some pilot projects, various British experts consider that any plans to extend Internet voting must be implemented gradually. Changes in this regard cannot be introduced in the space of one election, not only because of the need to train the people supervising the electronic operations and acquire the necessary equipment, but also because of the need to familiarize electors with the method (ICAVM, 2002).

The second category of comments made concerning Internet voting concerns the reserves regarding the conformity of this new voting method with legal criteria for democratic elections. First of all, there is the question of ballot secrecy. Internet voting, like any form of remote voting, raises the question of how to guarantee that voters, without the protection offered by the privacy of the polling booth, are not subjected to any outside pressures when voting (Watch & Birch, 2002). The aim of secrecy is to protect voters from such influences.

Another problem is the question of equality. The issue here is not the principle of "one man, one vote" (OMOV), but rather the principle of equal access to voting. Numerous observers and academics have denounced what is commonly referred to as the digital divide. In their view, the introduction of remote Internet voting would accentuate the gap between different social classes (rich and poor; people having minimal qualifications and those having received higher education; young and old, visual impaired persons). This affirmation is based on several empirical observations. According to Norris, although Internet access is increasing in Europe, it continues to be more widespread among younger people and people with a higher level of education (Norris, 2002). Consequently, those groups would be more inclined to vote if Internet voting become the rule.

This digital divide seems to be confirmed by several national experiences with Internet voting. For example, in Arizona, young people and people having received higher education made the most use of Internet voting during the democratic party's primary elections in 2000 (Solop, 2001). Although the electoral participation of young people in the 18-24 age group was low (2.1%), 75% of the people who declared that they had voted via the Internet were young people (Gibson, 2002). The British experience was the same (ODPM, 2002, p. 4-6). In California, it is the 55 and over age group that is the most opposed to Internet voting (Secretary of State, 2000).

Finally, it is necessary to reiterate that the main aim of considering new voting methods, including Internet voting, was to make it cheaper for electors to vote in order to achieve a higher voter turnout. However, it would appear that the success of Internet voting in this regard is somewhat mixed. In the canton of Geneva, fewer than 5% used Internet voting (Trechsel, Mendez, & Kies, 2003). In Great Britain, where electors had the choice as to which voting method to use, 41% of electors preferred to vote by post compared with 2.9% for Internet voting, 1.5% for telephone voting, 0.7% for voting by SMS and 0.2% for voting by electronic polling booth (British Electoral Commission, 2003). On the other hand, in Arizona, the use of Internet voting in the Democrats primary elections was 7.23% higher than in the previous presidential election.

Nevertheless, the mixed results in terms of electoral participation are not accompanied by a strong rejection among voters of this voting method. In UK, at the end of the pilot projects, a survey showed that 59% of the citizens having used Internet voting declared that it was "easy" or "very easy" (MORI, 2003, p. 46). In Switzerland, 91.6% of Internet users are in favour of Internet voting (Trechsel, Mendez, & Kies, 2003). In France during the Cybervote project, 22% of Internet voters said that their level of confidence in Internet voting was reasonable, while 68% said that it was high (Cybervote, 2003, p. 64). It would appear, therefore, that the low use of Internet voting stems not from the risks associated with this voting method, but rather from the lack of apparent advantages for voters in using it. In this regard, other remote voting methods, such as postal voting, are for the time being more popular (EGov Monitor, 2003).

FUTURE TRENDS

Electronic voting is at a turning point. After a first experimentation stage, it is now being more widely used in several democracies. Computer voting received a satisfying appreciation from electoral authorities. As a consequence, several political entities using this form of e-voting are considering its generalization. Such evolution is for instance under consideration in Belgium. The main stumbling-blocks in that respect are related to security and re-counting issues.

By contrast, experiences of Internet voting raised more hopes, but also more fears. The digital divide, as well as security issues (hackers, frauds ...) lead most countries to adopt a more sceptical stance towards Internet voting. None of the countries presented in this article has serious projects to generalize Internet voting. The sole form of Internet voting under consideration is computer voting in a polling station connected to the Internet.

