Internet Voting in Sub-national Elections: Policy Learning in Canada and Australia

Nicole Goodman[1] and Rodney Smith[2(✉)]

[1] Munk School of Global Affairs, University of Toronto, Toronto, Canada
nicole.goodman@utoronto.ca
[2] Department of Government and International Relations, University of Sydney, Sydney, Australia
rodney.smith@sydney.edu.au

Abstract. In advanced democracies, the expansion of internet voting in national elections appears to have stalled. New announcements by governments of online voting initiatives seem to be matched by announcements elsewhere that trials will not proceed, or that completed trials will not result in wider deployment. Debates between proponents and opponents of internet voting in advanced democracies now run along well-worn lines. The same examples are endlessly recycled. This apparent inertia at the national level masks the gradual increase in examples of deployment at the sub-national level. These sub-national cases provide a growing stock of evidence about more and less successful ways of managing transitions to voting by internet. This article draws upon advocacy coalition theory to analyse some of these sub-national developments, focusing on remote online voting in Australia and Canada.

Keywords: Internet voting · Sub-national elections · Policy · Canada · Australia

1 E-Voting: No Movement?

In July 2014, the Norwegian government announced that it was ending its internet voting trials, following concerns about privacy and the failure of internet voting to increase turnout, especially among young voters. The trials had been judged by many to be popular and successful, with the most recent pilots in 12 municipalities resulting in 38% uptake among 250,000 eligible voters [5, 39]. At around the same time, the United Kingdom's Electoral Commissioner, Jenny Watson, and the Speaker of the UK House of Commons, John Bercow, separately announced their support for the UK to move to remote online voting in order, among other things, to increase youth turnout [4, 5]. The UK government had ended its own internet voting pilots a decade earlier, due to criticisms about the insecurity of online voting and its failure to raise turnout, criticisms that were eerily similar to the conclusions now being drawn in Norway [28, 40].

These synchronous examples are typical of the lack of progress toward internet voting in advanced democracies over the past decade. While the use of internet and computer technology for other electoral tasks such as voter registration, voter identification and electoral roll mark-off at polling places, and electronic counting of scanned

R. Krimmer et al. (Eds.): E-Vote-ID 2016, LNCS 10141, pp. 164–177, 2017.
DOI: 10.1007/978-3-319-52240-1_10

paper ballots has increased, the initial expansion of remote online voting appears to have stalled. Every new announcement by a government that e-voting should be trialled or introduced seems to be matched by an announcement elsewhere that trials will not proceed, or that completed trials will not result in wider use.

The voting technology that is the subject of this article, remote online voting is presently used for binding elections in ten countries: Australia, Armenia, Canada, Estonia, France, India, Mexico, Panama, Switzerland and the United States. While there was a flurry of adoption in the early 2000s, many pilots were terminated because hoped-for effects on turnout were not realized or due to technical considerations. Today only Estonia permits voting by internet in national elections for all electors. Armenia, France, Mexico, Panama and the United States have also used the technology in national elections but only as an option for citizens or military living abroad. Internet voting is deployed sub-national or local elections in all the other countries listed above. This change in the pace of development is the result of several factors. First, online voting did not deliver 'magic bullet' improvements to waning voter participation as was hoped in places such as the UK and Norway. These assessments, however, were often based on one or two elections and did not consider other contextual variables that may have affected the rate of voter participation. Second, concerns about security, fraud, and new pressures to create verification tools to ensure votes were cast as intended slowed i-voting developments in Estonia and Switzerland. Finally, in Europe in particular, budget crises and declining trust in the internet contributed to the halting or stalling of voting technology purchases and trials.

Perhaps as a result of this stasis, public debates over remote online voting in advanced democracies now run along well-worn lines. Proponents argue that internet voting will bring modernisation, efficiency, improved access to the voting process and increased turnout, especially among targeted populations such as young people. Opponents warn of threats to electoral integrity wherever online voting is introduced or expanded, citing issues of security and privacy (see Table 1). In these debates, the same examples of success and failure are endlessly recycled.

Table 1. The well-established remote online voting debate

Arguments in favour	Arguments against
Modernisation	Caution (let others take the risk)
Accessibility (for remote voters, immobile voters, busy voters, persons with disabilities etc.)	Accessibility (the 'digital divide', variable internet coverage and quality, and computer literacy etc.)
Engagement, participation and turnout (especially for the young)	Erosion of social rituals of voting (the death of the 'sausage sizzle' etc.)
Reduction in voter error and accidentally spoiled ballots	Security threats (hacking, viruses, denial of service attacks etc.)
Secrecy (for voters with disabilities etc.)	Secrecy (family members voting together, coercion, vote-buying, intercepted votes etc.)
Faster and more accurate ballot counts.	Loss of scrutiny of the ballot count
Reduced expense (over time)	Expense of setting up system, voter education, etc.
Environmentally friendly	Voting occurs without full information (since people vote early)

