PARLIAMENT OF VICTORIA

Electoral Matters Committee

Inquiry into electronic voting

Parliament of Victoria
Electoral Matters Committee

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Committee functions

The Electoral Matters Committee is constituted under section 9A of the *Parliamentary Committees Act 2003*.

The committee's functions are to inquire into, consider and report to the Parliament on any proposal, matter or thing concerned with:

a. the conduct of parliamentary elections and referendums in Victoria;

b. the conduct of elections of Councillors under the *Local Government Act 1989*; and

c. the administration of, or practices associated with, the *Electoral Act 2002* and any other law relating to electoral matters.

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Contents

Preliminaries

Committee functions iii
Committee membership v
Committee secretariat vi
Terms of reference xi
Chair's foreword xiii
Recommendations xv

1 Introduction 1

1.1 Terms of reference – Inquiry into electronic voting 1
1.2 Responsibilities of the Electoral Matters Committee 1
1.3 The Electoral Matters Committee's previous inquiries 1
1.4 Inquiry process 2
1.4.1 Submissions 3
1.4.2 Public hearings 5
1.4.3 Briefings 6
1.4.4 Site visits 6
1.5 Data analysis 8
1.6 Report outline 8

2 Background to the inquiry — electronic voting and election technology at Victorian state elections 9

2.1 Definitions 10
2.1.1 Electronic voting 10
2.2 Electronic voting in Victoria 13
2.2.1 History 13
2.2.2 Franchise 15
2.2.3 Statistics and voter satisfaction 16
2.2.4 How it works 17
2.2.5 Electronic voting and source codes – technical aspects 18
2.2.6 Postal voting – email delivery of ballot material 18
2.3 Technology and Victorian electoral administration 19
2.3.1 Enrolment 19
2.3.2 Computer counting of Legislative Council ballot papers 22
2.3.3 Communication 23
2.3.4 Election management – EMS 24
2.3.5 How the VEC provides services to political parties 24
2.4 The Parliament of Victoria and electronic voting 25
2.5 Chapter conclusion 27

3 Electronic voting and election technology in Australia 29

3.1 History of electronic voting in Australia 30

3.1.1 Timeline of electronic voting in Australia – key events 30

3.2 Major drivers of electronic voting in Australian electoral administration 35

3.2.1 Social change 35

3.2.2 Australian households, the Internet and mobile phone technology 36

3.2.3 Population mobility and geographic change 37

3.2.4 Challenges associated with the postal service, and postal voting in general 38

3.2.5 2013 and 2016 federal elections, calls for electronic voting 39

3.2.6 'No major crisis' concept, or path dependency 41

3.3 Arguments for and against electronic voting, focusing on remote voting 41

3.3.1 Arguments for electronic voting 42

3.3.2 Arguments against electronic voting 46

3.4 Electronic voting and election technology in Australia 51

3.4.1 Federal elections 52

3.4.2 Australian Capital Territory 53

3.4.3 New South Wales – iVote 56

3.4.4 Queensland 62

3.4.5 South Australia 63

3.4.6 Western Australia 63

3.4.7 Tasmania 63

3.4.8 Northern Territory 64

4 Electronic voting in international jurisdictions 65

4.1 Estonia 65

4.1.1 Organisations with whom the committee met 65

4.1.2 Estonia's electoral system 65

4.1.3 History of electronic voting in Estonia 67

4.2 Denmark 72

4.2.1 Organisations with whom the committee met 72

4.2.2 Denmark's electoral system 72

4.2.3 Discussion about electronic voting in Denmark 73

4.3 United Kingdom 74

4.3.1 Organisations with whom the committee met 74

4.3.2 The UK's electoral system 74

4.3.3 Advance voting and postal voting 75

4.3.4 Electronic voting pilots 75

4.3.5 Speaker's Commission on Digital Democracy 76

4.3.6 Attitudes towards electronic voting 76

4.4 United States of America 77
4.4.1 Organisations with whom the committee met 77
4.4.2 US electoral system 78
4.4.3 Electronic voting in the United States 78
4.4.4 Meeting with Electoral Assistance Commission 80
4.4.5 Meeting with Alexandria City 81
4.4.6 Arlington County Board of Elections 83
4.4.7 Fairfax County Board of Elections 86
4.4.8 New York State Board of Elections 88
4.4.9 Brennan Centre for Justice 89
4.5 New Zealand 91
4.5.1 Local government trials 91
4.5.2 Electoral participation at New Zealand elections 93

