

Will Remote Electronic Voting Systems Increase Participation?

Andrea Houston, Yurong Yao, Chitu Okoli, Edward Watson

Abstract

Remote electronic voting systems (REVSs) have become a viable mechanism for official political elections. As an entirely automatic, electronic, technology-based voting environment, REVSs can enable remote voting, facilitate monitoring, voting and tallying, eliminate manual registration verification, and report immediate and accurate results. However, it is uncertain whether the use of REVSs could increase citizens' participation in elections. This study examines citizens' perceived acceptance of remote electronic voting system in the United States. By collecting the data from multiple sources, we compare the participation intention of using REVS among voters and non-voters, and citizens of different ages. We found that web-based REVS usage can significantly increase the participation of non-voting citizens, and that young adults have a strong preference to using REVSs. The implications and the recommendations about the use of REVS are discussed in detail.

Key words: remote electronic voting systems, voting participation, web-based REVS, telephone-based REVS, age differences, voting mechanisms

Introduction

Democratic societies and organizations that require consensus to operate often use voting to determine consensus and to make decisions. Voting is also used to elect officers and decision makers at the federal, state and local government levels and in private organizations. Typically, a physical presence is required for participants to vote. Votes can be cast through a show of hands, vocally or mechanically (paper,

Will Remote Electronic Voting Systems Increase Participation?

voting machines, etc.). More recently, organizations and governments have explored voting mechanisms that do not require a physical presence, such as absentee voting by mail, voting by telephone or voting via the Internet. As the United States government has increased the number and quality of its services on the Web, such as court case information (Kelly and Tastle, 2004) and election candidate information (Tolber and McNeal, 2003), electronic voting is increasingly considered as an important next step in electronic government.

Although voting mechanisms are evolving, most voting systems face two major challenges. First, they must capture, record and report votes accurately and timely. The counting controversy over the 2000 presidential votes in the State of Florida of the United States caused by “chad” problems illustrate just how important accuracy can be (CalTech-MIT, 2001). However, even in the 2004 presidential elections, some United States counties started to use electronic touch-screen voting systems in booth, some system errors still occurred. For example, in Cuyahoga county in Ohio—the most critical state in that election—it was reported that more votes were cast than the number of registered voters in the region (Kaplan, 2005). In addition, Georgia, which was the first in United States to use computers to tally ballots in 1964, successfully held a uniform state-wide computerized election by using in-booth direct-recording electronic (DRE) system in 2002 (Williams and King, 2004). Though electronic voting system (EVS) still needs further enhancement, EVS did play the role in improving the quality of voting services.

Second, voting systems must encourage enough voting participation to ensure that true consensus is captured—for this reason many organizations have quorum requirements for critical votes. In the United States, voting participation can often be very low, particularly in state and local elections (quite often as low as 25% of

Will Remote Electronic Voting Systems Increase Participation?

registered voters), causing concern among governments and government watchdog groups who worry that special interest groups may take advantage of the situation. There are several new initiatives attempts both at the state level—Democratic 2000 presidential election in Arizona (Done, 2002; Mohen and Glidden, 2001; Phillips and von Spakovsky, 2001)—and at the federal level—Secure Electronic Registration and Voting Experiment (SERVE) (Federal voting Assistance Program, 2003)—that are exploring the use of new remote electronic voting systems with the intention of increasing voter participation.

Research Questions

In this study, we defined a remote electronic voting system (REVS) as an entirely automated, electronic, technology-based voting environment that enables remote voting, facilitates monitoring, voting and tallying, eliminates manual registration verification, and has immediate and accurate results. The debate about the pros and cons of remote electronic voting is considerable, with concerns about the voting process, voter participation, and the final turnout (Mohen and Glidden, 2001; ONS News, 2003; Phillips and von Spakovsky, 2001). Concerns come from two general perspectives: technical and social. From the technical perspective, Rubin (2002) addressed several challenges associated with remote electronic voting, including potential attacks on the central voting server, ballot delivery, and interface design. He concludes that the current technical infrastructure is not yet suitable for public voting. Other technical issues associated with REVSs include platform compatibility, security, reliability, system vulnerability, registration control, systems connectivity, and user interface design (NSF, 2001). Among them, security is placed as the primary concern, not only for REVS but also for electronic voting systems in general. There is considerable controversy over security-related issues, involving the

Will Remote Electronic Voting Systems Increase Participation?

entire electronic process of identification, ballot casting, tallying, transmission and storage (Lee et al., 2003; Lin et al., 2003; Economist, 2004; Heichler, 2003; Rac-Dupress, 2004). Coggins (2004) thus strongly advocates an independent qualification test on voting systems to ensure that they meet all legal requirements before they could be used in elections.