2 Internet Voting and Advocacy Coalition Theory

One way of understanding this apparent impasse can be found in the advocacy coalition framework developed by Paul Sabatier and other public policy scholars [23]. Adopting this approach, we can view the remote online voting debate as mostly occurring in a policy sub-system, well away from the everyday cut and thrust of policy debates that attract the attention of the news media and the general public. As a specialised issue, internet voting policy involves established, small and relatively closed groups of expert participants, including electoral officials, members of parliamentary committees on electoral issues, political party officials, online voting system vendors, computer scientists, internet security specialists, political scientists, and advocacy groups for people with disabilities, people living in remote areas and the like. These participants form competing advocacy coalitions that use technical expertise and other resources to try to influence public policy via strategies such as submissions to policy-makers, media campaigns and specialist conference presentations [23].

As Table 1 suggests, the contest between supporters and opponents of online voting has become stable both with regards to opposed core normative beliefs (participation versus security) and opposed specific policy preferences. The advocacy coalition framework suggests three general pathways by which an impasse between competing coalitions can be broken. One is a shock or crisis that provides an advantage to one side of the policy argument. These shocks might be external to the policy sub-system (e.g., a fiscal crisis that causes governments to cut funding for innovations in electoral management) or internal to it (e.g., a major failure of paper or electronic voting processes). A second pathway is policy-oriented learning from the accumulation of new information and examples over time, which favour the position of one coalition over another. A third pathway of compromise occurs when the competing advocacy coalitions recognise that the policy status quo is unacceptable to each of their positions [23].

The first or second pathways to policy change appear more likely than the third in the field of remote online voting policy. The fear of electoral shock or crisis is seen in the reluctance of governments in advanced democracies with well-run elections to introduce internet voting, in case its use results in a failed election that they are forced to invalidate. The continued decline in electoral turnout represents a countervailing set of repeated shocks or crises facing political elites in these countries, which internet voting may potentially counter. A less dramatic policy-learning path is provided by the accumulation of examples of internet voting at the sub-national level. These sub-national cases provide a growing stock of under-examined evidence about more and less successful ways of managing any transition to the use of internet voting and the effects that the technology has on elections. The following sections of this paper explore these developments at the sub-national level, focusing on Canada and Australia. Our analysis draws upon a review of sub-national electoral commission reports and other government documents, news media reports, and survey, interview and focus group data. The Australian survey and interview results presented are based on secondary analysis of research originally conducted for the New South Wales Electoral Commission. The Canadian survey data was collected as part of the Internet

Voting Project; a study focused on understanding the effects of online voting on local elections in the province of Ontario.

3 The Canadian Municipal Experience

Since 2003, 192 municipal elections with a remote online component have taken place in Canada. The number of municipalities using online voting has nearly doubled with each election (see Table 2). There have been more than 4.5 million online 'voting opportunities' in these municipalities since 2003, although the actual number of online

Table 2. Remote online voting in Canadian municipal elections

Year	Number of Municipalities	All electronic elections	Pre-registration	Online voting period	Number and proportion of online voters[a]
2003	12 (including Markham) in Ontario	10 (83%)	1 Yes; 11 No	1 advance; 12 in full election	Markham: 7,210 (16.7%)
2006	20 (including Markham and Peterborough) in Ontario	13 (65%)	2 Yes; 18 No	2 advance; 19 in full election	Markham: 10,639 (17.7%); Peterborough: 3,473 (14%)
2008	4 (including Halifax) in Nova Scotia	0	No	3 advance; 4 in full election	Nova Scotia: 29,918 (10.85%)
2009	Halifax, Nova Scotia by-election	0	No	1 in full election	Halifax: 9,259 (74.2%)
2010	43 (including Markham) in Ontario[b]	24 (54.5%)	6 Yes; 37 No	6 advance; 37 in full election	
2012	14 of 54 (including Halifax) in Nova Scotia[c]	5 (35.7%)	No	10 advance; 4 in full election	Nova Scotia: 490,535 (67.1%)
2014	97 of 444 (including Markham) in Ontario	59 (61%)	12 Yes; 85 No	6 advance; 91 in full election	Ontario: 335,257 (51.5%)

Sources: [12, 14, 15, 29]. Additional data collected by the Internet Voting Project and provided by Intelivote Inc.

[a]The proportion of online voters is calculated based on the number of votes cast in communities that offered internet voting.

[b]Forty-four municipalities planned to use internet voting, however all seats were acclaimed in the Town of Hawkesbury and so elections took place in 43 of them.

