ISSUES GUIDE:
INTERNET VOTING

PREPARED FOR: THE CENTRE FOR PUBLIC INVOLVEMENT, UNIVERSITY OF ALBERTA

LONG VERSION, NOT ADAPTED

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INTRODUCTION:

The following document is an Issues Guide designed to inform you about some of the more prominent issues and debates surrounding the topic of Internet voting. By reviewing this information it is hoped that you will be better able to decide whether offering Internet voting in local elections is right for the City of Edmonton and feel more confident in imparting your recommendation.

The move toward Internet voting is part and parcel of a larger trend in online citizen involvement, private business, and e-Democracy. Citizens are increasingly embracing the Internet as a channel for political participation and private businesses are continuing to transition services online. Governments are also slowly making increased use of the Internet to interact with citizens and provide service, but on the whole have been slower to embrace Internet voting. There are many reasons for this.

For one, despite the advantages of Internet voting there are some valid concerns which merit exploration. There are varying opinions as to whether these concerns can be adequately satisfied through features of the Internet voting system or whether the associated risks exceed the prospective benefits. Second, election agencies and governments take the electoral process very seriously – as a key institution responsible for the regular election of government representatives and renewal of democracy – it is of the utmost importance that the integrity of electoral process be maintained. This means that any proposed change(s) to elections must be thoroughly evaluated and thoughtfully considered prior to implementation Third, the fact that Internet voting works well in some areas does not ensure it will function effectively in other regions. Every jurisdiction is unique and must individually assess its own contextual factors and whether the necessary conditions are present to ensure the successful deployment of an Internet voting system.

To put this in perspective, the Issues Guide begins with an overview of Internet voting in Canada and a summary of what has been happening around the world. It then proceeds by explaining what Internet voting entails and the different types of online voting that exist. Next, it provides justification for predominately exploring remote Internet voting here – primarily because <u>it is the type of Internet voting you are considering for adoption in Edmonton</u>. It then explores the following issues or topics of Internet voting: Internet penetration, accessibility, trust, security and authentication, fraud and privacy, accuracy, voter turnout, cost, and environmental impact. Throughout the document you will find questions you may want to consider as you evaluate whether Internet voting is appropriate for the City of Edmonton.

Please note that for purposes of stylistic relief terms such as 'online voting', 'online ballots', and 'Internet ballots' are used interchangeably with 'Internet voting' to refer to casting a ballot using an Internet connection. Also, this document focuses largely on developments and experiences in Canada and Europe given that the most Internet voting activity and development has occurred in these regions. Other comparative examples are noted where relevant.

THE CURRENT STATE OF INTERNET VOTING IN CANADA:

There have been more instances of binding local elections using Internet voting in Canada than any other country worldwide. By October 2012 about 60 municipalities across two Canadian provinces have offered Internet voting in their local elections creating more than 2 million elector online voting opportunities.[1] First used to elect the late Jack Layton as the federal NDP leader in 2003, Internet voting was introduced in 12 cities and townships across the province of Ontario several months later as an alternative method of voting in their elections. Since then there has been significant uptake by other communities, namely those located in Ontario and Nova Scotia. In the 2010, for example, 44 Ontario municipalities adopted an Internet voting option and 14 Nova Scotia communities offered online ballots as an alternative voting method in their October 2012 local elections[2] (see **Figure 1** in the Appendices for a complete list of all the municipalities within Canada that have used online ballots for binding elections).[3]

At the same time, many other municipalities are exploring the possibility of using online ballots in future elections. On September 25, 2012 for example, Greater Sudbury city council approved the use of Internet voting in 2014 for their 115,000 electors. In May 2011, the City of Vancouver also passed a resolution to move forward with online voting, but was prevented from doing so by the province (see Goodman, forthcoming). Furthermore, in October and November 2012 citizens of Edmonton had the opportunity to participate in the 2012 Jellybean Internet Voting Election. This mock election provided a test, which helped determine whether Internet voting would be a useful alternative method of participating in future City of Edmonton elections.

Aside from municipal developments, Canadian provinces are also taking steps to explore the possibility of introducing Internet voting in their provincial elections. The British Columbia (BC) government, for example, recently asked Elections BC (their provincial elections agency) to convene an independent panel to study the benefits and drawbacks of using online ballots in provincial or local elections in BC. The elections agency also recently prepared a discussion paper addressing Internet voting (this paper can be found here: http://www.elections.bc.ca/docs/Internet-Voting-Discussion-Paper.pdf). Furthermore, one of the projects listed on their 2011-2014 Service Plan is to "develop an Internet voting strategy". While it is not clear whether online ballots will actually be introduced, the province has made researching the possibility of Internet voting a priority.

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[1]In some cases the same electors are offered the opportunity to vote online in multiple elections such as the case of the Town of Markham in 2003, 2006, and 2010 meaning that the option to vote online may not have been extended to more than two million unique electors.

[2]Of the 44 Ontario municipalities that offered Internet voting in 2010, 38 also offered telephone voting as an alternative method of casting a ballot. In their October 2012 elections, all 14 Nova Scotia communities extended the option of both Internet and telephone voting to electors.

[3]Another Nova Scotia municipality, Hants East, passed the necessary approvals to proceed with Internet voting, but shortly after determined the necessary funding was not available and went ahead with paper ballots. The community of Middleton, Nova Scotia, also agreed to use Internet voting in their October 2012 elections, but since all of the races were acclaimed no actual voting took place.

Ontario has also moved toward exploring the potential of Internet voting in recent years, although here the focus has been more broadly on electronic voting methods. In May 2010 the provincial legislature passed the *Election Statue Law Amendment Act*, which "provides the province with the authority to test an electronic voting method pending approval from the Ontario Legislative Assembly and the province's Chief Electoral Officer (CEO)" (Goodman, forthcoming). Part of this gives Elections Ontario the directive to research and report back to the Ontario government on the potential of 'network' voting by 2013. Network voting is broader than online ballots and could include voting via telephone, fax, SMS (text message) or a multi-platform approach, which encompasses more than one type of electronic voting. Despite the fact that no trials or tests have been officially approved the province is making strides to explore the prospects of Internet voting.

While province of Alberta has not explicitly made a commitment to test Internet voting either, it passed legislation in 2010 that provides for trialing election equipment and procedures in a by-election. Legislative approval would be required prior to testing (Elections BC, 2011). No other progress toward implementation is apparent, but the presence of a legislative framework to support online ballots signals that Internet voting could be a possibility for Alberta.

After the last Manitoba provincial election on October 4, 2011 recorded a turnout rate of 56 percent (the second lowest in Manitoba's history), Premier, Greg Selinger, also made public statements that Internet voting is something Manitoba would consider. Though no plans have been made public there seems to be a slow growing culture of support for Internet voting among the provinces (Canadian Press, November 9, 2011).

No other provinces have made public any plans to evaluate or test Internet voting, but Alberta, British Columbia, New Brunswick, Nova Scotia, Ontario, and Saskatchewan all have legislation in place that would permit the use or trial of alternative voting methods in elections. Because the *Municipal Elections Act(s)* established by the provinces govern municipalities[4], most cities and townships are not able to explore the possibility of implementing online ballots unless the necessary overarching legislation is in place by the province.