However, there are issues beyond just technical ones to consider for remote electronic voting in public elections. In general, the social issues surrounding electronic voting can be broken into two sub-groups: political issues and human behavioural issues (NSF, 2001). The political concerns are closely associated with possible changes in policies and in the election process, including the effects of an REVS on federalism, deliberate democracy, election process design, and other legal concerns. Human behavioural issues concern human attitudes and behaviours towards an REVS, the effect on voter participation, and the effect on communities. The most obvious are concerns raised about unequal participation due to a potential digital divide, a phenomenon associated with the disparate use and access of Internet technology, among the voting population. Brazil has already held an all electronic national election (Riebeek, 2002); the Brazilian government considers the digital divide as a critical issue (Joi, 2004). The first online Democratic Party presidential primary election in Arizona in the United States was nearly cancelled due to a lawsuit that alleged a discriminatory election process (Solop, 2001).

We believe the social issues are just as important as the technical ones. Voters' attitudes which directly impact their participation—and, in turn, the final election results—will be an on-going challenge. It is all too common to see the implantation of technically-sound systems that are rejected by consumers for behavioural reasons. Hence, in this paper, we focus on behavioural social issues, as we believe that the

Will Remote Electronic Voting Systems Increase Participation?

technical issues will eventually be solved, although perhaps not as quickly as some people would prefer. It is also likely that technical solutions may involve a considerable economic investment. In particular, some of the security-related problems may cost a considerable amount of money to resolve, and their solutions may include a larger investment in infrastructure and monitoring devices than most governments had originally planned for. The concerns (technical, social and economic) regarding electronic voting, have caused some to wonder if the potential benefit is really worth it. Without evidence for a potential benefit, it doesn't seem reasonable for governments to invest more in electronic voting.

One benefit suggested by many of the organizations who are looking at using electronic voting is an increase in voting participation. In this paper, we study the question: *Will the newer forms of remote voting actually increase voting participation?* To answer this question, we gathered information from several sources. First, we looked at data collected by the United States Census Bureau (US Census Bureau, 2005), which asked people why they did not vote in recent elections. Second, we looked at studies of absentee voting by mail, using the State of California as an example. We reasoned that if this form of remote voting increased participation, other forms of remote voting could as well (Patterson and Caldeira, 1985). In addition we reviewed reports from experimental remote electronic voting trials in Arizona (Done, 2002; Solop, 2001), California (Reed, 2000), Oregon (Reed, 2000; Wyman, 2000) and the United Kingdom (Flood, 2005). Finally, we conducted our own survey of people in Louisiana to capture attitudes towards various remote electronic voting system mechanisms.

In addition, we also examine the question: *Which mechanism of REVS do voters prefer?* We focused on two mechanisms suitable for remote voting: Web-based

Will Remote Electronic Voting Systems Increase Participation?

and telephone-based. A Web-based REVS operates using the World Wide Web, permitting voters to participate on-line. A telephone-based REVS is an interactive voice response system that uses touch-tone telephones for voting.

Why People Say They Don't Vote

The United States Census Bureau collected information on why people did not choose to vote during the November 2000 and 2004 federal elections despite the fact that they were registered to vote (US Census Bureau, 2005); that is, we examined not just people who were *eligible* to vote, but those who had *registered* their prior intention to do so. We classified these reasons into two main categories: those that an REVS could address and those that an REVS could not address (Table 1a and b). Of the approximately 18.8 million registered voters in 2000 who reported that they did not vote (16.3 million in 2004), approximately 50% of them gave reasons that we believe could be overcome by a remote electronic voting system, such as “too busy”, conflicting schedules, illness or disability, out of town, inconvenience, transportation problems, or bad weather. Approximately 3 to 4 million people in each election indicated that they did not vote due to conflicting schedules or being too busy.

Insert Table 1a and b here

While the proportion of people listing some of these reasons may appear small, the number of voters is large enough to potentially influence election outcomes, particularly in close elections. For example, even though only 0.5 to 0.6% of voters gave “bad weather” as their reason for not voting, this represents 119,000 voters in 2000 and 82,000 in 2004. Considering that the 2000 election was decided on a

Will Remote Electronic Voting Systems Increase Participation?

difference of just 537 votes within one state (Florida), and that Florida had at that time 5.7% of the United States population, we could roughly approximate that about 6,758 (5.7% of 119,000) people did not vote in Florida due to poor weather. If remote electronic voting systems had been available to eliminate this obstacle, the national election result could have easily been different. Of course, this is a simplistic example, but it serves to illustrate the significant impact this technology could have. If various forms of remote electronic voting had been available, an additional 9.6 million voters might have participated in the US November 2000 elections, and an additional 8.2 million for the November 2004 elections.