[c]Online voting was approved for 16 communities, but all seats were acclaimed in the Town of Middleton and the Municipality of East Hants determined that it could not afford implementation.

votes is much lower. In the 2014 Ontario municipal elections for example, about 2.2 million electors had the option to vote online, with 335,257 online ballots cast. Presently municipal online voting is limited to the provinces of Ontario and Nova Scotia, where communities have the option of passing by-laws to introduce alternative voting modes. The provinces write municipal election legislation in Canada. To date six provinces (Alberta, British Columbia, New Brunswick, Nova Scotia, Ontario and Saskatchewan) have passed legislative provisions that allow for the use of alternative voting methods by municipalities [15]. Despite a supportive legislative framework, however, and a great deal of local interest, provinces such as Alberta and British Columbia have not permitted municipalities to proceed with internet voting trials primarily because of security concerns. In Alberta in particular, a group of municipalities planned to adopt internet voting in 2013 when the Minister of Municipal Affairs issued a moratorium. Many of these communities have since argued for more autonomy and it appears as though online voting will be used in select Alberta municipalities in 2017.

Rationales for the introduction of internet voting in Canadian municipalities vary, but there are common themes. A 2013 Elections Canada research report found that anticipated improvements in accessibility, voter turnout, and leadership in e-government were the most popular reasons for adopting, or considering deployment of, internet voting [31]. In a 2014 survey of election administrators in Ontario, the three top cited reasons for the use of internet voting in elections were accessibility (25%), increasing voter turnout (22%), and voter convenience (17%) [13, 16]. Apart from the desire to be a modernising leader in e-government, these reasons focus on making it easier for electors to vote and promote their participation. They do not include efficiency goals such as improving counting processes or reducing election costs. For Canadian election administrators, improvements in voter participation and retention of current voters motivate shifts to online voting.

Many municipalities in Ontario and Nova Scotia have used, or continue to offer, remote voting channels such as postal voting, and in some cases proxy voting [8, 30]. Remote online voting is typically offered as one of multiple voting modes including some combination of paper, telephone, and postal ballots. Many communities, however, have opted for all electronic elections. In 2014, 59 of 97 Ontario municipalities that used internet voting eliminated paper voting altogether. Fifty-eight of these used a combination of internet and telephone ballots, while the Municipality of Leamington ran the first all internet election in Canada [9].

Beyond differences in voting modes, municipal internet voting deployment varies in two important ways. One is the time period in which internet voting is made available. Smaller communities (populations less than 25,000 persons) or those with large seasonal populations (e.g., in areas where there are a lot of cottages) typically offer internet voting for the full election (during the advance voting period and on Election Day). By comparison, larger places with populations greater than 100,000 inhabitants generally have online voting in the advance vote period only. Another difference is whether pre-registration is required to vote online. Most small communities do not require registration beforehand and also use fewer credentials to authenticate voters' identities (e.g., items such as a PIN, date of birth, security question, and password). A municipal association survey of 38 municipalities that used internet

voting in 2014 asked which credentials were used. In 92% of cases, a PIN was required to cast a ballot online, 42% required date of birth be filled in, and in 16% the creation of a security question was necessary. Most large cities require registration ahead of time. This latter approach customarily involves the successful completion of multiple credentials [16].

The examples of remote online voting in Canadian municipalities since 2003 offer considerable scope for policy learning, since they vary across key dimensions, including the size, demographics and geographic location of the municipalities involved, the combination of voting modes, the online voting vendors, online voting process requirements (e.g., registration or no registration) and the online voting period [14, 16]. Policy learning has been important for growing uptake amongst Canadian municipalities and has influenced the type of models adopted.

The fact that communities with populations greater than 100,000 have opted for a registration requirement, for example, is largely a consequence of the City of Markham initially adopting that approach in 2003. Markham's process meant that electors received a letter with instructions for registering to vote online, with those who registered receiving their voting credentials in a second letter. A risk assessment conducted by Professor Henry M. Kim from York University found that Markham's two-step approach reduced the chances of fraudulent internet voting [25]. All large municipalities followed suit, although some amended the Markham approach slightly by using email instead of paper mailing for the second 'mail-out'.

In a further step, policy-makers in the Town of Ajax decided that using email to communicate voting credentials to electors was not necessarily secure, given that creating a fake email account was easier than intercepting mail. At the same time, Ajax officials determined that the initial registration requirement increased the perceived costs of internet voting for electors and thus worked against their goal of increasing turnout. For these reasons, Ajax retired paper voting altogether in 2014 and ran an all-electronic election in which the 75,000 eligible voters could gain access to internet or telephone ballots using a mailed out PIN and additional personal details [1, 11, 22]. The Ajax experience may change the patterns of online voting implementation by encouraging other mid-sized and large municipalities to adopt a similar approach to deployment.