At the federal level, our national elections agency, Elections Canada, has been studying online voting for some time. Changes to the *Canada Elections Act* in 2000 made it possible for the Chief Electoral Officer to test electronic voting methods in a federal general election or by-election with the approval of Parliament. In its 2008-2013 Strategic Plan, the agency committed to trialing Internet voting. It plans to seek approval of parliamentary committees to do so sometime after the 2015 general election. In the meantime time it will continue its research efforts while monitoring trials in other jurisdictions.

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[4] There are exceptions to this, including for example the City of Toronto and the City of Vancouver.

Aside from government elections, interest and use of Internet voting in other types of elections has also witnessed significant growth. Notably, an increasing number of political parties are opting to elect their leaders using remote online voting. Recent provincial examples include the NDP and Liberal parties in British Columbia, the Saskatchewan NDP, the Alberta Party, the New Brunswick Liberal Party, and Alberta Liberal Party. The federal NDP party also elected their current leader, Thomas Muclair, in March 2012 using Internet voting. The federal Liberal party will also be using Internet voting to elect their new leader in April of 2013 (Goodman, forthcoming). Finally, unions are also increasingly making the move to online ballots for their elections, action votes, and the ratification of union agreements.

In less than ten years Internet voting has garnered interest at all levels of government in Canada. The main motivation(s) for exploring online ballots as a complementary voting method in elections is to enhance accessibility for electors, particularly special groups of electors who may have greater difficulty voting in elections. Some of these groups may include, but are not limited to: persons with disabilities, students away at college or university, seniors, and military personnel. The hope of increasing voting turnout, especially among the younger demographic is another motivator.

In addition, election administrators indicate a willingness to provide an election service that is comparable to other services citizens make use of, and to develop an election process that is keeping pace with the technological changes of society. For many Internet voting is considered to be a natural extension of advances in technology. Other considerations, such as cost effectiveness, speed of tabulation, and improved accuracy of results increase the attractiveness of an online voting system (see Goodman, 2010; Goodman, forthcoming).

The rationale(s) for not adopting Internet voting or for being more cautious in its consideration include topics such as security, notably threats of hacking and election fraud and problems associated with voter authentication. Privacy/ ballot secrecy is also cited as a worry. Additionally, there is uncertainty surrounding an effective evaluation process such as the ability to audit the election that may include a re-count or some type of ballot verification. Interestingly, access is often included alongside these disadvantages since certain groups of electors, especially those with lower incomes, less knowledge of computers, or electors living in rural areas may have no computer, lack Internet access or have a poor quality connection, which can make voting online more challenging. Equality is a central tenet of electoral integrity and the election process. With this in mind, it is important that any complementary methods of voting improve accessibility rather than exacerbate disparities in access. Overall, this is not an exhaustive list of all the potential benefits and drawbacks of adopting an Internet voting system, but they are some of the more popular items that have been cited by those evaluating whether Internet voting is a good idea, particularly election administration in Canada.

INTERNET VOTING IN EUROPE:

Although Canada is the main focus of the Issues Guide, it is useful to study and be aware of Internet voting developments elsewhere. Most Internet voting activity has occurred in Europe with many countries trialing some type of online or electronic ballots. Presently, some type of Internet voting is being used in the following countries: Australia, Estonia, France, and Switzerland. India and Norway are also participating in ongoing pilot projects (Barrat i Esteve, 2012). In some of these jurisdictions the deployment of online voting systems has been regarded as a success. In these areas, availability and use of online ballots has expanded accordingly. Estonia, for example, first introduced online voting in its 2005 local elections. The initial experience went so well that online ballots were used for the national parliamentary elections in 2007, the European Parliament elections and municipal elections in 2009, and again in the 2011 national parliamentary votes (see Estonian National Electoral Committee, 2012 and Alvarez et al., 2009).

Key features of Estonia's Internet voting model that have contributed to citizen uptake and its continued success include: Internet penetration, public support and trust, a supportive legal framework, and a secure and reliable authentication system (Goodman, 2010). This last element, authentication, refers to the process of confirming an elector's identity and establishing that that person is indeed who they say they are. While these are not necessarily all of the elements required for online voting deployment to work well, these factors have made the Estonian system function effectively. Estonian electors are also increasingly making use of the online ballots with each consecutive election. In 2005, about 9,300 people voted online, whereas in 2011 the number of Internet voters had risen to approximately 141,000 or around 15 percent of all eligible electors (Estonian National Electoral Committee, 2012).

In other jurisdictions, however, less desired effects or worries about security have caused government and election administration to rethink the implementation of online voting. This has resulted in projects either being halted or canceled. In the United Kingdom (UK), for instance, online ballots did not have the desired effect on voter turnout in local elections and were terminated (Goodman et al., 2010). The United States (US), by comparison, has canceled many of its attempts at small-scale Internet voting trials because of concerns related to security and authentication (Barrat i Esteve, 2012; Goodman et al., 2010).

Internet voting has also been banned in Germany since a 2005 ruling by the German Constitutional Court supported that it was possible to hack the electronic voting machines used in its 2004 European Parliament election and its 2005 general election (Ibid.). Although this security concern was not directly related to Internet voting per se, electronic and Internet voting methods are usually thought of as being part of the same group of voting methods. While they should be identified as distinct, there are still legitimate security worries about electronic and Internet voting alike. More specific details about Internet voting programmes in these countries and the rationales for continuing with online ballots or rejecting them can be found in Elections Canada's *A Comparative Assessment of Electronic Voting* or by accessing the Norwegian E-Vote Project's report, *International Experience with E-Voting*.

WHAT IS INTERNET VOTING? METHODS AND FEATURES:

Internet voting refers to the process of casting your ballot on an electronic device <u>using an Internet connection</u>. This differs from voting via electronic voting machines and vote counters, which do not use the Internet. There are several different types of Internet voting, which include poll-based voting (this comprises precinct Internet voting and polling place Internet voting), kiosk Internet voting, and remote Internet voting. The first type takes place at a polling location, whereas the latter two occur at a less controlled location that may not be supervised by election officials. For a detailed chart of the specific benefits and drawbacks of each of these types of Internet voting and areas or regions in which they have been used or tested, <u>please see "Benefits and Drawbacks of Various Electronic and Remote Voting Methods</u>," a table produced by Elections Canada and included in the Appendices.

Internet voting at a polling station[5] can occur in two ways. **Precinct Internet voting** happens when an elector is able to vote using a computer or electronic device via the Internet at his/her designated polling location. This type of online voting may help reduce congestion in the poll center, but still requires electors to make the same trip to the polls. **Polling place Internet voting,** by comparison, refers to using the Internet to vote at any polling station. This may be your assigned ballot location or any other polling station. Being able to vote at any poll may lower the opportunity cost of travel for some and could also make the process more accessible for some disabled electors who might have greater ease accessing one building over another.

Both of these approaches have the added benefit of being in a location that can be controlled by election officials, but do not really offer increased travel convenience for electors, unless they are able to cast a ballot at a more convenient polling location. In fact, polling place Internet voting is sometimes criticized because electors are still required to travel to a poll with the added burden of learning a new way to cast a ballot. This can be especially difficult for those who are not familiar or comfortable using computers. Polling place Internet voting can be helpful, however, at increasing poll efficiency by reducing line-ups and improving the accuracy of vote tabulation.

