Non-Technical Risks of Remote Electronic Voting

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INTRODUCTION

A few years ago, remote electronic voting seemed like a good idea for the near future. Globally, voting turnout figures are dropping dramatically (Electoral Commission, 2002) and politicians are therefore trying to find ways to increase civic participation. One solution is to make the voting process more convenient by giving voters the opportunity to submit their governmental election ballots over the Internet from home or work, or through their mobile phones using SMS. In this way, people will not have to leave the comfort of their homes or their work routines to have their voices heard. What a great boost this would be for our Western democracy! Citizens who live overseas, housebound people, or business travellers, everybody could use a computer to cast a ballot online. However, we will argue in this article that for several reasons remote electronic voting does pose a real challenge for e-government and might not necessarily be the best way forward.

BACKGROUND

Many politicians and legislators are in favour of this new voting technology. They expect it to bring convenience to the voters, may increase turnout among the young, may result in cheap, efficient vote counting, and may reduce the incidence of human error (Dictson & Ray, 2000; Mohen & Glidden, 2001). Technological development of electronic voting is stimulated by national governments, and also in the context of the European Union (EU) Framework Programs.1 On the other hand, opponents of Internet voting claim that besides large security risks, and the lack of equal access to the Internet for all citizens, it is not the voting *method* that matters. Low turnout is perceived as a symptom of a deepening crisis of democracy. Widespread indifference to, and ignorance of politics, is causing an evaporation of the concepts of citizenship and participation (Eliasoph, 1998). Previous reforms to make voting more convenient have had little effect on turnout levels and virtually none on the composition of the electorate (IPI, 2001). In our own research in which we examined a series of experiments with e-voting and e-polling, we did not see any positive influence on voting turnout. In four different sites a series of three e-polls took place, and in each case, we saw a declining turnout, suggesting that the effect of new technology on turnout is at best only temporary (Van den Besselaar, Oostveen, De Cindio, & Ferrazzi, 2003).

Nevertheless, even without affecting voting turnout, e-voting and e-polling technologies are of great importance. In order to clarify the opportunities and risks for democratic processes, we studied some 15 experiments with an e-voting system. The conclusion is that "voting in your underwear" (Arent, 1999) does not seem a valid option—at least not at this moment. Various technical, organisational, and behavioural issues are at stake. We discuss the main issues here.2 We focus mainly on remote e-voting, but several of the risks discussed are also relevant for e-voting in a polling station using a voting computer, and for other (nonelectronic) forms of remote voting, such as postal voting.

SECURITY AND VERIFIABILITY

Many people are concerned about the *security of remote voting* (Harris, 2003; McGaley & Gibson, 2003; Rubin, 2000). When people use computers from home or work, the machines are never as secure as the voting machines used in supervised kiosks or polling stations. Personal computers might be more vulnerable to hackers, denial of service attacks, viruses, or phantom Web sites which are used to divert voters (Kohno, Stubbefield, Rubin, & Wallach, 2003). Another problem with the use of personal computers at home or work is that the *requirement of verifiability* becomes very difficult to realize (Mercuri, 1993). Internet voting systems pose a problem in that the tallying process is not transparent. Voters should be able

to see that their votes are tabulated correctly. The best way to do this is to provide a voter-verifiable physical audit trail (Mercuri, 2001). If citizens do not trust that the elections they participate in are fair and that the votes are counted correctly, then they may not accept that the final votes represent their opinion. At polling stations the voting system could provide such a voter verifiable audit by printing a permanent paper record of each vote. In case of any doubts about the results of the election, there is then the possibility of a manual recount of these paper ballots (McGaley & Gibson, 2003). However, voting computers often do not have this facility, which makes recounting impossible—also in the polling station. If we switch from e-voting in the polling station to Internet voting from home, this becomes an even more serious problem: the paper trail is then impossible.

Yet, technical vulnerabilities are not the only threats to the security, integrity, and secrecy of Internet ballots. Social issues also play a very important role. Voting systems should guarantee a democratic election which is free, equal, transparent, and secret. However, *remote* e-voting cannot guarantee any of these criteria. This article will give an overview of five nontechnical reasons why we think (remote) e-voting poses a real challenge for e-governments around the world (Oostveen, 2006).

FREE AND SECRET VOTING

In a recommendation report written by the Council of Europe (2004), five basic principles of democratic elections and referenda are specified. Elections need to be universal, equal, free, secret, and there should be direct suffrage. These principles apply to traditional voting as well as to new voting methods. With e-voting the voters must be identified by the system; the tallier must be able to distinguish the votes cast by valid voters from those cast by voters who are noneligible. At the same time the votes must remain anonymous and secret. No one should be able to determine how any individual voted, and voters should not be able to prove how they voted because this would facilitate vote selling or coercion. Remote e-voting increases the risk of coercion of the voter by, for instance, a dominant spouse, the teacher at school, or the boss in the office.