This information reveals more when divided into age groups. Different age groups clearly have different concerns. For example, the 65+ group is primarily affected by illness or disability (45–50% listed this reason) while the other age groups are primarily affected by conflicting schedules and being out of town (these two categories combined account for between 28% and 37% of the other groups). Since REVS can address at least half of the reasons given for not voting, we believe this data supports our premise that REVS availability could increase voter participation.

But Would They Really Vote?

Presumably, some of the reasons for not voting can be addressed by any remote voting system. Therefore, it would be instructive to look at the results from another form of remote voting, absentee voting by mail, to see if voting participation increased. In 1978, the State of California instituted a new absentee voting law with the intent of increasing the number of voters by “abandoning restrictions limiting eligibility for those too ill to go to the polling stations or to those who would be travelling on Election Day”. An increase (as large as 20% in some counties) in voter participation was observed as a result of this law (Patterson and Caldeira, 1985).

Will Remote Electronic Voting Systems Increase Participation?

Absentee voting has become more popular over time. Reed (2000) reports that absentee voting increased in Monterey County, California from 4.4% of the voters in 1978 to 23% in 1998. The limitation of this kind of remote voting is that it requires advance planning.

Other remote voting studies in Oregon report that 76% of the voters polled would favour remote voting over traditional booth voting (Wyman, 2000). A study of on-line voting in Thurston County, Oregon reports that 91.5% of the people who tried it stated they would choose to vote on-line if available and 66% reported that it was easier to vote on-line than with the current mechanical systems (Reed, 2000). We believe that evidence from absentee voting and the existing trial remote voting systems indicates that voters will use an REVS and voting participation is likely to increase as a result.

Solop (2000) confirmed that the availability of Internet voting could encourage a significant number of people that might otherwise not participate in an election. In 2000, Arizona offered Web-based voting as an option in the Democratic Party primary election. 17% of registered democrats said that they would be likely to vote if Internet voting were available. He also examined if a voter's demographic subgroup influenced whether they used the Internet or a traditional method (booth voting or mail). He found that only age, income and education significantly influenced the choice of voting method. Specifically, Internet voting was more appealing to well-educated voters, voters with higher incomes, and younger voters. However, race and gender were not significant factors in determining whether voters chose to use the Internet.

Also regarding the Arizona 2000 election, Done (2002) randomly surveyed 495 Arizona residents immediately after the online election. His study confirmed that

Will Remote Electronic Voting Systems Increase Participation?

a majority of respondents in all ethnic, education and income groups indicated their willingness to vote by the Internet. Of the survey respondents who did not register for the 2000 national election, 62% indicated they would be willing to register using the Internet.

Electronic voting is not only an issue in United States. UK government has conducted 17 pilot projects in the local and European elections to test the effects of multiple REVS (Henry, 2003). The two largest e-voting projects were conducted in Sheffield and Swindon in 2003 (Flood, 2005). In Swindon, turnout increased by 15% when Internet voting was offered to citizens. That was exactly the same percentage people who used the Internet to cast their votes. 92% of voters also said they would use e-voting in a general election. In Sheffield, when voters were offered the choice of voting using traditional methods, the Internet, mobile phone, touch-tone telephone, and smartcards, the net increase in turnout was 5.2%. 34% of voters in Sheffield indicated that these REVSs made them more likely to vote in an election (Flood, 2005).

Attitudes towards Remote Electronic Voting Systems

Encouraged by the results from trial remote electronic voting systems in Arizona, California and Oregon, and motivated by the reasons given for not voting collected by the United States Census Bureau, we conducted a survey in winter 2002 to capture attitudes towards REVSs in Louisiana, a south-central state in the United States. Louisiana was one of the first states to adopt touch-screen electronic voting machines. As a result, many Louisiana voters have been familiar with electronic voting technologies for many years, albeit not remote electronic voting. Thus, unlike other states where voters were not even familiar with electronic voting systems, our respondents could indicate their feelings about *remote* electronic voting technologies,

Will Remote Electronic Voting Systems Increase Participation?

rather than merely the advantages of electronic technologies that still required physical presence to vote.

We surveyed three different groups of people. The first group consisted of 138 business students (undergraduates and executive MBAs). The second group consisted of 285 voters who were surveyed as they left the polls during the November 2002 election. The final group consisted of 118 parents at a local private middle school.

Participants were asked to indicate how likely they would be to vote in the next national election using traditional booths versus a Web- or telephone-based remote electronic voting system (REVS). We excluded 166 respondents who were neutral between booth voting and an REVS, thus obtaining 375 unambiguous responses. Respondents' answers classified them into four groups: (1) those who would not vote regardless of availability; (2) those who would only vote using a traditional booth; (3) those who would prefer voting by REVS over traditional booth voting; and (4) those who would only vote if an REVS was available. We compared the responses of recent voters versus non-voters, and we compared voting preferences by age groups. Our survey results are summarized in Table 2.