Kiosk Internet voting involves voting online through a kiosk machine that is managed by election officials. Kiosk machines are typically located in high-traffic, public areas where they are readily accessible by many such as shopping centers, public libraries, community centers or a city hall. Kiosk machines can also be used to provide online voting access to members of specific groups such as seniors in retirement homes.

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[5] Please note that throughout the document 'polling station' and 'voting station may be used interchangeably. In an Edmonton context, 'voting station' is the appropriate term, but the literature on Internet voting commonly refers to 'polling station'.

Presumably, this type of Internet voting offers added convenience because an elector could cast their ballot while shopping, instead of making a special trip to a designated voting station. It offers slightly less control for election officials though, which means a little less security. It can also pose greater technical problems than polling place Internet voting. The amount of control election administration has over the kiosk depends on the type chosen and the location they select.

Remote Internet voting requires casting a ballot remotely using an electronic device that connects to the Internet. This could be from a personal home computer, a work computer, an Internet café, or perhaps a mobile device. This method has the benefit of being the most accessible for many electors, making it easier for citizens who are traveling, on vacation, ill, busy, dealing with inclement weather, or facing mobility issues to cast their ballots. Its primary disadvantage is that it offers election officials the least amount of control and so can carry greater security risks. Privacy concerns have also been raised, since it becomes difficult to enforce voting confidentially. That said, remote Internet voting can increase privacy for some groups of electors, particularly the certain persons with disabilities who are able to vote privately for the first time in some cases because of special voting applicators (see Alvarez and Hall, 2004; Carter and Campbell, 2011; Goodman et al., 2010).

METHOD EXPLORED HERE AND WHY?

The City of Edmonton is exploring the possibility of using Internet ballots in future elections. The decision whether to proceed with deployment will depend on the feedback from citizens and public consultations with electors. Like most other jurisdictions, Edmonton is considering using the remote type of Internet voting.

When people talk about Internet voting they typically think about being able to vote from their homes and as opposed to casting an online ballot from a regular voting station. Public perception and opinion of Internet voting seems to address the remote concept. Also, being able to vote remotely is most reflective of other technological developments in service provided by government and private companies.

Furthermore, remote Internet ballots seem to be the popular choice because they have the greatest potential to enhance accessibility for electors, giving them the option of voting from the comfort of their home or another convenient location. However, as mentioned above, this type of Internet voting also poses the greatest risks, which must be well managed by election officials. Because this method of Internet voting brings the greatest benefits and risks it is important to thoroughly explore the topics and concerns associated with its implementation.

Since remote Internet voting is the method of online voting being considered for the City of Edmonton, it is explored in more detail here. The following guide provides an overview of some of the issues to think about when evaluating whether remote Internet voting is right for Edmonton. **Online ballots are being considered as an additional method of voting and will NOT replace paper voting in voting stations.** Take a read through and formulate your own opinion about whether remote Internet voting will work for your community.

KEY ISSUES AND CONSIDERATIONS:

• Internet Penetration

Is there sufficient Internet penetration in the City of Edmonton to proceed with Internet voting?

Before introducing Internet voting it is important for government officials to make sure that a good portion of electors have access to the Internet, and that this access is of sufficient quality to cast a ballot. If there is little familiarity with the Internet and use of it, introducing a method of voting that relies on it may not have satisfactory uptake from citizens. Looking at other areas for comparison, it can be observed that Internet voting works best when there is high degree of Internet penetration. For example, in the Town of Markham where Internet voting has been successfully used in three consecutive local elections, 80 percent of residents say they have high-speed Internet access and more than 80 percent report having access to a home computer. Data from Halifax, which has used online ballots in three elections[6], also indicates similar high levels of Internet penetration with about 78 percent of households in the municipality reporting an Internet connection (Goodman, 2010).

Other countries where Internet voting works well report similarly high levels of Internet accessibility and use. Notably, Statistics Estonia reports that 75 percent of Estonians used computers and the Internet in the first quarter of 2010. Estonia is also rated in the top 5 among other European Union countries for offering public services online (Estonian National Electoral Committee, 2009; Goodman et al., 2010).

Looking at Edmonton, Statistics Canada's 2009 Canadian Internet Use Survey reports that the City is characterized by one of the highest rates of Internet use across Canada at 86 percent. Only Calgary and Saskatoon reported higher rates of use at 89 percent. This suggests that citizens of Edmonton are active Internet users. Regarding connection quality, the same survey indicates that 92 percent of Canadians with home access to the Internet have a high-speed connection. Other research ranks Canada as having the third highest rate of Internet penetration worldwide with 84 percent of citizens having online access (Belisle, 2009). While these

statistics look impressive, it is important for election officials to consider that citizens living in rural areas may have slower connectivity and that individuals with lower incomes may not be able to afford a computer or Internet access.[7]

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[6] Internet voting has been used in Halifax in two elections in 2008 and 2012 and one by-election, which took place in 2009.

[7] A process that requires electors to pre-register by scanning forms and emailing credentials as used to register to vote for the 2012 Jellybean Internet Voting Election may present additional barriers for those who have limited or no access to a computer with Internet access.

Accessibility

Is accessibility an issue for Edmonton electors?

How much would online voting improve the accessibility of the electoral process?

Is the digital divide a concern for Edmonton? Would Internet voting increase access or exacerbate class and income inequalities in the system?

Accessibility is frequently cited as of the primary benefit associated with remote Internet voting. Being able to cast your ballot remotely means you could conceivably vote from home, work, or even while away on vacation. This option could make voting especially easier for certain groups of electors who normally have difficulty making it out to the polls because of mobility issues, inclement weather, travel, health problems, or because they are simply 'too busy'.

In particular, online voting can be helpful for students away at university or college who still wish to participate in the electoral process back in their home town, but find poll-based voting away from home arduous. It can also make the voting process more accessible for senior citizens and disabled persons. Some jurisdictions, such as Canada, have looked at offering remote Internet voting to specific groups of citizens like those mentioned here. Military personnel have also been a popular choice since they are often called away for duty and online ballots seem to be a faster alternative to mail-in votes. The United States, for example, has focused on Internet and electronic voting for military personnel. Remote Internet voting for military was planned in 2004 through a project titled, Secure Electronic Registration and Voting Experiment (SERVE), but did not proceed because of security concerns. Kiosk Internet voting was used to Bring Remote Access to Voters Overseas (BRAVO) for residents of Okaloosa County, Florida in 2008 (Simons and Jones, 2012). More recently, passage of the Military and Overseas Voter Empowerment Act (2009) permits qualified US citizens and military serving abroad to access and cast ballots using several electronic methods. Though the military has long relied on mail delivery for voting in US elections, it has now largely moved to using Internet. Presently, 32 US states allow military and overseas voters to return ballots electronically (Smith, November 27, 2012).

One accessibility issue that has caused considerable debate is referred to as the ***digital divide***. A digital divide refers to a disparity in access to technology, in this case computers with an Internet connection. Many citizens with low incomes may have difficulty affording a computer and an Internet service, which can be considered luxuries. The digital divide can occur in two ways. First, there can be a divide between those people who have home computers with Internet access and those who do not have an Internet connection, or own a computer. Second, there can be inequality in Internet connectivity. Some electors may be able to afford very quick access or live in urban centers where faster connections are more easily obtained. Those with lower incomes, however, may not be able to afford a quicker connection method, and rural inhabitants sometimes simply do not have the option of using the faster service due to their

location. As Internet connectivity improves this component of the digital divide becomes less of a concern, but equality of access to computers with Internet connections of acceptable speeds is an important consideration when assessing the impact of Internet voting (see Alvarez and Hall, 2004; Goodman et al., 2010).