5 Electronic voting and election technology in Victoria; evidence and proposals 95
5.1 Remote electronic voting 96
5.1.1 Proposals for remote voting – adopting iVote 96
5.1.2 Proposals for remote voting – iVote 'modified' 104
5.1.3 Proposals for remote voting – do not adopt iVote 105
5.1.4 Specific evidence about remote voting systems 106
5.1.5 Security and ballot design concerns 121
5.1.6 Contact details of electronic voters 123
5.1.7 Alternative electronic voting systems 123
5.1.8 Specific evidence about electoral participation and electronic voting 124
5.2 Expanding kiosk voting 131
5.2.1 Expanding vVote 132
5.3 Election technology at Victorian state elections 137
5.3.1 Electronic roll mark off in Victoria 137
5.3.2 Electronic ballot paper scanning 139

Appendices
1 List of submissions 141
2 Public Hearings 143
3 Domestic site visits 145
4 New Zealand site visits 147
5 International site visits 149
6 Electoral Matters Committee reports and discussion papers 151

Terms of reference

Inquiry into electronic voting

Received from the Legislative Assembly on 7 October 2015:

That, under s33 of the Parliamentary Committees Act 2003, an inquiry be referred to the Electoral Matters Committee for consideration and report no later than 30 April 2017 on:

1. the forms of electronic voting currently utilised in Victoria and other jurisdictions and their effectiveness; and
2. alternatives that are available that if implemented would ensure the continued integrity and security of the electronic voting system.

Chair's foreword

I am pleased to present the Electoral Matters Committee's report on its enquiry into electronic voting to the Victorian Parliament. The Committee received a reference from the Government on electronic voting in the context of significant community interest in this matter.

The Committee advertised its enquiry and held a series of public hearings, where State Electoral Commissions, experts in technology and other interested parties further explained their submissions. The Committee is indebted to all of those who made submissions and is most appreciative of those who were prepared to appear before the Committee at our public hearings to provide further details of their experience and knowledge.

I wish to thank the Deputy Chair of the Electoral Matters Committee, Ros Spence, and the other members of the Electoral Matters Committee – Martin Dixon, Russell Northe, Adem Somyurek, Lizzie Blandthorn and Fiona Patten. The Victorian Parliament is fortunate to have Committee members who are so engaged in all aspects of the Committee's work.

The Committee had to consider two competing forces as a consequence of this enquiry. Firstly, the Committee is aware of a significant and growing desire across the voting public for electronic voting. Secondly, the Committee received overwhelming evidence that it is extremely difficult to guarantee the security of votes lodged electronically. Whilst the simplistic view is frequently put that if members of the public can conduct their banking with confidence online, then similarly members of the public should be able to cast their votes online. However, the expert evidence gathered by the Committee advised that the success to banking online is guaranteed by linking the name of the person doing the banking and the transaction. In our democracy, a secret ballot is a fundamental right of every individual in Australia and that this severed link between the person casting a vote and the ability of the system to check it, makes electronic voting a far more difficult technical proposition.

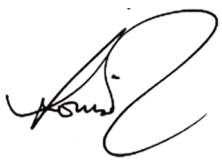
However, the Committee is also conscious of the fact that the postal system, on which we will rely for postal votes for the next State election in 2018, is a vastly different postal system from the one that operated decades ago.

The enquiry also took place during the 2016 Federal Election and during the 2016 Census. While both the Prime Minister and the Leader of the Opposition called for electronic voting immediately after the delay in obtaining the Federal Election result, both Members of Parliament and the public shortly thereafter experienced the 2016 Australian Census which demonstrated the problems that could arise over an electronic approach, certainly an electronic approach over an entire project. The Committee is cognisant of the fact that an electoral result must be secure, accurate and incontestable.

The Committee examined the different electronic options currently available across a number of Australian states and also examined a number of international case studies. With the exception of Estonia, many countries in the world are now moving away from electronic voting in the light of significant security concerns.

The Committee therefore has been cautious in its recommendations. The Committee supports electronic voting in principle for a limited classification of voters, comparable with the New South Wales iVote model. Specifically this would apply to people with a vision impairment or disability, or to people who would be out of Victoria on election day, either interstate or overseas. The Committee also favours a combined approach from the Commonwealth and various state electoral authorities, particularly given the extremely high cost of establishing remote voting options and the need for rigorous security. During the hearings, the various Electoral Commissions showed a willingness to cooperate across the country, seen as a most encouraging development by the Committee. The Committee also concluded that there are additional opportunities to take advantage of technological improvements such as electronic roll mark-off, which would improve Victoria's voting system.