Policy learning has also influenced the period in which municipalities make online voting available. Some communities, such as Halifax Regional Municipality and the Town of Whitby, first trialled remote online voting in a by-election before deploying it in a regular election. In addition, steady growth in municipal uptake with each election can be attributed to the fact that early adopters have reported successful deployment of the voting method. Hearing positive testimonials from voters, candidates and election administrators has encouraged other communities across the provinces of Ontario and Nova Scotia to modernise voting.

Generally, online voting experiences have been positive for stakeholders. Reported technical and security issues have been limited [15]. Technical issues in 2014 Ontario municipal elections concerned the accuracy of voters' lists, delays in the postal delivery of voting instructions and credentials to households, and a two and a half hour election night delay in the posting of results for about 44 municipalities [3, 16, 34]. The latter problem prompted the online voting provider to reduce its fee to the affected

municipalities by 25% [2]. One mayoral contest in Napanee involving a three-vote margin resulted in a recount of internet ballots, after which the original result was confirmed [3, 38].

Canadians that have used online voting report positive experiences. The 2014 Ontario local elections provide evidence that internet voting is popular, even where paper and telephone options are also available. In the 23 municipalities that offered all three voting modes, 55.6% of votes were cast by internet, 31.6% by paper and 12.8% by telephone [16]. Similarly in the 2010 elections in the 12 municipalities that used all three voting options, internet ballots were more popular than telephone and paper combined in eight municipalities, more popular than either of the other two channels in three municipalities, and less popular than both the other channels in just one municipality (calculated from [12]). Satisfaction levels among surveyed internet voters have consistently been over 90%, with similarly high proportions of users claiming they would use internet voting again and recommending its expansion into provincial and federal elections [12, 16].

The primary rationale voters cite for using internet voting is convenience, however access also appears to be a factor. Among Ontario voters surveyed in 2014, 14% claimed that they would probably or definitely not have voted without the internet option. Fifty-eight percent of people who voted in 2014 and had not done so in 2010 identified the accessibility of internet voting in 2014 as the factor that made the difference to their behaviour [12, 15, 16]. Canadian studies find a 3% increase in municipal election turnout following the adoption of the voting reform [17]. Goodman and Pyman conclude that internet voting has a 'modest potential to engage non-voters' [16]. Notably, the voting mode does not appear to have met the goal of engaging young voters, as the most common users are middle–aged or older. The average internet voter in the 2014 Ontario municipal elections was 53 years old [16].

Despite the issues mentioned earlier, most municipal electoral officials involved in the 2014 Ontario election had positive views about internet voting deployment. Over 90% of those surveyed would recommend using online voting in the next municipal elections, and for future provincial and federal elections. Officials cited accessibility, turnout and convenience as the primary benefits of the voting reform. When considering risks, they tended to rate internet voting as involving more risks than paper ballots cast at a polling place but as less risky than the other remote options of telephone or postal voting. For officials, the greatest challenges posed by internet voting adoption were public education and countering negative news media [16]. Internet voting policy learning has occurred in Canada and this is likely continue, since a record number of about 200 Ontario municipalities anticipate adopting voting reform in the 2018 election.

Election candidates were perhaps the group most affected by the adoption of internet voting. With increasing numbers of voters casting an early ballot, candidates had to work harder to get campaign messages to voters at the start of the election period [12]. Many candidates in 2014 believed that remote online voting had improved turnout and interest in the election. Eighty-nine percent supported its use as an additional voting channel, although 64% opposed the use of the internet ballots as the only voting channel [16].

Finally, it is worth noting that internet voting was halted municipally in the province of Alberta because of an internal policy shock. In 2012 the City of Edmonton

invested in a public consultation process to evaluate the possibility of using internet voting in future municipal elections. This included carrying out public opinion surveys, a mock online election to test the technology, a series of citizen roundtables and the creation and implementation of a Citizens' Jury. After hearing expert testimony and careful deliberation the Jury voted in favour of proceeding with internet voting in the 2013 elections, 16 to 1. The negative juror eventually changed his vote to support the policy change [24].

Although the Jury supported the change and compiled a list of recommendations for adoption, the voting reform had to be approved by City Council before implementation. As the issue came before Council, a local computer programmer and public opponent of internet voting, Mr. Chris Cates, requested to speak to Council. During his presentation to an Executive Committee of six councillors on 28 January 2013, Cates explained that he had voted twice in the mock election and argued that the system security was therefore unsafe. He would not explain how he had cast two ballots. (Officials wanted persons from anywhere in the world to be able to vote in the mock election and test the technology so registration was not tightly controlled. It is thought that Cates registered twice to vote). Cates' testimony cast doubt upon the security of internet voting and echoed concerns raised by computer scientists during the Jury process. While councillors had other concerns about proceeding with internet voting, Cates' allegation of voting twice has been suggested as a reason for their rejection of the proposal in a vote of 11 to 2 [24].