• Trust

What is the culture of trust in Edmonton like regarding the municipal government? The Internet? E-Government? Internet voting?

Public trust in government and political processes is very important in a democratic society. Citizens who have more trust in government are more likely to live happier lives and become engaged in politics. Similarly, trust in elections and voting is essential to maintain the integrity of the electoral process. It is sometimes difficult to preserve this trust under regular voting conditions, (for example, the Robocalls issues at the federal level here in Canada) so adding the option of remote Internet ballots presents another dimension to consider.

Common sense tells us that for Internet voting to work well there must be public trust in the government's ability to deploy an online voting system accurately and safely. This conclusion is also well supported by academic research (Carter and Campbell, 2011; Chevallier, 2009; Goodman, 2010; Spycher et al., 2011). Studies also reveal that electronic or Internet voting systems lacking public confidence have been likely to fail. Climates of distrust in electronic voting technology in Germany, Ireland, the Netherlands, and Paraguay have all contributed to a lack of acceptance of Internet voting and a rejection of its use (Barrat i Esteve, 2012; Spycher et al., 2011). It is important to note, however, that in each of these cases the issues and/or problems were with direct-recording electronic (DRE) machines and equipment, not Internet voting systems per se.

There are many elements of trust that are important to ensure the acceptance and uptake of Internet voting. A certain level of trust in others is helpful because it means that citizens will be more likely to assume that the people handling the system are well meaning. Trust is also important so that citizens have a certain degree of faith in their peers to not engage in malicious behavior that may jeopardize the election process.

It is helpful to think about trust in four different aspects when considering whether the public will, or can build, trust in Internet voting (**see Figure 2**). First, as noted, it is important for the public to have trust in the government or electoral agency responsible for facilitating the election. If a private company is responsible for carrying out the Internet voting portion of an election, there needs to be a sufficient level of trust to ensure that the public is comfortable with the company administering the ballots. Having assurance in the government's decision to go ahead with the provider is also important.

Second, there needs to be some level of public trust in the Internet itself. Research points out that in the context of e-Government, the Internet represents the institutional environment. Having confidence in this medium means believing that it is dependable and capable of facilitating votes securely and accurately. It also means that the system should be auditable (Carter and Campbell, 2011:32)

Third, trust in e-Government and acceptance of online government services is necessary because it signals assurance in the system and increases the likelihood that voters will choose to cast their ballots online (Goodman, 2012). E-Government is still new to a lot of people and until they become familiar with the advantages and consequences of carrying out online transactions with the government it may take time to nurture this trust (Carter and Campbell, 2011). Areas with a greater degree of Internet penetration and use will probably be quicker to place their trust in these types of transactions because of familiarity with the medium. As the trend of e-Government develops and an increasing number of services are available to citizens online it is reasonable to believe that comfort with these types of activities will rise and trust will also become more durable.

Figure 2: Trust Framework

The Electoral Process and Election agency --->> The Internet --->> e-Government Services --->> Internet Voting System

Finally, the public should have trust in the Internet voting system itself. Research has shown that trust in the system is closely linked to its performance. A system that operates well, without errors or that recovers quickly from minor errors is more likely to earn public trust (Barrat i Esteve, 2012; Corritore et al., 2003). Assessing how well a system performs, however, may not be that easy for the average citizen to determine. Many eligible electors will look for cues such as "ease of navigation, good use of visual design elements, professional images of products, the absence of typo errors, a professional look for the site, ease of searching and ease of transactions" (Barrat i Esteve, 2012:24; Corritore et al., 2003). So, these features may be worth assessing when thinking about deciding whether to use an online voting system.

Overall, it is important for a majority of the public to feel comfortable with the voting system and to have confidence in the type of Internet voting that is introduced. Ways to promote trust are through education, dissemination of information, public engagement, and the involvement of other election stakeholders such as candidates and the media. Research also identifies system transparency, verifiability and being able to test elections as elements that can establish trust (Spycher, 2011). Ultimately, trust in Internet voting will mean electors are more likely to welcome the emergence of online ballots and make use of them. Introducing any alternative voting method must be done with the integrity of election process in mind and this is a key consideration for election officials.

• Security and Authentication

What are the security concerns that Edmonton needs to consider when evaluating Internet voting?

What types of system features would be necessary to mitigate these security concerns? Are these possible?

Can authentication be successfully achieved based on current Internet voting technologies?

Security risks are cited as one of the biggest challenges associated with Internet voting. Many Internet voting projects have either never gotten off the ground due to security concerns, or were terminated after the fact because of them. Online voting in the US, especially, has been clouded by a culture of uncertainty because of the perceived safety and security risks. Recommendations from some of the major initial reports addressing Internet voting in the US such as the California Voting Task Force report, the Caltech/MIT Voting Technology Project, the National Workshop on Internet Voting, and *A Security Analysis of the Secure Electronic Registration and Voting Experiment* have all taken cautionary stances regarding Internet voting. Primary concerns include: the threats of system attacks, election fraud, vote buying, and voter coercion (Alvarez and Hall, 2004; Goodman et al., 2010).

Current US literature (Simons and Jones, 2012) continues to emphasize security concerns regarding Internet voting, citing potential loss of the secret ballot, vulnerability of servers, insider attacks, wholesale rigging or theft[8], problems of malware on the elector's computer or electronic device, and other types of potential system attacks and election fraud as problematic.[9] Similar concerns have been echoed in the Netherlands and Germany, although these were regarding electronic voting machines (Barrat i Esteve, 2012).

Of all the types of Internet voting, remote Internet voting offers the least amount of control for election officials. Generally less control implies greater security risks, but it does not have to denote an unacceptable increase in these risks. The testing of electronic voting worldwide and its use in binding elections has shown that the greatest technical difficulties have been with voting machines in voting stations or kiosks and not all of these used the Internet. Electronic machines used in the 2000 US election are an example of this.

Also, in 2005 Quebec used electronic voting machines for its municipal elections. These voting machines jammed in several communities, which prompted requests for re-counts. Afterward, the Directeur général des élections du Québec issued a moratorium on electronic voting. This was followed by the passage of Bill no. 55 in 2006, which prevented the future use of voting

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[8]Wholesale theft refers to the theft of the entire election or a majority of ballots as opposed to theft of one polling place or election office "conducted at the retail level by operatives" (Simons and Jones, 2012:68).

[9]In particular, the ability of a University of Michigan team of graduate students to take over the voting system during a D.C. pilot test is cited as a primary example of the insecurities associated with Internet voting (Simons and Jones, 2012).

machines (Elections Quebec, 2012). "An imprecise legislative and administrative framework; [the] absence of technical specifications, norms and standards; and poor management of voting systems (especially lack of security measures)" were all cited as reasons for doing so (Laronde, 2012).