The Committee also wishes to thank the staff of the Electoral Matters Committee. The staff are ably led by Mark Roberts, the Executive Officer, and backed up by Nathaniel Reader, the Research Officer and Bernadette Pendergast and Maria Marasco, the Administrative Officers. I also wish to thank the Assistant Clerk, Robert McDonald, who also supported the work of the Committee during this inquiry.



Hon Louise Asher MP
Chair

28 March 2017

Recommendations

RECOMMENDATION 1: The committee supports in principle the provision of a system of remote voting at Victorian state elections. The system should be available to a limited category of electors; those who are blind or have low vision, those with motor impairment, those with insufficient language or literacy skills, and eligible electors who are interstate and/or overseas. 135

RECOMMENDATION 2: The committee recommends the Victorian Electoral Commission work closely with the Australian Electoral Commission, state and territory electoral commissions to develop agreed principles of integrity and security for any electronic voting system, as part of a coordinated effort to develop a national electronic voting capability in Australia. 135

RECOMMENDATION 3: The committee recommends that any remote voting system should be underpinned by the most rigorous security standards available to the VEC. To ensure these standards are met, the committee recommends the Victorian Parliament establish an Electronic Voting Board to oversee technical and traditional scrutiny arrangements for remote voting. The Board should include members of academia with technical expertise in electronic voting, electronic voting specialists and representatives from registered Victorian political parties.. 137

RECOMMENDATION 4: The committee recommends the Victorian Parliament amend the *Electoral Act 2002* (Vic) to provide that the details of electors registering to use any potential remote voting system are shared by the VEC with registered Victorian political parties. 137

RECOMMENDATION 5: The committee recommends that the VEC prepare a detailed cost-benefit analysis for rolling out electronic roll mark off facilities to all Victorian polling places, including early voting centres and Election Day voting centres, at the 2018 Victorian state election. This information should be included in the VEC's 2017/18 annual report. 139

RECOMMENDATION 6: The committee recommends that the VEC further investigate electronic ballot paper scanning for the 2018 Victorian state election, and report back to the committee.. 140

1 Introduction

1.1 Terms of reference – Inquiry into electronic voting

On 7 October 2015 the committee received terms of reference to inquire into electronic voting at Victorian state elections and report to Parliament by 30 April 2017. The committee was specifically required to report on:

- The forms of electronic voting currently utilised in Victoria and other jurisdictions and their effectiveness; and
- Alternatives that are available that if implemented would ensure the continued integrity and security of the electronic voting system.

1.2 Responsibilities of the Electoral Matters Committee

The Electoral Matters Committee is a joint investigatory committee of the Parliament of Victoria. The committee comprises seven Members of Parliament drawn from the Legislative Assembly and Legislative Council.

While some committees have ongoing functions to scrutinise legislation and finances, the Electoral Matters Committee most usually conducts inquiries based on a reference from either house of Parliament. The powers and responsibilities of the committee are determined by the *Parliamentary Committees Act 2003* (Vic). The committee's functions, as defined by s9A, are, "if so required or permitted under this Act, to inquire into, consider and report to Parliament on any proposal, matter or thing concerned with–

- The conduct of parliamentary elections and referendum in Victoria;
- The conduct of elections of Councillors under the *Local Government Act 1989* (Vic); and
- The administration of, or practices associated with, the *Electoral Act 2002* (Vic) and any other law relating to electoral matters".[1]

1.3 The Electoral Matters Committee's previous inquiries

This inquiry is the Electoral Matters Committee's tenth inquiry and the first completely dedicated to electronic voting and election technology.

Most recently, in May 2016, the committee tabled its final report for the inquiry into the conduct of the 2014 Victorian state election. This was the third consecutive inquiry by the Electoral Matters Committee into a Victorian state election, institutionalising parliamentary review of Victorian elections. The

1 *Parliamentary Committees Act 2003* (Vic) s9A. Retrieved 27 January 2016 from www.austlii.edu.au/au/legis/vic/consol_act/pca2003273/s9a.html.

report made six findings and 23 recommendations. The Victorian Government's response to the report was tabled in Parliament on 8 November 2016 and can be downloaded on the committee's website.

In the 57th and 56th Parliaments, the previous Electoral Matters Committee also inquired into:

- The future of Victoria's electoral administration (inquiry completed in 2014);
- The functions and administration of voting centres (inquiry completed in 2010);
- Misleading or deceptive electoral advertising (inquiry completed in 2010);
- Voter participation and informal voting (inquiry completed in 2009);
- Political donations and disclosure (inquiry completed in 2009); and
- Matters relating to the committee's 2008 international investigations into political donations and disclosure and voter participation and informal voting (inquiry completed in 2008).[2]

In 2014 the then committee also issued a discussion paper for its inquiry into the impact of social media on Victoria's electoral administration. The discussion paper is also available on the committee's website.