Insert Table 2 here

Voters versus non-voters

First, we conducted non-voter analysis for a rough comparison with the US census non-voter data. We asked, "Did you vote in any local, state or national election in the past 15 months?" For our sample, only 56 (14.9%) indicated that they did not vote in the last 15 months. This reflects an obvious bias introduced by the large number of participants who were surveyed as they exited the polls. Using a chi-

Will Remote Electronic Voting Systems Increase Participation?

squared test we found that there are significant statistical differences between REVS preferences of recent voters and non-voters. The most significant difference between the two groups occurs for the respondents who said that they would vote in the next election ***only*** if an REVS was available (33.9% of the non-voters vs. 0.9% of the voters). This finding strongly supports our argument that REVS availability would increase voting participation. It is also interesting to note that 67.8% of voters indicated a preference for an REVS (over traditional booths) compared to only 41.1% of non-voters. This preference was predominantly for Web-based REVS (44.2% of voters vs. 32.1% of non-voters). We believe that these numbers reflect a preference for the convenience of Web-based vs. traditional booth voting. They may also reflect a preference for a graphical user interface and the ability to change a vote before submission—advantages on-line voting has over most telephones. Such preferences may become irrelevant as the difference between telephone- and Web-based REVS decreases with the increase in mobile or wireless computing and an increase in the number of cell phones providing Internet access.

Age

Our second analysis of REVS preference was based on age differences. For our sample, the ages were fairly evenly distributed with the exception of the 65+ group, which had only 21 usable responses. Using a chi-squared test, we found that there were significant statistical differences in REVS preferences among the four age groups. For the two extreme categories (would ***only*** vote in a booth or would ***only*** vote using an RVS), the age distribution is consistent with stereotypical expectations: 47.6% of the 65+ group would only vote in traditional booths, versus 11.3% of the 18-24 group. Predictably, the other two age groups fell in between (28.2% for 25-44 group and 33.6% for the 45-64 group). At the other extreme, 17.5% of the 18-24

Will Remote Electronic Voting Systems Increase Participation?

group would ***only*** vote using an REVS while only 1 or 2 people (less than 1.5%) of the two mid-range age groups indicated that preference. None of the 65+ group chose this option. This finding is consistent with Solop (2001) and Done's (2002) results. This is most likely due to the amount of technology exposure and computer use for each age group. In general, younger adults have had more exposure to technology and have used computers more often than older adults. The youngest adults may have used computers in school. The working adults have most likely used technology at work. Retired adults living on fixed incomes may have very little exposure to either computers or technology. The differences may also reflect reluctance in older citizens to change their mental models and patterns of voting behaviour and may be an indication of their comfort level with and mistrust of technology in general. It is interesting that the 18-24 participants predominantly preferred Web-based REVS whether they indicated they would only vote using an REVS (17.5%) or they merely preferred using an REVS over a booth (48.5%). Again, a Web-based REVS appears to be preferred over a telephone-based REVS.

The preferences for the moderate option, those who prefer REVSs but are willing to vote in booths, are not stereotypical. The 25-44 age group significantly prefers this option (70.1% of respondents selected it). The next highest group was the 45-64 group (62.1% prefer this option), followed by the 18 to 24 group (61.9%). The 65+ group showed the least preference for this option (only 47.6%). However, for the 65+ group, there was no difference between this preference and a preference for voting ***only*** using a booth (also 47.6%). Also interesting in this group was a marked bias against a telephone-based system (only 1 individual preferred it). This may be due to negative experiences with automated telephone services. Unfortunately due to the small sample size for this age group it is impossible to generalize any findings.

Will Remote Electronic Voting Systems Increase Participation?

However, *within* the moderate option (preference for an REVS but willing to use a booth), the differences between age groups does follow a stereotypic pattern. Every age group indicated a preference for Web-based REVS (over telephone-based). This preference was strongest in the 18-24 group (48.5%) and decreased with age (47.9% for 25-44 group, 35.7% for the 45-64 group, and 28.6% for the 65+ group). The strong preference for REVS use among young voters is especially encouraging as this is the group that traditionally has the lowest rate of voting participation [4]. Although the age-based REVS mechanism preference trend is predictable, what is interesting is the fact that such a large percentage of respondents of all ages indicated a preference for REVS availability in future elections. We believe that REVS availability may particularly attract the young adult voters (18-24) who typically have the lowest participation rates. However, our survey indicates strong support at all age levels for REVS use, particularly Web-based REVS use in future elections.