In Canada there have been a couple of instances where the robustness of private Internet voting systems has been called into question. The first occurred during the 2010 Ontario local elections when the Internet voting system being used in the community of Arnprior froze for 57 minutes near the end of the voting day. Voting was extended through the following day to compensate for this. The glitch in service was attributed to a system add-on that allowed candidates to monitor their progress (CBC, October 27, 2010). This issue, however, was not a security concern in the sense that there was no external threats compromised the system. Issues with the federal NDP leadership vote in March 2012, however, did present a security risk. Severe delays in the ability to cast online ballots were the result of a *distributed* **denial of service attack**, which occurs when there is an attempt "to crash or greatly slow down websites by inundating Internet servers with bogus external communication requests that deny legitimate user access" (National Post, March 27, 2012). It was reported that "hundreds of false voting requests to the system" came from over 10,000 "malevolent" IP addresses (Ibid.) A later audit carried out by Price Waterhouse Cooper identified that no ballots had been altered, subtracted, or added (Canada Newswire, March 27, 2012).

There are always security risks associated with any computer system, which includes Internet voting. The key to enhancing the security of an Internet voting system is to mitigate risk by ensuring that "the processes, the procedures, the people – all the variables that are included in good security – are in place" (Canadian Press, November 9, 2011). Some of the more prevalent concerns include: how to physically secure computer systems used for the voting process; how to protect voter identity (keep data encrypted in transport); how to protect from denial of service attacks; and how to protect and verify that election has not been tampered with. Despite the risks, many of these concerns seem to have been effectively managed in European and Canadian elections.

Physically securing computer systems involves locking Internet voting servers in secured environments. This is something that the Internet service provider, election agency or government is responsible for depending on how the online portion of the vote is structured. Protecting each voter's computer or electronic device (i.e. iPad or mobile phone) is more challenging. These devices are not accessible to service providers or election officials and therefore are impossible to control. To ensure there is no tampering with votes various codes, such as unique PIN codes, CAPTCHA challenges, date of birth (DOB), and elector-created alphanumeric personal passcodes, can be used to enhance the security of the vote. These have worked well in Canadian municipalities and are discussed below under the heading, *Fraud & Privacy*.

The issue of how to protect voter identity is important because votes are supposed to be anonymous and therefore there should be no linkage between a voter and his/her ballot. In Halifax in 2008, for example, votes were encrypted when the poll closes to ensure anonymity (Markham has used a similar approach). A more detailed method is carried out in the Estonian system, where the voter's ballot is encrypted by the voting application upon its completion. This system also very effectively deals with the problem of authentication.

Authentication in Internet voting is a process or act that confirms or authenticates the identity of a person. Whereas voting in person makes it easier to verify an identity because election administration can perform a visual identification by comparing an elector to their photo ID, it is more challenging to validate an identity online. Passwords, codes, secret questions, other personal information such as DOB, or even digital signatures are all ways to confirm an elector's identity, but these are sharable, which means the system is not infallible. Many of these authentication tools have been used successfully in Canadian municipalities, notably Burlington, Halifax, and Markham.

In the 2010 Markham election, for example, electors were required to register to vote online first. This step needed a unique PIN (that was mailed out on voter information cards), an elector's DOB, and prompted the elector to create a seven-digit numeric personal passcode. Once registration was complete, electors were mailed a second card by registered mail. When the time came to vote online this second card provided another unique PIN, which was needed, along with the same personal passcode (Goodman, forthcoming).

Authentication is secured in the Estonian system by something referred to as a "double envelope scheme" wherein an elector's encrypted ballot becomes the inner envelope and his/her digital signature becomes the outer envelope. This is the equivalent of a voter sealing his/her ballot in a blank inner envelope and then putting the inner one into an outer envelope with his/her name and address on the front. When the ballots are tallied the outer envelope is removed and discarded, and the anonymous inner envelope in placed in the virtual ballot box (Estonian National Electoral Committee, 2009; Goodman et al., 2010; Maaten, 2004).

Overall, concerns relating to security are probably the most potent criticisms in the Internet voting debate, while accessibility and convenience are the greatest advantages. No system can ever be completely secure, so it is important to evaluate the benefits and drawbacks and determine strategies and features that best minimize risk, while maximizing benefits. These particular features will likely be different for every area because factors, such as the size of the electorate, Internet connectivity, the stakes or nature of the election, the level of government, elements needed to maintain the integrity of the electoral process, building and maintaining the trust of the public and other election stakeholders (i.e. candidates and the media), all influence what will work well. While all systems should be as secure as possible, there may be a desire to change system features based on some of these variables.

• Fraud & Privacy

How much of a threat is fraud and privacy?
How are these concerns effectively managed in Canada and elsewhere?

It is said that Internet voting creates additional opportunities for election fraud or coercion since there is not as much human oversight. Fraud involves taking someone's vote or changing votes without the consent of those electors. Coercion, by comparison, is when a citizen is pressured or forced into voting a certain way they would not have otherwise, or is made to give his/her ballot away.

The threat of voter coercion and the implications this has for privacy are managed in the Estonian system by allowing electors to cast as many ballots as they like right up until and on election day. Therefore, in situations where there is peer pressure to vote a certain way, or an aggressive family member trying to impose their political views on an elector, this person is able to cast their ballot choosing their true preferred candidate, in private. This lowers the risk of coercion, vote buying, and helps maintain privacy (Goodman et al., 2010; Madise and Martens, 2006). There may be the chance of voter coercion taking place later in the campaign, but the possibility of multiple votes makes it less likely that a spouse, family member or friend would successfully cast a ballot on behalf of an elector since there are opportunities to re-cast a ballot.

In Markham, these threats to privacy have been dealt with by educating candidates and electors about the guidelines provided in the *Municipal Elections Act*, which stipulates that an individual must only vote once and the ballot must be cast in secret. To more fully address privacy concerns, Halifax officials amended a bylaw to add harsher penalties, such as a $10,000 fine or up to two years in jail, if someone is found influencing the vote (Internet Voting Workshop Summary of Proceedings, 2012). No evidence of violations has been reported to date, but not having supervision over every single voting transaction makes it impossible to know for certain if some type of coercion has occurred. To partake in any type of vote buying or coercion is against the law and the perpetrator would be prosecuted accordingly.

Finally, Internet voting (and other types of electronic voting as well) can improve the privacy of the vote for certain groups of electors, such as persons with disabilities by allowing them to vote unassisted and in secrecy. Various applicators can be used for the visually and hearing impaired that allow electors with these disabilities to cast a ballot without assistance. So, while there are secrecy issues associated with Internet voting that require risk management, there are also privacy benefits for some (Goodman et al., 2010; Goodman, 2010).

• Accuracy

Does Internet voting improve the accuracy and efficiency of election results? What about recounts? How are they successfully managed?

Improved efficiency and accuracy of election results is commonly identified as a benefit of Internet voting. Human counting errors and precision difficulties with other types of machine counting, such as punched cards, have caused problems in the past and contributed toward the recounting of votes. Missing or lost ballots is another criticism of human counting and something that is seen as resolvable with Internet voting. Electronic vote counters have been around and actively used for some time, but electronic devices that use the Internet are newer. Many municipal officials in Canada have cited online voting systems as improving accuracy of results and delivering these more quickly. Halifax and Markham are two examples.