Our research shows that the possibility of coercion is a real concern among voters (Oostveen & Van den Besselaar, 2004). We organised 12 focus groups and one online forum in four different countries with voters and organisers of ballots (pollsters). We ensured that there were vast differences in the socio-demographic makeup across the respondents in each of the focus groups, including age, gender, income, and ethnicity (further details in Oostveen & Van den Besselaar, 2004; Oostveen, 2006). The greatest risk of e-voting, according to the majority of the panellists, is the possibility that a voter can be forced by someone else to vote for a certain alternative. An Italian voter pointed out: "At first I thought it was a good idea, but now I fear the influence and pressure that family members could exert on voters." With remote voting there will never be the same privacy that a voting booth provides.

This phenomenon of "family voting" is also possible with other voting technologies. Husbands could accompany wives into the polling booth, and this indeed is also a real problem in many cases. However, appropriate regulation may prevent this from occurring, because voting in a polling station is in the public domain and therefore controllable. Postal voting makes coercive family voting also a possibility. As is often argued, the education of voters and a stable political situation may heavily reduce the risks of family voting. In our view, however, the voting system should be robust also in periods of political tension. Therefore, postal voting does not seem to be a good idea either.

Remote electronic radicalizes this problem. Our research shows that many voters do not trust that their privacy is guaranteed in e-voting systems. And these voters feel that surveillance may alter their voting behaviour, as our research indicates (Oostveen & Van den Besselaar, 2005). Here, there is a need for additional research and experimentation before deciding about the deployment of the new voting technology.

DIGITAL DIVIDE

E-voting has to deal with an existing digital divide, in which there is an upper-class bias (Alvarez & Nagler, 2000; Phillips & von Spakovsky, 2001). This digital divide can be expected to influence the participation in, and the outcome of, ballots. According to many observers the digital divide is declining, yet this is generally measured in terms of *access* to the Internet. However, divides may be much more subtle and related to skills required to install the software and hardware, learning, social networks that provide help, ownership of advanced versus older types of computers, insights into the security and risks, and so on. From the literature we learn that despite the narrowing of the "digital divide," Internet connections are still not distributed evenly across racial, gender, age, regional, and socioeconomic lines. This applies even more so for the skills needed to use the technology (Wellman & Haythornthwaite, 2002). Demographic groups with less access and less familiarity in using computers might find some types of e-voting difficult or intimidating. There-

fore, government may be making it easier for some people to vote, but not for others. In the end, e-elections may be even less representative than traditional ones (Alvarez & Nagler, 2000). In our own study we saw considerable differences in the frequency of use of ICT (Oostveen, 2006). This frequency of using ICT is related to the amount of difficulties with installing and using the system. We, therefore, cannot assume that every citizen has equal access to e-voting possibilities.

Although most of the voters involved in our research would be willing to use e-voting systems themselves, they are of the opinion that remote e-voting should only be used as one alternative voting method. According to the respondents, such a system cannot be used exclusively. One respondent remarked: "The middle class will be more likely to have a computer, but the working class will not. So it will enhance the vote of those middle-class people." The voters also fear that e-voting will discriminate against older voters because of their limited experience and knowledge of computers. It was said: "Yeah … the older you are, the less willing you are to change and it will discourage elderly people from voting" and "Older people panic about computers and will be put off from voting."

The organisers of the ballots emphasised that e-voting should not replace the traditional voting systems in the near future, as it may exclude from participating, groups who are able to use the traditional ways of voting. This is a legitimate claim, and politicians in favour of e-voting do generally agree with it. However, the prospect of saving money is often dominant in the introduction of e-voting, and the inclination to keep expensive parallel systems alive may therefore in practice be low. Experiences in other sectors support this. Whereas, for instance, the credit card was introduced as an additional means for paying bills, transactions have increasingly become exclusively related to credit cards, such as reserving a hotel room or renting a car. And e-voting in the polling booth has replaced paper voting completely in the Netherlands: so there is a clear tendency of new voting technologies replacing older technologies. This may also be the case in the future with remote voting.