CONCLUSION

It would appear from the two parts of our analysis above concerning the various national experiences, that several conclusions can be drawn as to the advantages, drawbacks, and questions raised regarding the application of NICT to the electoral process. Both in the case of computer voting and Internet voting, the lessons learned can be grouped into three categories.

The first concerns technical considerations, and in particular voting secrecy. The various "wide-scale" tests have highlighted two major problems in this area. The first concerns the vulnerability of the hardware used, from the point of view of not only technical failures, but also hacking and viruses. In addition to that, there is the more fundamental issue of voter identification. First of all, it is necessary to ensure the security of the procedure to avoid identity theft. In addition, there is a clear need to separate the identification and voting processes. Without those guarantees, the principle of ballot secrecy will be undermined.

The above reflection on voter anonymity leads to the second category of comments, namely compliance with the legal principles associated with any democratic election. First of all, as we have discussed, is the guarantee of ballot secrecy, where over and above the question of identification, there is also the difficulty of avoiding social pressure on the elector, which is a risk as soon as the vote is cast outside the *ad hoc* booth.

The second major legal principle which requires attention in the light of the national experiences concerns the principle of equality among voters. In particular, the use of IT methods, and all the more so in the case of Internet voting, raises the question of equal access for all social categories. This affects in particular people who are less familiar with IT systems (older people, people with a lower level of education, economically disadvantaged groups, etc.).

Finally, various socio-political questions have also been emphasized. The main ones concern the effect of the new voting methods on voter participation in elections. In this regard, the figures are mixed. In certain cases, no impact was observed, while in other cases a slight increase was recorded. In any event, computer voting and Internet voting attract are neither strongly supported nor virulently rejected. However, the majority of voters acknowledge the ease of use of the new methods. Likewise, no strong expression of distrust has been noted. Nevertheless, the use of Internet voting or computer voting is still relatively limited, when other options such as paper-based voting or postal voting are available. The explanation seems to lie with the fact that voters find it difficult to perceive any added value in the two voting methods discussed in this article.

Solutions are however conceivable with regard to the observations noted and questions raised. However, it is important to be particularly attentive in this regard, both as regards political decisions and academic research. As long as the necessary legal guarantees are not in place and ballot security ensured, these new voting methods will continue to be at a disadvantage compared with paper-based voting which has proved its worth over numerous decades. However, the social acceptance and resultant legitimacy of the new voting methods depend on these questions of effectiveness and added value. Without that, computer voting and Internet voting will continue to be disputed. Moreover, by extension, the whole electoral process will be called into question. There can be no doubt that no democracy can afford such a malaise.

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KEY TERMS

Attended Electronic Voting: Form of electronic voting requiring that the voter go to a polling station to cast a vote.

Computer Voting (or Automated Voting): Form of electronic voting by which electors vote by following the instructions on the screen of a computer installed in a polling booth, instead of by using a ballot paper.

Digital Divide: Several social groups (older people, people with a lower level of education, economically disadvantaged groups, visual impaired persons) have a more difficult access to IT. As a consequence, the introduction of IT in the electoral process would put certain categories of voters at a disadvantage, depriving them de facto of their right to vote.

Electronic Voting (or E-Voting): The use of one of more electronic means to vote and/or to process votes.

Internet Voting: Form of electronic voting by which electors vote by using a computer connected to the Internet. This operation can be take place in a polling booth, via interactive kiosks installed in public places, or from any computer connected to the Web.

Ticketing: Form of computer voting where a voting ticket is printed by the computer and collected in a sealed ballot box, in order to improve confidence in electronic voting and, eventually, recount in case of contest.

Unattended Electronic Voting: Form of electronic voting not requiring that the voter go to a polling station to cast a vote: the voter may cast a vote from any computer connected to a network transferring his vote to electoral authorities.

ENDNOTES

- ¹ We have avoided using reports drawn up solely by private companies involved in electronic voting, because of the risk that they might put their business interests before other considerations.
- ² <http://www.elections.fgov.be/Nouveau/NouveauFr/Docunfr/aspects/voteautomatise/Cdocu52.htm>.
- ³ Interactive kiosks, the Internet, digital television, voting by computer, by telephone, by SMS, by mobile phone, etc.

Encyclopedia of Digital Government

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Volume III
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