Worry about recounts also relate to accuracy. Halifax conducted a recount with online ballots and it was undertaken without issue. The procedures for a recount were carefully outlined in its procedures and bylaw, which involved reopening the encrypted file.[10] The process included a third party verifying "that the file was indeed the data and then a judge reopen[ing] the data file" to confirm that the numbers matched. Linking the identity of the voter to a ballot was eliminated because when the poll closed an auditor encrypted the data points. At a public policy conference hosted by Carleton University and Elections Canada, a representative from the Town of Markham confirmed that Markham and the City of Peterborough use similar procedures for recounts. Markham added that it has followed Ontario case law to determine how recounts take place, which states that the recounting of ballots must be carried out in the same manner as the original ballot was counted.

Finally, it should be mentioned that part of the reason many have a negative association with the accuracy of online voting, or lack thereof, is because of the events that transpired in Florida in the 2000 US presidential election. This election used electronic counting machines, not Internet voting, which apparently did not record an estimated four to six million ballots. These ballots however, were paper and not electronic ballots. George Bush had a lead of only 537 votes over his opponent, Al Gore. A recount was ordered but was rejected in a 5-4 decision by the Supreme Court, which declared Bush the winner. The counting trouble in this race has made it the most controversial election in US history. Although the machines used in this election did not use the Internet and were used to count paper ballots and not electronic votes[11] they have managed to frame the debate surrounding accuracy and in some sense, security, of online voting. Even though this punch card technology is not still readily used in the US (see **Figure 3** located in the Appendices) its role in the 2000 US election has created a negative legacy of electronic counters in the minds of many.

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[10] This file contained the anonymous ballots.

[11] The problem had to do with how the paper ballot was laid out and aligned, not in how the electronic ballot counting equipment read the holes or marks in the ballot.

• Turnout

Will the introduction of Internet voting have a positive impact on electoral participation in Edmonton?

Will Edmontonians make use of online ballots if they are available?

What will the effect be on young people who are the least likely group to participate in elections?

Increasing voter turnout is a major motivation for considering adopting Internet voting as an additional voting method. Since the Internet has particular appeal for the younger generations, it is hoped that the deployment of Internet voting will encourage these cohorts of electors to participate electorally. So far turnout results from Canada and other jurisdictions around the

world are mixed. In some cases there has been a notable increase in turnout, whereas in others there has been a decline or little change. In the Town of Markham, for example, turnout in the advance polls (the portion of the election where online ballots are offered) has been permanently transformed as a result of Internet voting. Advance turnout increased 300 percent from 2000 to 2003 and an additional 43 percent in 2006. Turnout in 2010 stayed the same, but this was likely because the incumbent was perceived to be the victor early on in the race.

Prior to the emergence of Internet voting advance turnout in Markham was characterized by a couple thousand votes, whereas it now averages around 10,000 (Goodman, forthcoming). When the municipality of Huntsville, Ontario, first offered Internet ballots in 2010, voter turnout increased 15 percent from the previous election. The municipality credited this improvement in participation to the added method of voting (Canadian Press, November 9, 2012). Similarly, in Estonia, researchers show a 3 percent increase in the voter turnout of the 2009 local elections because of Internet ballots (Trechsel et al., 2010).

Other research suggests, however, that increases are not always a sure thing and that turnout may drop even with the offer of Internet voting. An examination of the impact of Internet ballots on voter turnout in a different Estonian election (the 2007 parliamentary elections) by different researchers finds no effect on voter participation (Bochsler, 2010). Comparing turnout percentages for 2006 and 2010 in 21 Canadian municipalities and townships that first introduced online ballots in 2010 shows a turnout increase in 16 and a decrease in 5 (see **Figure 4** in the Appendices). As Goodman (forthcoming) observes, "[the] decreases suggest that Internet voting is not a panacea for all the causes of declining turnout, while the increases imply that for some the added accessibility and convenience offered by Internet voting encourages turnout" (10). Either way, more research is needed to address the question of whether adding Internet voting as a complementary voting method can improve turnout.

It is difficult to say whether changes in turnout are attributable to Internet voting or other elements of the election such as whether important issues are at stake, the closeness of the race, or whether there is an important difference between parties and candidates. Many jurisdictions that have continued to use Internet voting over multiple elections have observed positive increases in turnout. In Canada, cases such as Markham and the municipality of Halifax suggest that online ballots can have a positive impact on participation if Internet voting is implemented slowly, with careful consideration, and also with public education in mind.

Although there is an inconclusive effect on turnout, data indicates that many electors are making use of online ballots. For example, in 85 percent of the Canadian municipalities[12] that offered online voting in 2010, a majority of the votes cast during the online voting period were Internet ballots. In all but <u>one</u> community, a majority of the ballots were cast electronically (Internet or telephone) (see **Figure 5** in the Appendices). Overall, many more electors seem

to be participating in the advance portion of elections through the Internet ballot option than voted in the advance polls using the paper ballot system. Similar uptake is characteristic of the cities and townships that have permitted online voting up until and on Election Day.

All things considered, there is no conclusive evidence that shows introducing Internet voting will have a positive impact on turnout one way or the other. Internet voting will not fix the problem of voter turnout decline completely – **it is not a solution to the social and political causes of non-voting**. It does, however, have the potential to lower the opportunity cost of voting sufficiently that some electors may be encouraged to participate. With respect to young people, Canadian research shows that middle-aged electors are actually the most likely group to make use of Internet voting (see Goodman, forthcoming). Part of this is because young people vote much less than older electors. Either way, though, it is very unlikely Internet voting is going to cure young people's withdrawal from the electoral process.

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[12] This is based on 34 of the 44 municipalities for which data was available. Please see Goodman, forthcoming.

• Cost

Will Internet voting raise or lower the costs of elections in Edmonton?
Will the cost be different in the short-term than the long-term?

Although Internet voting can lower the cost of elections long-term, in the short-term it may be more costly. While expenditures such as printing ballots and staffing can be reduced over time, initially an investment is required into the online voting system or to secure an Internet voting provider, but also to educate and inform the public about the introduction of online voting, its features, how it will work, and how they can access the service.

Research sponsored by Elections Canada suggests that a poll-based municipal election costs between four and six dollars per eligible elector, whereas the standard rate for Internet service providers is about two dollars (this price can of course vary based on service providers), plus the cost of any mailers or voter information cards (Goodman et al., 2010).[13] Though this price is significantly lower, since Internet voting is not a replacement for traditional poll-based voting but rather an addition method of participation, the overall cost to run the election could be greater, perhaps even much more so. Halifax, for example, paid 1.3 million dollars to cover the costs of their 2008 election. $487,151 of this amount was the cost paid to the Internet service provider to run the electronic portion of the election (Goodman et al., 2010:29). That said, many Ontario municipalities reported saving money in the 2010 municipal elections, particularly in the 22 communities that used Internet voting only.

Longer-term, as Internet voting processes became more familiar and are increasingly used by citizens, poll-based associated costs could be reduced slowly, eventually becoming more cost effective. After using Internet voting again in a 2009 by-election, and being pleased with the results, Halifax Regional Municipal Council expected to be able to eliminate a number of polling locations and staffed poll tables in the 2012 election since they would only be offering electronic (Internet and phone) advanced voting and no paper balloting. Using this strategy they reduced the number of polling locations from 146 to 103, and the number of staffed poll tables from 600 to 491. They correctly anticipated this service change would lower election costs while also resulting in "happier electors" (30). So, while there is potential to reduce costs down the road, in the beginning the introduction of online voting will likely increase the overall cost of municipal elections in Edmonton. It should also be noted that of the several types of Internet voting, remote online voting is the least expensive.