Implications and Conclusions

The most important message for governments, organizations and REVS developers is that evidence from multiple sources (US Census, absentee voting studies, experimental remote electronic voting trials, and our own survey) indicates a significant broad-based support for REVS in voters of all ages. In addition, the evidence suggests that REVS availability will increase voter participation in any voting process that uses an REVS. An REVS clearly appeals more strongly to younger voters, who demonstrate a marked preference for Web-based REVS. We believe this is due to several factors including a higher level of exposure to technology in general and the Internet specifically which results in a higher level of comfort using such technology and a higher level of trust of this technology. It may also be due to an increasing resistance to change behaviour as an individual grows

Will Remote Electronic Voting Systems Increase Participation?

older. But even among the most resistant group (65+), respondents were as likely to prefer booth-only voting to indicating a preference for REVS voting (split roughly 50/50 between those two options). Apparently what is important to that age group is having voting booths remain as a voting mechanism option. We believe that this age group is particularly concerned with security and privacy during voting and believe that a voting booth offers the most secure and private voting mechanism.

It is also clear from our survey that the Internet is the preferred REVS mechanism (over telephones or no preference between them). We believe this is due to the advantages an on-line system provides over a strictly voice-based system such as a graphical user interface, the ability to change votes multiple times prior to submission, and the ability to review or even print out voting information. As mobile computing becomes more prevalent, we expect the advantages provided by a web-based REVS to increase as voting will become increasingly independent of delivery device, time and location.

Currently, besides the option of the Internet, mobile devices such as cell phones and PDAs could also be used for voting. In the private sector, Audience Alive, a company located in South Africa, provides mobile voting solutions which uses mobile phone technology to create a real-time, interactive communication channel between the organization and the audience (Audience Alive, 2005). In the public sector, a number of initiatives are trying to provide services via mobile devices. For example, a framework was proposed for the setup of mobile government (m-government) (Sharma and Gupta, 2004) and XML is significantly studied in order to provide governmental services through multiple devices (Vassilakis et al., 2004). In Europe, there is an ongoing experiment involving 31 cities to adopt information and communication technologies to improve the government services (Evan, 2004). 29 out

Will Remote Electronic Voting Systems Increase Participation?

of the 31 reported that there is an increase in interactive communications between citizens and administration. Furthermore, in June 2003, the Kedah UMNO political party of Malaysia launched mobile election operation rooms and successfully conducted the elections using mobile devices (New Straits Times, 2003). However, security issues seem more significant in information transmission by mobile devices (Sharma and Gupta, 2004), as the signals are easier to hack than in the case of cable transmission. We would believe that with the successful experiences of other government, and the development of m-government and telecommunication technology, mobile devices could play an increasingly important role in elections in United States as well.

The implications of this study are clear. Voters in the United States want remote electronic voting. Though the majority of voters do not want an REVS to be the only voting mechanism, they do want the option to use an REVS made available. Governments should devote resources to providing an REVS option to voters, focusing primarily on Web-based delivery strategies. We have some specific recommendations for both governments and REVS designers on developing and promoting REVS:

- **Encourage private organizations to adopt REVS use as a decision-making tool.** Voters familiar with the use of an REVS in their work lives should be more willing to use an REVS in their political lives. Actually, many EVS vendors have made efforts in this direction. Many not-for-profit organizations also use a variety of electronic voting techniques for organizational elections and stakeholder decision making. For example, by May, 2005, SafeVote, a company providing online voting services, has successfully provided more than 57 Internet voting

Will Remote Electronic Voting Systems Increase Participation?

services to communities, companies and associations. More than 45,000 people were involved (SafeVote, 2005).

- **Focus on young adults and encourage their use of REVS.** This group is the most likely to use REVSs in elections. However, as this age group is presumably the most technologically savvy group, they could also be the least tolerance of technical deficiencies such as response time delays. Allow young adults to try REVSs, and then improve their performance accordingly.
- **Conduct more experiments by using REVS to test feasibility and encourage wide participation.** Early users reported high levels of satisfaction and support for REVS, but the number of voters actually using such systems was small and therefore should have had a minimal impact on such things as response time, down time, and denial of service. Marketing efforts should more aggressively publicize the current success stories from state and federal REVS initiatives.
- **Carefully evaluate the reasons why voters want the option to use REVS and make sure that those reasons are adequately addressed in their design.** In particular, since convenience and time or location independence seem to be the predominant excuses for non-voting, an REVS should be designed to increase convenience and minimize any time or place requirements.
- **Ensure that appropriate security and privacy are guaranteed to maintain a high level of trust and confidence in an REVS.** The security and feasibility issues need to be well addressed by computer scientists. Even the interface design and disability accommodation should be taken into considerations. Only with the collaboration with politicians and computer professionals can this be properly executed. An independent auditing system is also critical in ensuring the reliability of REVSs. How to embody the code of law in the software code to control the

Will Remote Electronic Voting Systems Increase Participation?

operations of voting systems is a challenge to all system designers (Mercuri and Camp, 2004). Smart cards are also considered as a possible option for identification and authentication in government services to enhance the security (Smith, 2004). Furthermore, there is a debate about whether opening source code of the voting system to the public can increase the security (Kitcat, 2004; Evan, 2004).