1.4 Inquiry process

After receiving the terms of reference for this inquiry in October 2015, the committee commenced secondary research, including analysis of electoral data from the VEC's Virtual Tally Room and desktop review of the political science literature on Australian electoral participation and electronic voting.

All Victorian parliamentary joint investigatory committees advertise their terms of reference and invite submissions from the general public and other interested parties. For this purpose, the Electoral Matters Committee secretariat maintains a comprehensive database of approximately 300 stakeholders. The database includes:

- Electoral commissions, including Australia's nine electoral commissions;
- Australia's two other dedicated parliamentary electoral matters committees (the Parliament of Australia's Joint Standing Committee on Electoral Matters (JSCEM), and the NSW Parliament's JSCEM);
- Psephologists, or people who study elections and electoral processes;
- Academics at Australian and international universities who have an interest in electoral administration, including the University of Melbourne's Electoral Regulation and Research Network;

2 Parliament of Victoria, Electoral Matters Committee, "Inquiries".

- Australia's political parties, including the parties who contested the 2014 Victorian state election;
- Community and other advocacy / peak representative organisations representing a social group experiencing barriers to electoral participation (such as Vision Australia, which represents people who are blind or have low vision);
- Members of the public with an interest in electoral administration and how Victorian elections are run; and
- For this inquiry the committee also contacted stakeholders with specific expertise in electronic voting and election systems.

The committee wrote to its stakeholders in May 2016, requesting submissions and their participation in the inquiry. The committee distributed a press release on 27 May 2016 accompanying the call for submissions.[3]

Following on from the 2014 Victorian state election inquiry, when the committee contacted 108 independent candidates who contested the election, the committee wrote to these candidates to seek their input.[4]

1.4.1 Submissions

Like all Victorian joint investigatory committees, the committee also placed a call for submissions in print media, advertising in the *Herald Sun* on 28 May 2016. The inquiry was also publicised on 1 June 2016 in the Parliament's regular monthly advertisement in *The Age* newspaper, "Parliament News". While the deadline for submissions was 1 July 2016, the committee accepted, by negotiation with submitters, some submissions after the due date.

In May and early June 2016 the committee also called for submissions on the Parliament's website and the Parliament's Twitter feed and Facebook pages.

The committee received 34 written submissions, the second highest number of submissions ever received for any inquiry conducted by the Electoral Matters Committee since its inception in 2007, reflecting obvious interest in electronic voting and election technology. A detailed list, ordered by name and date, is contained in Appendix One.

Submissions addressed a wide range of issues relating to electronic voting, electoral participation and Victoria's electoral administration. Some of the major themes included:

- Victoria's current arrangements for electronic voting, including the VEC's vVote system, including evidence about strategies to improve the system, to make it more accessible and proposals to make the system available to a larger cohort of electors;

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3 Parliament of Victoria, Electoral Matters Committee, Inquiry into the 2014 Victorian state election, "Media".

4 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, September 2015, p.13.

- How technology can be used to improve aspects of Victoria's electoral administration, such as electronic counting methods, electronic roll mark off and other technologies;
- The potential for Victoria to adopt a remote (internet) voting system, including the views of the Victorian Electoral Commission (VEC) about electronic voting, and other key stakeholders in the Victorian electoral process, such as political parties;
- Evidence about electronic voting in other Australian jurisdictions, including evidence about NSW's iVote system, the NSW Electoral Commission's (NSWEC) remote internet voting platform, and how iVote is administered and run by the NSWEC;
- The challenges Australia's electoral commissions face administering postal voting at a time when Australia Post has scaled back its regular mail services;
- How Victorians who are currently able to access electronic voting services, such as Victorians who have low-vision or do not speak English, think about electronic voting. The committee received submissions directly from advocacy groups and from individuals;
- Proposals and evidence from software companies about electronic voting in Victoria; and
- Evidence about electronic voting in comparable international jurisdictions, including Estonia, Denmark, the United Kingdom and the United States of America.

The committee wishes to thank those organisations and individuals who made a submission to the inquiry.

Victorian Electoral Commission

The VEC is an independent and impartial statutory authority established under the *Electoral Act 2002* (Vic). The VEC conducts Victorian state elections, local council elections, certain statutory elections and polls, and commercial and community elections.[5] The VEC also conducts boundary reviews, maintains the Victorian electoral enrolment register, conducts electoral research and provides education services. Its core mission is to engage all Victorians who are entitled to vote in the democratic process.[6]

The VEC's work is governed by three pieces of legislation:

- *Electoral Act 2002* (Vic);
- *Constitution Act 1975* (Vic); and
- *Electoral Boundaries Commission Act 1982* (Vic).