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[13]Mailing out a voter notification letter is a common cost regardless of whether paper ballots or Internet voting is chosen.

• Environmental Impact

How can online voting positively affect the environment and reduce the footprint of Edmonton elections?

Internet voting is considered to be a 'greener' choice to traditional ballots because as many ballot papers do not have to be printed. In addition, poll clerks are not required to drive boxes of ballots from one location to another on election night. Election supervisors would also be required to travel to polls less, and electors would not have to drive to voting stations. Voting online contributes to less paper usage and has a lower carbon footprint because less or no transportation is required to cast a ballot (depending on the individual and circumstance). Since environmental concerns are becoming increasingly important, the lower planetary impact of Internet voting can be seen as a benefit of the alternative voting method. Halifax, for example, has confirmed online voting is a 'greener' option.

FINAL COMMENTS

It is intended that the information provided in this Issues Guide will provide you with a baseline of knowledge about some of the more pertinent topics associated with Internet voting – including problems, concerns, and benefits. The decision to introduce Internet voting in any area seems to be controversial and whether it will work well depends on the jurisdiction and the context. We can never say for certain whether something that is successful in one area will work equally well in another. By using this information, you have been tasked with determining whether Internet voting is right for the City of Edmonton. Your knowledge of the City of Edmonton, its culture, its people, and its political system make you a suitable assessor of the types of political institutions that are a good fit in this social and political climate. Your *personal* knowledge coupled with the information in this Guide and the additional education you will receive through the Citizens Jury process will hopefully give you the tools you need to make this important public policy decision.

APPENDICES

Figure 1[1]: Internet Voting in Canadian Municipalities

ONTARIO		ONTARIO		NOVA SCOTIA		ONTARIO		NOVA SCOTIA	
2003	# of electors	2006	# of electors	2008	# of electors	2010	# of electors	2012	# of electors
Champlain	8000	Addington Highlands	5135	Berwick	1696	Addington Highlands	5135	Argyle	6,350
Clarence-Rockland	15343	Augusta	6500	Halifax	279326	Arnprior	6600	Bridgewater	7065
East Hawkesbury	3100	Champlain	8000	Stewiacke	1002	Augusta	6500	Cape Breton	83370
Hawkesbury	10100	Clarence-Rockland	15343	Windsor	2744	Belleville	49500	Chester	8260
Markham	158000	Cobourg	15500		Total	Brockton	3500	Clare	7025
North Dundas	8289	East Hawkesbury	3329		284768	Brockville	15000	Digby	1105
North Glengarry	8900	Edwardsburgh/ Cardinal	5700			Burlington	125000	East Hands	14350
North Stormont	5500	Hawkesbury	10100			Carling	3800	Halifax	327000
South Dundas	8417	Markham	164000			Champlain	8000	Kentville	4,200
South Glengarry	10988	North Dundas	8700			Clarence-Rockland	15343	Middleton	1250
South Stormont	10100	North Stormont	5500			Cobourg	15500	Stewiacke	1066
The Nation	9100	Perth	5200			East Hawkesbury	3329	Truro	9680
	Total	Peterborough	75000			Edwardsburgh/ Cardinal	5700	Victoria	5700
	255837	South Dundas	9000			Elizabethtown-Kitley	7500	Windsor	2678
		South Frontenac	19000			Greenstone	5000	Yarmouth	5441
		South Glengarry	9230			Hawkesbury	10100	Digby	5950
		South Stormont	10100			Huron-Kinloss	7200		Total
		Tay Valley	7800			Huntsville	19000		490535
		The Archipelago	5300			Laurentian Valley	10000		
		The Nation	9100			Leeds-Thousand Islands	7000		
			Total			Markham	186000		
			397537			McNab/Braeside	5700		
						Mississippi Mills	11000		
						Montague	3500		
						North Dundas	8700		
						North Grenville	10000		
						North Stormont	5500		
						Pembroke	10000		
						Perth	5200		

[1]Three by-elections have also been conducted in municipalities using Internet voting, these include Tay Valley in 2007, Montague in 2008, and Halifax in 2009 (Smith, April 8, 2010). This data is original research. An earlier version of this table was included in Goodman, 2010.

ONTARIO		ONTARIO		NOVA SCOTIA		ONTARIO		NOVA SCOTIA	
2003	# of electors	2006	# of electors	2008	# of electors	2010	# of electors	2012	# of electors
						Peterborough	75000		
						Port Hope	13900		
						Prince Edward	23000		
						Renfrew	5700		
						South Bruce	8350		
						South Dundas	9000		
						South Frontenac	19000		
						South Glengarry	9230		
						South Stormont	10100		
						Stratford	20000		
						Tay Valley	7800		
						The Archipelago	5300		
						The Nation	9100		
						West Elgin	4000		
						Whitewater	7100		
							Total		
							800887		

Figure 3: The Evolution of Electronic Voting Technology in the US
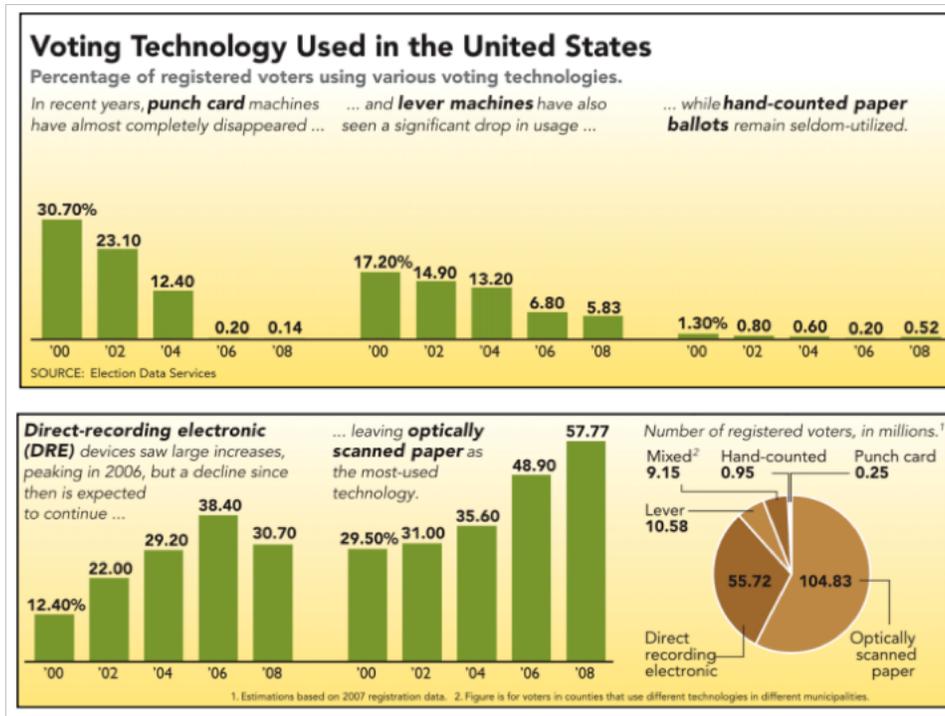
Source: Chart taken from the Norwegian E-Vote Project report, International Experience with E-Voting, written by Barrat i Esteve et al., 2012. Their data is provided by Election Data Services: http://www.electiondataservices.com.