- **Establish a regulatory body to certify and manage the installation and operation of electronic voting systems.** Since the quality and reliability of electronic voting system manufacturers varies, it is absolutely critical for the government to issue laws to formalize the operation and management of electronic voting systems. Not only would such laws increase the confidence of the public in using electronic voting systems and REVSs, but they could also serve to guide system designers and voting officials in planning and executing voting activities via REVSs.

Though quite a few problems are not yet solved, with the continuous efforts from the government, computer scientists, politicians and system designers, we believe that it is nonetheless feasible and effective to increase voters' participation by using REVSs. In December 2002, The United States Congress passed the Help America Vote Act (HAVA), authorizing \$3.8 billion in federal funds. A large proportion was allocated to replace the old punch card machine and lever-voting machine (Evan, 2004). So far, things have significantly improved. By comparing the machines used in presidential elections throughout the United States, the use of punch card equipment has declined from 16.93% in 2000 to 9.39% in 2004 while electronic voting system usage has doubled from 9.93% in 2000 to 21.4% in 2004 (Evan, 2004). These changes have improved services and reduced potential errors in elections.

Will Remote Electronic Voting Systems Increase Participation?

However, the advances are still not aggressive enough. Considering more than 5 million persons who can not cast the ballots as they were out of town and those overseas militaries (Shamos, 2004), it is well worth investing REVS to provide the opportunities. If governments and organizations wish to improve participation, they need to focus on making voting more convenient and more widely available to participants. A viable option choice is a remote electronic voting system.

References

- Audience Alive, found at:
http://www.audiencealive.co.za/Products/mobile_voting_solutions.htm on July 13, 2005.
- CalTech-MIT. (2001) *Voting: What Is, What Could Be*. CalTech-MIT Voting Technology Project.
- Coggins, C. (2004) "Independent Test of Voting Systems" *Communications of the ACM*, Vol.47, No. 10, pp. 34-38.
- Done, R. S. (2002) "Internet Voting: Bringing Elections to the Desktop," Research Report, PricewaterhouseCoopers Endowment for the Business of Government, available on-line at: http://www.endowment.pwcglobal.com/pdfs/Done_Report.pdf).
- Economist (2004) "Good intentions, bad technology," *Economist*, January, 24, 2004, Vol.370, No. 8359, pp. 30-32.
- Evan, W.M. (2004), "Voting Technology, Political Institutions, legal Institutions and Civil Society: A Study of the Hypothesis of Cultural Lag in Reverse", *History and Technology*, Vol. 20, No. 2, pp. 165-183.
- Federal Election Commission (1998) "Voter Registration and Turnout by Age, Gender & Race 1998", available on-line at:
www.fec.gov/pages/98demog/98demog.htm .
- Federal Voting Assistance Program (2003) "Vote Using the Internet in 2004", available on-line at: <http://www.serveusa.com>
- Flood, S. (2005) "The People's Choice", *Computer Weekly*, 4/26/2005, pp.26-28.
- Heichler, E. (2003) "Criticism of Electronic Voting Machines' Security is Mounting," *ComputerWorld*, January 15, Vol. 37, No.50, pp. 1-2.
- Henry, S. (2003) "Can remote Internet voting increase turnout?" *Aslib Proceedings*, Vol.55, No.4, pp. 193-203.

Will Remote Electronic Voting Systems Increase Participation?