The rejection of internet voting by Edmonton City Council led the office of Alberta's Minister of Municipal Affairs to place a moratorium on internet voting for the 2013 elections, preventing other municipalities that had planned to use the technology from proceeding. The 'shock' of a potential security compromise, even in a mock election, is a key reason why internet voting has experienced a standstill in Alberta. Although some municipalities have revisited the issue and lobbied to use online ballots in 2017, this case illustrates the way shocks can shift internet voting policy debates.

4 The Australian Experience

Remote online voting is currently offered in only one jurisdiction in Australia. Certain groups of voters in New South Wales (NSW), the most populous of Australia's six states, are able to cast their votes via the internet or telephone using the iVote® system. Since 2011, NSW voters have cast nearly 339,000 votes across nine elections (see Table 3).

The development of remote online voting in Canada and NSW has differed in two ways. First, while remote online voting in the Canadian municipalities is now available to all voters and is the only way to vote in some municipalities, only certain categories of NSW voters are eligible to vote via the internet. Registration and voting are compulsory for almost all adult citizens in NSW elections, as they are in national, state and territory elections across Australia. Thus the goals of the policy-makers who introduced remote online voting were not to boost overall voter turnout but instead to improve access to the ballot for citizens who would otherwise find it difficult to cast a vote. Division 12A of the NSW *Parliamentary Electorates and Elections Act 1912* specifies that 'technology assisted voting' such as remote online voting is intended only for use

Table 3. Elections using internet voting in New South Wales

Election	Number of internet voters	Total number of voters	Percentage of internet voters
2011 State Election	46,862	4,290,595	1.09%
2011 Clarence By-election	1,246	44,412	2.08%
2012 Heffron By-election	798	36,724	2.17%
2012 Sydney By-election	2,192	38,457	5.70%
2013 Northern Tablelands By-election	1,859	44,393	4.19%
2013 Miranda By-election	679	41,289	1.64%
2014 Charleston By-election	763	42,592	1.79%
2014 Newcastle By-election	836	43,645	1.91%
2015 State Election	283,669	4,561,234	6.22%
Total Votes Cast	338,904	9,143,341	3.70%

Source: Figures from the New South Wales Electoral Commission.

by voters who are vision impaired, illiterate or have another disability that prevents them from voting without assistance or makes voting a challenge, as well as voters who live 20 kilometres or more from a polling place, or who will be out of the state during polling day. Many NSW voters using internet voting would otherwise not have voted, would have voted by postal ballot, or would have been unable to cast a secret ballot [21].

As with most online voting in Canadian municipalities, the NSW iVote is offered as part of a suite of voting channels. In the NSW case, these include paper ballots at polling places on or before polling day, postal voting and some mobile voting services. In contrast to some Canadian municipalities, the NSW government currently has no plans to make internet voting the only available voting channel, or to expand the categories of voters that are eligible to vote online. At the same time, the NSW Electoral Commission has little incentive to take action against the significant minority of voters who actually use the iVote system but are officially ineligible to do so because they do not fit the categories of voter specified in the *Act* (see above). These ineligible voters mainly vote online for reasons of convenience. Survey research suggests that ineligible voters comprised around one-quarter of voters using the iVote system in the 2015 NSW election, a figure that is likely to increase as these voters recommend online voting to others and it becomes better known (IPSOS 2015: 73–74; 83–84).

The second difference between Canada and Australia with respect to online voting has to do with number of significant organisations involved in its authorisation and administration. The introduction of internet voting in NSW has occurred under the oversight of a single legislative body, the NSW Parliament, has been managed by a single electoral management body, with a technical system provided by a single electronic elections company (Scytl). Canadian developments, by contrast, have involved a growing number of municipal governments and about six competing technology vendors. The relatively low initial uptake of online voting at the 2011 NSW

state election (just over 1% of voters), was followed by a series of seven by-elections involving limited numbers of voters, which allowed the NSW Electoral Commission to test and refine the iVote system before it was used by a much larger group of voters (over 6%) in the 2015 state election [7]. By contrast, 54 Canadian municipalities used remote online voting for the first time in 2014, although as shown earlier, many of them drew upon the experiences of earlier adopters.

The different ways in which the growth of remote internet voting has occurred in Canada and Australia mean that the risks of internal shocks and the patterns of policy learning are likely to vary to some degree. A critical technology failure in one Canadian municipal election, for example, may not affect the commitment of other municipalities to deploy online voting, while a critical failure in a NSW election might cause a complete suspension of the voting method.