CULTURAL EFFECTS

A third issue that comes into play when people do not vote from a polling station is the erosion of the "civic ritual" of physically casting a vote in a location where members of the community gather (Dictson & Ray, 2000). The loss of the civic ritual is commented upon in many academic articles about e-voting. Critics argue that it would make elections less of a community event, which might create a greater gap between citizens and government, thereby decreasing participation. What some people believe is that voting is more than the simple act of indicating one's political preference; it is a vital public ritual that increases social solidarity and binds citizens together (Mohen & Glidden, 2001). Of course, as is often argued, modern society shows a tendency toward individualization, and remote electronic voting fits into this tendency. However, it is a normative issue whether one wants to reinforce or counteract this fragmentation of society by selecting appropriate technologies.

Our interviews indicated that the loss of the actual ritual of voting is indeed something to consider (Oostveen & Van den Besselaar, 2004). The pollsters are very concerned about the loss of the "civic ritual" of casting a ballot and consequently the loss of the importance and the value of voting. Their fear is that the system could be considered "too cold" by the voters. The pollsters voiced their concern that the loss of the civic ritual could decrease the significance related to voting and hence overall turnout. They go even further by pointing out that making the current voting procedures easier might produce an increase of "spread ignorance," that is, an increase of "superficial behaviour" and/or a growing oversimplification of voting behaviour. As e-voting may destroy the civic rituals it can have a negative influence on the political culture and therefore is best avoided. The voters' focus groups also identified traditional voting procedures as a ritual that should be preserved. A respondent remarked: "For elderly people traditional voting is often a kind of important tradition." The representatives of a trade union that piloted the system also articulated that the use of remote e-voting would negatively influence the internal communication and formation of opinions within the organisation.

ORGANISATIONAL ISSUES

A fourth important issue is the logistics of organising a remote e-ballot. The process of registering, distributing hardware and software, organizing help desks and other forms of support for voters, is a complex and difficult task. It requires planning of activities of various institutions and actors (for instance, the organiser of the ballot, the certification authorities, and the "supplier" of the e-voting service).

Our research showed that limited resources and budget have an impact on the success of organising a ballot and increasing turnout (Oostveen, 2006; Van den Besselaar et al., 2003). Public relation materials, translation of documents, and support all require a substantial amount of money. Changes, especially those involving new technologies, are intensive users of resources which

are often scarce in many organisations. Because we think that e-voting systems have particularly great potential in local organisations, trade unions, community networks, and other contexts where it is more difficult to devote resources to voting and polling than in traditional elections, special attention to the issue of resources is required. Many potential users of e-voting technology will have to use it with relatively low resources. Other organisational problems encountered had to do with the large number of actors involved in the project. As various actors play a role such as the organiser of the ballot, the certification authority, and the e-voting service provider, the complexity of organising e-voting is a serious issue that needs further attention.

Furthermore, a change or a lack of personnel, and difficulties in distributing the materials were other organisational issues that came up during the field experiments. We would like to highlight the problem of distributing the materials (hardware, software, documentation). It would be tempting to assume that distributing materials to the voters can only be a problem in a small-scale pilot study. A lot of time, effort and planning need to be invested to ensure that a pilot, or indeed a real e-ballot, runs smoothly. This did not only prove to be the case in our project and also in other larger pilots. One example from the United Kingdom illustrates this. On June 10, 2004, the UK government embarked on the largest experiment in postal voting. During the European and local elections in England, about 14 million voters in the East Midlands, North East, North West, and Yorkshire and the Humber had to vote by post. There were no normal polling stations in those areas. Thousands of ballot papers were not delivered on time. In some cases printers missed the deadline to get the papers to the Royal Mail. Other problems included misprinted ballot forms. Technical issues were blamed for delays by one of the 12 printing contractors, while the illness of a managing director has been blamed for delays at another company. This example illustrates that even at high-stake, well-financed elections, the distribution of materials and problems with personnel can have disastrous results with people being denied the opportunity to vote.

We do not want to suggest that it is impossible to organise a large-scale e-election; however, the examples of successful experiments can easily be matched by counterexamples.

BEHAVIOURAL EFFECTS

Finally, we pay attention to the social psychological issue of social identity (Ellemers, Spears, & Doosje, 1999; Tajfel, 1978) in relation to remote e-voting. The main difference between remote e-voting and traditional voting is that remote e-voting can be done in the privacy and security of one's own home rather than at a polling station in the community. The social psychological implications of this have been paid little attention hitherto. One important implication of e-voting is that when one votes at home, isolated behind the computer terminal, a more individual level of identity (and more individual self-interests) is likely to become salient compared to when one votes in the community hall, surrounded by other people from different groups and backgrounds or at work surrounded by colleagues. In the latter two cases, collectivist and even multicultural concerns may be more salient. Research shows that people's social identities have a very powerful impact on their perceptions, emotions, and behaviour (Ellemers, Spears, & Doosje, 2002). As Andrew Brader (2001) points out, "people act in ways specific to their situation."