- Hoffman, L. J. and Cranor, L. C. (2001) "Internet voting for public officials," *Communication of ACM*, January 2001, Vol.44, No.1, pp. 69-71.
- Joi, L. A. (2004). "Bridging the Digital Divide: Some Initiatives in Brazil," *Electronic Government, an International Journal*, Vol. 1, No. 3, pp.300-315.
- Kaplan, A. (2005) "Follow the Nonexistent Paper Trail" *Humanist*, Vol.65, Issue 1, pp. 7-10.
- Kelly, E. P. and Tastle, W. J. (2004) "E-government and the Judicial System: online access to case information", *Electronic Government, an International Journal*, Vol.1, No.2, pp. 166-178.
- Kitcat, J. (2004), "Source Availability and E-voting: An Advocate Recants", *Communications of the ACM*, Vol. 47, No.10, pp. 65-67.
- Lee, C. Yang, W. and Hwang, M. (2003) "Untraceable Blind Signature Schemes Based on Discrete Logarithm Problem," *Fundamenta Informaticae*, July, Vol.56, No.1/2, pp. 307-321.
- Lin, I., Hwant. M. and Chang, C. (2003) "Security enhancement for anonymous secure e-voting over a network," *Computer Standards & Interfaces*, Vol.25, No.2, pp. 131-140.
- Mercuri, R. and Camp, L. J. (2004), "The Code of Elections", *Communications of the ACM*, Vol. 47, No.10, pp.52-58.
- Mohen, J. and Glidden, J. (2001) "The case for Internet voting," *Communication of ACM*, Vol. 44, No.1, pp. 72-85.
- New Straits Times (2003), "Mobile Election Operation room launched in Kedah", 06/14/2003.
- NSF (2001) *Report on the National Workshop on Internet Voting*, March 2001.
- ONS News (2003) "Convenient Electronic Ballots Allow You to Cast Your Vote Online," *ONS News*, December, Vol.18, No.12, pp. 3.
- Patterson, S. C., and Caldeira, G. A. (1985) "Mailing in the Vote: Correlates and Consequences of Absentee Voting," *American Journal of Political Science*, November, Vol.29, No.4, pp. 766-788.
- Phillips, D. M. and von Spakovsky, H. A. (2001) "Gauging the risks of Internet elections," *Communication of ACM*, January, Vol.44, No.1, pp. 73-85.
- Posner, R. A. (2001) "Bush v Gore: Prolegomenon to an Assessment," *The University of Chicago Law Review*, Summer, Vol. 68, No. 3, pp. 719 - 746.
- Rac-Dupress, J. (2004) "E-Ballots: Will your vote count?" *PC World*, Vol.22, No.2, pp. 27-29.

Will Remote Electronic Voting Systems Increase Participation?

Reed, S. S. (2000) "Internet Voting Trial Comprehensive Reviews," Thurston County, Washing State, *Governmental Review*.

Riebeek, H. (2002) "Brazil Holds All-Electronic national Election," *IEEE Spectrum*, November, Vol.39, No.11, pp. 25-27.

Rubin, A. D. (2002) "Security Considerations for Remote Electronic Voting", *Communications of ACM*, Vol. 45, No.12, pp. 39-44.

SafeVote, <http://www.safevote.com/>, found on July 15, 2005.

Shamos, M. I. (2004), "Paper v. Electronic Voting Records – An Assessment", an paper for ACM Computers, Freedom & Privacy Conference, Berkeley, CA, April 2004 found at: <http://euro.ecom.cmu.edu/people/faculty/mshamos/paper.htm>.

Sharma, S. K. and Gupta, J.N.D. (2004), "Web Services Architecture for M-government: Issues and Challenges", *Electronic Government, an International Journal*, Vol. 1, No. 4, pp. 462-474.

Solop, F. I. (2001) "Digital Democracy Comes of Age: Internet Voting and the 2000 Arizona Democratic Primary Election," *Political Science and Politics*, Vol.34, No.2, pp. 289-293.

Smith, A. D. (2004) "Gauging acceptability of governmental intervention in terms of smart card technology", *Electronic Government, an International Journal*, Vol. 2, No. 1, pp. 87-110.

Tolbert, C.J and McNeal, R. S. (2003) "Unraveling the Effects of the Internet on Political Participation", *Political Research Quarterly*, Vol. 56, No. 2, pp. 175-185.

US Census Bureau (2005) "Voting and Registration", <http://www.census.gov/population/www/socdemo/voting.html>, as of July 2005, United States Census Bureau. Last updated June 16, 2005.

Vassilakis, C., Lepouras, G., Halatsis, C. and Lobo, T. P., (2005) "An XML Model For Electronic Services", *Electronic Government, an International Journal*, Vol. 2, No. 1, pp. 41-55.

Williams, B. and King, M. (2004), "Implementing Voting Systems: the Georgia Method" *Communication of the ACM*, Vol. 47, No. 10, pp. 39-42.

Wyman, K. M. (2000) "Thurston County Auditor Internet Voting Trial Comprehensive Review," available on-line at: <http://www.riik.ee/evalimised/katsed/inwashingtoncontryreview.pdf>

Will Remote Electronic Voting Systems Increase Participation?