Similarly, Canadian municipalities can learn from each other's experiences of different online voting systems, while NSW policy-makers will primarily learn lessons from the performance of the iVote® system in light of the specific context and demands of NSW elections. Some of this policy learning is directed by the NSW Electoral Commission, which undertakes internal and external testing of the iVote® system and reports the results [27]. Other aspects of this policy learning are more open-ended. The most important forum for this type of policy learning is the parliamentary inquiry into the conduct of each NSW state election undertaken by the Joint Standing Committee on Electoral Matters (JSCEM). JSCEM is a cross-party committee, whose members are drawn from the NSW Parliament's two houses, the Legislative Assembly and the Legislative Council. It receives submissions and takes evidence from interested individuals and organisations, including supporters and opponents of internet voting in NSW. JSCEM's recommendations on internet voting following the 2011 NSW election led to some modification of remote online voting for the 2015 election, particularly through provision of a new process whereby internet voters could verify their votes [26, 33].

Almost all of the nine NSW elections using internet voting have been uncontroversial. At the 2015 state election, however, two contentious issues developed soon after online voting began on 16 March. First, for the initial 36 h of voting, an administrative error led to the names of two minor parties being omitted from the online ballot paper for the state's upper house, the Legislative Council. During this period, about 19,000 votes were cast online [19]. Voting by internet was briefly suspended while the mistake was corrected. Nonetheless, the error raised the possibility that the Legislative Council election result might be challenged in the NSW Court of Disputed Returns and the outcome altered by the Court or the election rerun, if either of the affected parties narrowly missed out on winning a seat [18]. Ultimately, one of the parties—the Animal Justice Party—won the last seat in the contest, while the Outdoor Recreation Party fell short of gaining a seat and did not launch a legal challenge [20].

The second issue involved a public intervention on 21 March by two university computer scientists, one from the United States and one from Australia, who had previously opposed internet voting internationally on security and privacy grounds. They advised NSW voters that vulnerability in the system meant that 'your vote could have been exposed or changed without you knowing' and 'recommend[ed] you stick with an old-fashioned paper ballot' [37]. The NSW Electoral Commission disputed the

seriousness of the problem and criticised the two academics for the way in which they publicised their claims [10].

If the two controversies had any affect on voters, they appeared to pique interest in voting online. Daily registrations to use the iVote reached 10,000 on 17 March and then began to decline, falling to around 7,000 on 21 March, two days after the missing party name controversy and the day of the computer scientists' media intervention. Over the next few days, daily registrations increased sharply to 20,000, eventually reaching 50,000 new registrations on 27 March, the day before the close of online voting [6].

Surveys of online voters in 2011 and 2015 indicate they like the convenience of the voting mode [21, 35]. As in Canada, almost all NSW voters that voted online in 2015 (96%) were satisfied with the overall process, while satisfaction levels with more specific elements of the process—registration, receiving an iVote PIN number, and the time and ease of remote voting—all also exceeded 90% [21]. Although iVote users who reported being aware of iVote news during the 2015 election campaign were more likely to remember negative news items than positive ones, almost two-thirds of users remained 'very confident' that their votes had been recorded securely and accurately and a further third were 'fairly confident' [21]. These findings about confidence in the system are supported by the fact that only 1.7% of online voters used the iVote verification tool to check their votes after casting them at the 2015 NSW election [7]. Trust in online voting among non-users in NSW is likely to be lower; however, national survey research following the 2013 federal election found that over half (57%) of Australian voters were confident that a vote cast remotely via the internet would be recorded and counted accurately [36].

The nine NSW elections conducted using remote online voting have been considered a success by officials. The two potential internal shocks that occurred during voting in 2015 had little apparent impact on growing community acceptance in NSW of the internet as a trustworthy and convenient voting channel. The NSW Electoral Commission responded to these incidents by further modifying its remote online voting systems. The policy lessons other Australian jurisdictions draw from the NSW experience are mixed. In November 2014, the Commonwealth Parliament's Joint Standing Committee on Electoral Matters produced a report reviewing Australian experiences. It rejected internet voting for national elections, invoking familiar concerns about security, hacking, fraud, vote-buying, and voter coercion [32]. By contrast, the Western Australian Parliament recently drew on the NSW iVote® experience to pass the *Electoral Amendment Act 2016*. This *Act* will result in the adoption of limited remote online voting at the March 2017 Western Australian state election.

5 Conclusion

This article presents a comparative analysis of remote online voting adoption at sub-national level. Together, Canada and Australia provide nearly 200 examples of internet voting deployment in sub-national elections from which policy-makers can draw valuable lessons. This accumulation of cases carries the potential to inform expansion of remote online voting developments both horizontally (to other sub-national elections) or vertically (to national or supra-national elections) via a

process of careful policy learning. The evidence may show policy-makers, for example, that with proper planning the integrity of elections can be maintained or improved with internet voting adoption. Alternatively, it may show them that it does not achieve hoped-for goals such as increased turnout, or that it is too costly or risky. Internet voting adoption at sub-national levels may also create new informal forces for retention and expansion. Citizens who have experienced the convenience of remote online voting, for example, may be reluctant to give it up. The cases discussed here suggest that policy learning can be an iterative process involving fixed policy actors within a single jurisdiction, as in the NSW case, or it can be a policy borrowing process in which new policy actors adopt and adapt practices developed and tested by others, as has been common among the Canadian municipalities.