Figure 4: Percentage change in turnout from 2006 to 2010 in 21 Ontario municipalities
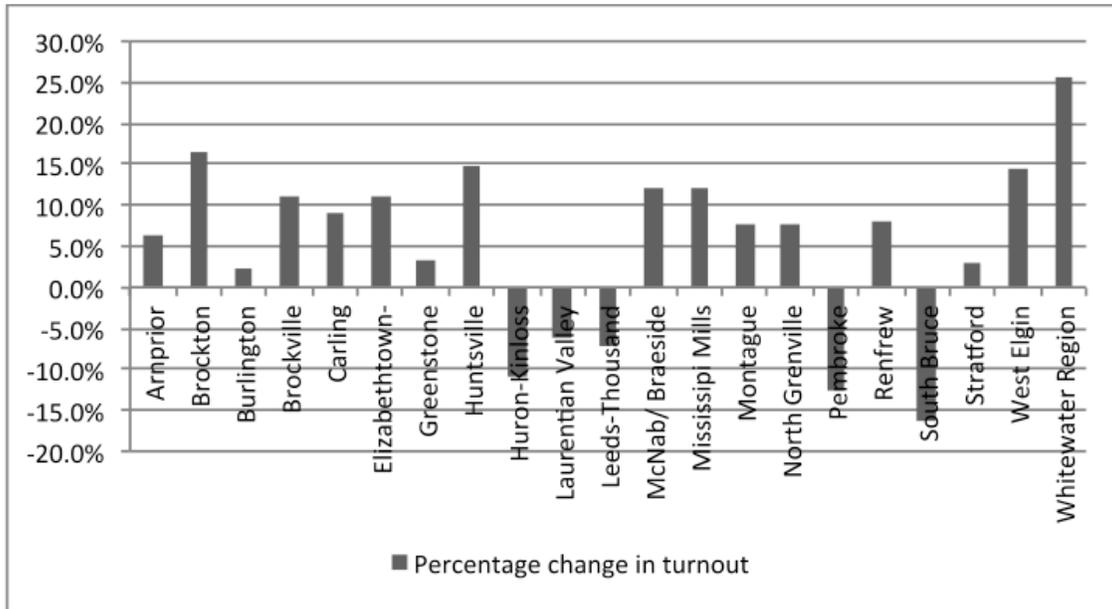
Source: Chart taken from Goodman, forthcoming.

Figure 5: Methods of voting in 33 Ontario municipalities and townships, 2010

Table 1: Benefits and Drawbacks of Various Electronic and Remote Voting Methods

SYSTEM TYPE	BENEFITS	DRAWBACKS AND RISKS	Where Method Has Been Used[6]
Remote Internet voting	—Convenience and accessibility for electors who have computers with Internet access at home, at work, or abroad; and for certain groups of electors (persons with disabilities, the military, single parents, electors who are traveling, etc.) —Flexible voting time for electors —Flagging of ballot errors —Replication of ballot images without voter information for counting or audit purposes —Lower cost than traditional methods —Potential to increase voter turnout —Potential to enhance electoral efficiency —Faster and more accurate election results —Elimination of long line-ups —Instant absentee ballot —Font size and screen language can be modified	—Limited access to Internet or limited understanding on part of some electors —Possibility of stolen voter packages or identification cards —Misuse of elector's ID card and personal information voting by others without the knowledge of the elector —Difficulty verifying voter ID —Possible pressure on electors to vote a certain way if in the presence of others —Hacks or viruses attacking the system and altering election results —Technical difficulties, programming errors or server malfunctions —Inaccuracies on the voters' list, resulting in one elector receiving a card intended for another elector	—Australia (for military and persons with disabilities only and the project has since been cancelled), Austria, Canada, Estonia, Netherlands, Switzerland, USA (for military only project was abandoned),UK (project also cancelled)
Kiosk Internet voting	—Placement in convenient high-traffic locations (e.g. malls and supermarkets) —Flexible voting time for electors —Flagging of ballot errors —Replication of ballot images without voter information for counting or audit purposes —Potential to help address the voting needs of certain groups of electors (persons with disabilities, single parents, etc.) —Potential to enhance electoral efficiency —Faster and more accurate election results —Elimination of long line-ups	—Lack of paper trail to allow auditing and recounts —In the case of a power outage, no alternate method is available —Expenses of machines —Software can sometimes be unreliable —Electors may leave the voting screen before ballot is officially cast —Hacks or viruses attacking the system and altering election results —Electors may be pressured to vote a certain way if in the presence of others —Technical difficulties, programming errors or server malfunctions —Machine updating and cost —Candidate representative's scrutineer function may be diminished —Inaccuracies on the voters' list could result in one elector receiving a card intended for another elector	—France

SYSTEM TYPE	BENEFITS	DRAWBACKS AND RISKS	Where Method Has Been Used[6]
Polling place Internet voting	—Eliminates mismarked or spoiled ballots and other invalid results —Programmable machines to dispense ballots for any riding —Removal of authentication questions so voter identification is most similar to the traditional process —Assistive devices to improve accessibility for electors with disabilities —Faster and accurate election results —Font size and screen language can be modified	—Auditing and recounts can be questioned if there is no paper trail —In the case of a machine failure (i.e. power outage) no alternate method is available —Machines are expensive —Software can sometimes be unreliable (many of these machines have a negative reputation based on failure in USA trials) —Electors may leave the voting screens before their ballot has been officially cast —Little advantage for electors in terms of convenience —Machine updating could also be an issue and costly	—Australia, Belgium, Brazil, Canada, Finland, France, Germany, India, Ireland, Netherlands, Norway, Portugal, Spain, Switzerland, UK, USA
Precinct Internet voting	—Elimination of mismarked or spoiled ballots and other invalid results —Programmable machines to dispense ballots for any riding —Removal of authentication questions so voter identification is most similar to the traditional process —Assistive devices to improve accessibility for electors with disabilities —Faster and accurate election results —Font size and screen language can be modified	—Auditing and recounts can be questioned if there is no paper trail —In the case of a machine failure (i.e. power outage) no alternate method is available —Machines are expensive —Software can sometimes be unreliable —Electors may leave the voting screens before their ballot has been officially cast —Little advantage for electors in terms of convenience —Machine updating could also be an issue, and be costly	

SYSTEM TYPE	BENEFITS	DRAWBACKS AND RISKS	Where Method Has Been Used[6]
Telephone voting	—Convenience and accessibility for electors who have telephones; and for certain groups of electors (persons with disabilities, military, single parents, electors who are traveling, etc.) —Flexible voting time for electors —Flagging of ballot errors —Familiar technology, especially for those familiar with telephone banking —No ballot printing —Fewer election staff and poll locations —Less costly —Potential increase in voter turnout —Enhance electoral efficiency —Eliminate long line-ups	—Traditional recount not possible because no paper trail —Possibility of stolen voter packages or identification cards —Difficulty verifying voter ID —Must ensure candidate representative's function is written into the program (e.g. Halifax candidate module) —Electors may be pressured to vote a certain way if in the presence of others —Possibility of telephone lines overloading or phone service interruption —Inaccuracies on the voters' list could result in one elector receiving a card intended for another elector	—Netherlands, UK

Source: Goodman et al., 2010. Please note that this table was compiled in 2010, so while the benefits and drawbacks are likely the same some additional countries and jurisdictions may have introduced or tried certain methods of Internet voting since then.

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