Table 1a. Reasons Registered Voters Did Not Vote in the November 2000 Elections

	Total (thousands)		Age							
			18-24		25-44		45-64		65+	
	,000	%	,000	%	,000	%	,000	%	,000	%
All reasons	18,724	100.0	3,487	100.0	8,031	100.0	4,409	100.0	2,796	100.0
Reasons solvable by an REVS	9,649	51.5	1,557	44.7	4,033	50.2	2,183	49.5	1,876	67.1
Illness or disability (own or family's)	2,765	14.8	116	3.3	588	7.3	656	14.9	1,406	50.3
Out of town or away from home	1,916	10.2	431	12.4	816	10.2	473	10.7	196	7.0
Too busy, conflicting schedule	3,917	20.9	834	23.9	2,178	27.1	823	18.7	82	2.9
Transportation problems	443	2.4	79	2.3	145	1.8	104	2.4	115	4.1
Bad weather conditions	119	0.6	16	0.5	27	0.3	24	0.5	52	1.9
Inconvenient location/lines too long	489	2.6	81	2.3	279	3.5	103	2.3	25	0.9
Reasons not solvable by an REVS	9074	48.5	1930	55.3	3998	49.8	2226	50.5	920	32.9
Forgot to vote	742	4.0	264	7.6	250	3.1	177	4.0	51	1.8
Not interested in voting	2,292	12.2	428	12.3	1,050	13.1	546	12.4	268	9.6
Did not like candidates or issues	1,443	7.7	193	5.5	617	7.7	453	10.3	180	6.4
Registration problems	1,284	6.9	318	9.1	603	7.5	243	5.5	120	4.3
Other reason, not specified	1,901	10.2	342	9.8	922	11.5	441	10.0	196	7.0
Refused or don't know	1,412	7.5	385	11.0	556	6.9	366	8.3	105	3.8

Source: US Census Bureau

Table 1b. Reasons Registered Voters Did Not Vote in the November 2004 Elections

	Total (thousands)		Age							
			18-24		25-44		45-64		65+	
	,000	%	,000	%	,000	%	,000	%	,000	%
All reasons	16,334	100.0	2,695	100.0	6,525	100.0	4,333	100.0	2,781	100.0
Reasons solvable by an REVS	8,151	49.9	1,167	43.3	3,145	48.2	2,097	48.4	1,710	61.5
Illness or disability (own or family's)	2,515	15.4	75	2.8	483	7.4	676	15.6	1,274	45.8
Out of town or away from home	1,470	9.0	345	12.8	529	8.1	464	10.7	125	4.5
Too busy, conflicting schedule	3,250	19.9	625	23.2	1,801	27.6	745	17.2	81	2.9
Transportation problems	343	2.1	51	1.9	98	1.5	65	1.5	128	4.6
Bad weather conditions	82	0.5	3	0.1	20	0.3	17	0.4	33	1.2
Inconvenient location/lines too long	490	3.0	67	2.5	215	3.3	130	3.0	70	2.5
Reasons not solvable by an REVS	8,200	50.2	1,528	56.7	3,373	51.7	2,236	51.6	1,073	38.6
Forgot to vote	555	3.4	164	6.1	222	3.4	130	3.0	47	1.7
Not interested in voting	1,748	10.7	270	10.0	672	10.3	477	11.0	323	11.6
Did not like candidates or issues	1,617	9.9	172	6.4	653	10.0	559	12.9	234	8.4
Registration problems	1,111	6.8	221	8.2	561	8.6	238	5.5	103	3.7
Other reason, not specified	1,780	10.9	291	10.8	770	11.8	459	10.6	250	9.0
Refused or don't know	1,388	8.5	410	15.2	496	7.6	373	8.6	117	4.2

Source: US Census Bureau

Will Remote Electronic Voting Systems Increase Participation?

Table 2. Preferences Between Voting Mechanisms

	Total		Voted recently				Age							
			Yes		No		18-24		25-44		45-64		65+	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Not vote regardless	13	3.5	7	2.2	6	10.7	7	7.2	1	0.9	4	2.9	1	4.8
Only booth	101	26.9	92	29.0	8	14.3	11	11.3	33	28.2	47	33.6	10	47.6
Prefer REVS														
Web	159	42.4	140	44.2	18	32.1	47	48.5	56	47.9	50	35.7	6	28.6
Phone	43	11.5	40	12.6	3	5.4	10	10.3	12	10.3	20	14.3	1	4.8
Either	37	9.9	35	11.0	2	3.6	3	3.1	14	12.0	17	12.1	3	14.3
Prefer REVS	239	63.7	215	67.8	23	41.1	60	61.9	82	70.1	87	62.1	10	47.6
Only REVS														
Web	19	5.1	1	0.3	18	32.1	17	17.5	1	0.9	1	0.7	0	0.0
Phone	1	0.3	1	0.3	0	0.0	1	1.0	0	0.0	0	0.0	0	0.0
Either	2	0.5	1	0.3	1	1.8	1	1.0	0	0.0	1	0.7	0	0.0
Only REVS	22	5.9	3	0.9	19	33.9	19	19.6	1	0.9	2	1.4	0	0.0
Total	375		317		56		97		117		140		21	

Source: E-voting Survey in Louisiana