Coalition advocacy theory has proven useful in understanding the development of policy in both sub-national contexts and is likely to provide guidance for future developments. Given the high rates of reported satisfaction with remote online voting in both contexts, the trend to more government and non-government services moving online, and increased internet penetration, there is good reason to believe that voters themselves will support policy shifts toward online voting. Deciding whether or not to make such shifts is likely to be a consequence of policy learning and political will. The strengths of the competing narratives advanced by coalitions of supporters and opponents about each new case of internet voting will be important in determining the direction of online voting policy.

Internal and external policy shocks will also play a part. As the 2014 Alberta and 2015 NSW experiences suggest, even well-prepared policy development and implementation of remote online voting may be struck by an internal shocks that force policymakers to decide whether they have the willpower to continue with its use.

One way or another, the growing number of sub-national cases adds an important dimension to the current policy impasse between competing advocacy coalitions that marks national and international debates on the issue. As more jurisdictions investigate the possibility of deploying internet voting, or develop plans for adoption, looking to these cases and modelling the policy learning they have experienced will be important. As governments and election management bodies increasingly modernise other parts of the voting process, such as voter registration, voters' lists, and ballot tabulation, it is only a matter of time before they reconsider the possibility of digital voting. When that time comes, the sub-national remote online voting laboratories of Canada and Australia will provide valuable lessons.

Acknowledgement. The authors thank Social Science and Humanities Research Council of Canada for financial support of the research.

References

1. Ajax News Advertiser: Votes Piling Up in Ajax, 22 October 2014
2. Baker, L.: Scytl Offers 25% Discount Over Election Problems. Cornwall Standard Freeholder, 28 November 2014

3. Baloch, M.: Council Moves to Recount Election Result. Kingston Whig Standard, 12 November 2014
4. BBC News: Bercow: E-voting would not be 'earth-shattering' step, 10 June 2014. http://www.bbc.com/news/uk-politics-27783329
5. BBC News: E-voting experiments end in Norway amid security fears, 27 June 2014. http://www.bbc.com/news/technology-28055678
6. Brightwell, I.: Administration of elections in NSW. In: Presentation to VoteID 2015: The Fifth International Conference on E-Voting and Identity, Bern, 3 September 2015
7. Brightwell, I., Cucurull, J., Galindo, D., Guasch, S.: An overview of the iVote 2015 voting system. http://www.office.elections.nsw.gov.au/__data/assets/pdf_file/0019/204058/An_overview_of_the_iVote_2015_voting_system_v4.pdf
8. Canada-Europe Transatlantic Dialogue: A Comparative Assessment of Electronic Voting, February 2010. https://elections.virginia.gov/Files/Media/SB11Workgroup/ComparativeAssessmentElectronicVotingElectionsCanada.pdf
9. CBC News: Online Voting Only for Leamington, Ont. Municipal Election, 2 April 2014. http://www.cbc.ca/news/canada/windsor/online-voting-only-for-leamington-ont-municipal-election-1.2595300
10. Easton, S.: Electoral Commission Goes to the Home of Direct Democracy to Defend iVote. The Mandarin, 9 October 2015. http://www.themandarin.com.au/55543-nsw-electoral-commission-goes-switzerland-defend-ivote/?pgnc=1
11. Gilligan, K.: Ajax Plugged into Electronic Voting in Municipal Election. Ajax News Advertiser, 29 September 2014. http://www.durhamregion.com/news-story/4884507-ajax-plugged-into-electronic-voting-in-municipal-election/
12. Goodman, N.: Internet voting in a local election in Canada. In: Grofman, B., Trechsel, A., Franklin, M. (eds.) The Internet and Democracy in Global Perspective, pp. 7–24. Springer, Berlin (2014)
13. Goodman, N.: Will E-Voting Boost Turnout in Ontario's Municipal Elections? The Globe and Mail, 21 October 2014
14. Goodman, N., Pammett, J.: The patchwork of internet voting in Canada. In: Krimmer, R., Volkamer, M. (eds.) Proceedings of Electronic Voting 2014 (EVOTE2014), pp. 13–18. TUT Press, Tallinn (2014)
15. Goodman, N., Pammett, J., DeBardeleben, J.: Internet voting: the Canadian experience. Can. Parliam. Rev. **33**(3), 13–21 (2010). Autumn
16. Goodman, N., Pyman, H.: Understanding the Effects of Internet Voting on Elections: Results from the 2014 Ontario Municipal Elections. Centre for e-Democracy, Toronto (2016)
17. Goodman, N., Stokes, L.C.: Internet Voting's Effect on Voter Turnout: An Empirical Examination of Local Elections, unpublished manuscript
18. Green, A.: Could NSW be Facing a Second Legislative Council Election? 8 April 2015. http://blogs.abc.net.au/antonygreen/2015/04/could-nsw-be-facing-a-second-legislative-council-election.html#more
19. Hasham, N.: 19,000 Electronic Votes Valid Despite Error on Ballot Paper. The Sydney Morning Herald, p. 9, 19 March 2015
20. Hasham, N.: iVote Glitch Raises Prospect of Legal Bid and Return to Polls. The Sydney Morning Herald, p. 4, 31 March 2015
21. IPSOS: 2015 NSW State General Election Research. Prepared for the NSW Electoral Commission, IPSOS, North Sydney, June 2015
22. Javed, N.: Ajax Ditches Paper Ballots for Online Municipal Election. The Toronto Star, 6 October 2014