Different voting contexts not only influence which identities and interests are made salient, they can influence behaviour relating to these identities and interests for *strategic* reasons. For example, being confronted with different groups of people at the polling station (or on the way to it) may make one feel more accountable to these audiences (e.g., ethnic minorities, the poor) than when at home on one's own, or surrounded by one's family. When group members define themselves in terms of their collective identity they focus on the similarities between themselves and fellow in-group members with reference to experiences, needs, interests, or goals. As a result "my" and "your" experiences, needs, and so forth are transformed into "our" experiences and needs (Stürmer & Kampmeier, 2000, p. 107). This is particularly likely to affect voting behaviour when this is identifiable (and thus accountable) to an audience that might disapprove. For example, many preelection polls underestimate self-interested or right-wing preferences, because they fail to take into account that people might not want to admit to such preferences in public. Contexts in which people perceive there is scrutiny of their choice may, therefore, affect voting for strategic or self-presentational reasons. Examples of a high-accountability context are votes that are conducted in public (e.g., in mass meetings with a show of hands), rather than by private ballot. Although e-voting may seem private, one of the concerns associated with this technology is whether it is indeed secure, or open to "surveillance" by those administering the system. The perception of surveillance may moderate voting preferences perceived to be critical of such authorities.

Another factor that may well cause features of e-voting to influence voting preference is the degree of social interaction and discussion around political topics prior to voting. Voting from the home increases the likelihood that choices will be discussed within a limited and

homogeneous group context, whereas voting in the community may open the voter up to disparate social influence from others, especially those relating to more prosocial or collectivist concerns. This process of validating views through discussion has been called group consensualisation (Haslam, 1997). Because discussion is likely to polarise in line with group norms and identities (Spears, Lea, & Lee, 1990) the parties to discussion can be highly influential.

Our own field experiments support the expectation that voters' social identity varies in different situations (voting in polling booth, voting from home, etc.) and that the voting media may have an effect on the voting outcome (Oostveen & Van den Besselaar, 2005).3 Of course, we are not claiming that political preferences will be entirely determined by the voting context. However, these contextual effects may be especially important in the case of "floating" voters who often decide elections.

CONCLUSION

We saw in this article that introducing new technology is always a complex undertaking which has many different aspects. These aspects are technical, as well as social, political, organisational, and behavioural. Historically, social aspects and democratic values have only been partially considered in the systems design process; the main focus has been on technical and economic factors. The five nontechnical issues we have addressed here may affect the final outcome of the elections and the political representation of the votes cast and should therefore not be neglected by politicians, legislators or researchers.

E-voting is a relatively new innovation and *remote* e-voting systems are in the first stages of development. Therefore, we are only beginning to clarify many of the important issues. However, it seems clear that many experiments are necessary, in both small- and large-scale environments, in order to develop the technology in a responsible way.

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KEY TERMS

Civic Ritual: A ritual is a formalised, predetermined set of symbolic actions generally performed in a particular environment at a regular, recurring interval. The general purpose of civic rituals is to engage a group of people in unified action to strengthen their communal bonds.

Digital Divide: The digital divide is the disparity in access to technology that exists across certain demographic groups. The digital divide exists between those in cities and those in rural areas. The digital divide also exists between the educated and the uneducated, between economic classes, and globally, between the more and less industrially developed nations.

Electronic Voting: E-voting is an election system that allows a voter to record his or her secure and secret ballot electronically. Electronic voting includes voting using a punch card, optical scan, or computer in a kiosk, or by using the Internet or (mobile) telephone.

Privacy: A system is private if neither election authorities nor anyone else can link any ballot to the voter who cast it, and no voter can prove that he or she voted in a particular way.

Remote Electronic Voting: Remote e-voting is an election system that allows a voter to record his or her ballot electronically from home, work, or school, instead of using a supervised polling station or kiosk.

Social Identity: Having a particular social identity means being at one with a certain group, being like others in the group, and seeing things from the group's perspective. In other words, people behave by acting in concert within a group with which they identify.

Verifiability: A system is verifiable if anyone can independently verify that all votes have been counted correctly.

ENDNOTES

1 However, this is also part of a general techno-economic policy to stimulate the deployment of the information highway, in order to get the e-society going.

2 More details about the methodology and results of our research can be found elsewhere: Van den Besselaar et al., 2003; Oostveen and Van den Besselaar, 2004, 2005; Oostveen, 2006.

3 Not much research has been conducted on this topic. One other study by Christin and Trechsel (2005) suggest that e-voting is neutral. These contrasting results show that more research is needed.