23. Jenkins-Smith, H., Nohrstedt, D., Weible, C., Sabatier, P.: The advocacy coalition framework: foundations, evolution, and ongoing research. In: Sabatier, P., Weible, C. (eds.) Theories of the Policy Process, 3rd edn, pp. 183–223. Westview, Boulder (2014)
24. Kamenova, K., Goodman, N.: Public engagement with internet voting in Edmonton: design, outcomes, and challenges to deliberative models. J. Public Deliberation, 11/2: Article 4 (2015)
25. Kim, H.: Risk Analysis of Traditional, Internet, and Other Types of Voting Alternatives for Town of Markham. A Study Prepared for the Chief Electoral Officer, Town of Markham (2005)
26. New South Wales Electoral Commission. Voting with iVote®, 15 March 2015. http://www.elections.nsw.gov.au/voting/ivote/overview
27. New South Wales Electoral Commission. iVote Reports, 15 July 2016. http://www.elections.nsw.gov.au/about_us/plans_and_reports/ivote_reports
28. Norris, P.: E-voting as the magic bullet for european parliamentary elections? Evaluating E-voting in the light of experiments in UK local elections. In: Trechsel, A., Mendez, F. (eds.) The European Union and E-Voting: Addressing the European Parliament's Internet Voting Challenge, pp. 60–90. Routledge, London (2005)
29. Nova Scotia: 2012 Nova Scotia Municipal Elections Highlights. http://novascotia.ca/dma/pdf/mun-2012-nova-scotia-municipal-elections-highlights.pdf
30. Nova Scotia: Municipal Elections Handbook 2012. http://novascotia.ca/dma/pdf/mun-municipal-elections-handbook.pdf
31. Pammett, J., Goodman, N.: Consultation and evaluation practives in the implementation of internet voting in Canada and Europe. Elections Canada, November 2013. http://www.elections.ca/res/rec/tech/consult/pdf/consult_e.pdf
32. Parliament of Australia: Joint Standing Committee on Electoral Matters: Second Interim Report on the Inquiry into the Conduct of the 2013 Federal Election: An Assessment of Electronic Voting Options, Parliament of Australia, Canberra (2014)
33. Parliament of New South Wales: Joint Standing Committee on Electoral Matters: Administration of the 2011 NSW Election and Related Matters, Parliament of New South Wales, Sydney (2012)
34. Sacheli, S.: Angry Towns Consider Withholding Payment to Internet Voting Company. Canwest News Service, 28 October 2014
35. Smith, R.: Internet Voting and Voter Interference: A report prepared for the New South Wales Electoral Commission, March 2013. https://www.elections.nsw.gov.au/__data/assets/pdf_file/0003/118380/NSWEC_2013_Report_V2.0.pdf
36. Smith, R.: Confidence in paper-based and electronic voting channels: evidence from Australia. Aust. J. Polit. Sci. **51**(1), 68–85 (2016)
37. Teague, V., Halderman, A.: Thousands of NSW Election Online Votes Open to Tampering. The Conversation, 23 March 2015. https://theconversation.com/thousands-of-nsw-election-online-votes-open-to-tampering-39164
38. The Canadian Press: Napanee Recount, 16 November 2014
39. The Carter Center: Internet Voting Pilot: Norway's 2013 Parliamentary Elections. Expert Study Mission Report, 19 March 2014. https://www.regjeringen.no/globalassets/upload/krd/kampanjer/valgportal/valgobservatorer/2013/rapport_cartersenteret2013.pdf
40. The Electoral Commission: Electronic Voting: May 2007 Electoral Pilot Schemes, The Electoral Commission, London (2007)