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5 Victorian Electoral Commission, "About", Victorian Electoral Commission, Melbourne, 2015. Retrieved 28 January 2016 from https://www.vec.vic.gov.au/About/Default.html.

6 Victorian Electoral Commission, "About", Victorian Electoral Commission, Melbourne, 2015. Retrieved 28 January 2016 from https://www.vec.vic.gov.au/About/Default.html.

On 1 July 2016 the VEC provided a detailed submission to the inquiry. The submission is discussed throughout this report, including in Chapter Two; Background to the Inquiry. However, at this point the committee notes that the submission contained considerable discussion about the current environment for electronic voting in Australia and Victoria, including the challenges associated with the rapid increase in flexible voting services, the increasing cost and long-term viability of postal voting and the ongoing low-take up of vVote, Victoria's current kiosk-based electronic voting system.

The committee also notes that the VEC's position on remote electronic voting has changed in recent times. In contrast to the 57th Parliament, during which the VEC considered the security risks of internet voting to outweigh the convenience of such a system, the VEC's submission notes that the VEC now supports Victoria adopting a remote voting system for a limited category of electors. The VEC wrote:

> "It is acknowledged that the VEC has shifted its position in relation to the use of remote electronic voting solutions as further developments with this form of voting have progressed. In its response to the EMC's 2012 discussion paper as part of the "Inquiry into the Future of Victoria's Electoral Administration" the VEC stated: "Within the current Victorian context, the VEC considers that the risks associated with internet voting options are too high at this point in time. However, the VEC will continue work in this area and follow relevant research so that an efficient and accessible option can be offered in the future for electors in remote locations or who experience difficulties accessing appointed voting locations. The VEC is now of the view that an efficient and accessible remote electronic voting option exists in the form of the NSW iVote system. A similarly functioning option should be available to a limited category of electors for the 2018 Victorian State election as recommended in the VEC's Report to Parliament on the 2014 State election".[7]

The committee thanks the VEC for its submission. The submission, current arrangements for electronic voting in Victoria and the VEC's administration of electronic voting, are discussed in Chapters Two, Three and Five.

1.4.2 Public hearings

Public hearings are an important part of the joint investigatory committee inquiry process. Organisations and individuals are invited to appear before the committee in person to elaborate on their written submission and clarify, or add, additional evidence.

For this inquiry the committee held three rounds of public hearings.

On Monday 22 August and Wednesday 24 August 2016 at 55 St Andrews Place, East Melbourne the committee heard from 15 organisations and individuals. Warwick Gately, the Victorian Electoral Commissioner, and Liz Williams, Deputy Electoral Commissioner, appeared before committee on Wednesday 24 August 2016.

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7 Victorian Electoral Commission, *Submission No.21, B*, p.12.

On 24 October 2016 the committee held public hearings at 55 St Andrews Place, East Melbourne and heard from two individuals.

On Monday 5 December 2016 the committee also held public hearings at 55 St Andrews Place, East Melbourne and heard from Australia Post.

Appendix Two lists the hearing schedules and list of witnesses for the four days of public hearings.

The committee wishes to thank those organisations and individuals who appeared at the public hearings.

1.4.3 Briefings

A joint investigatory committee may schedule briefings during the inquiry process so that it can explore particular subjects in greater detail or seek expert evidence from stakeholders. Table 1.1 lists the briefings the committee received during this inquiry.

Table 1.1 Inquiry into electronic voting – list of briefings

Date	Organisation / individual	Subject of briefing
23 November 2015	Mr Ian Brightwell, Former iVote Manager, NSW Electoral Commission	iVote, other issues related to remote voting
25 May 2016	Mark Radcliffe, iVote Manager, iVote seminar; Victorian Parliamentary Library	Presentation on iVote, statistics and administration
26 August 2016	Warwick Gately AM, Electoral Commissioner	The VEC demonstrated the VEC's electronically assisted voting system, vVote, as used at the 2014 Victorian state election.

1.4.4 Site visits

As noted earlier, many of the committee's stakeholders are located outside Victoria and Australia.

Domestic

During this inquiry the committee travelled domestically to support its investigations and conduct meetings with interstate electoral commissions. The committee travelled to Sydney and Canberra in 2016, and Hobart in 2017. Table 1.2 lists the dates and organisations met. Appendix Three provides a detailed list of the individuals the committee met during these visits.

Table 1.2 Inquiry into electronic voting – domestic site visits

Meeting location	Date of visit	Organisations met with
Canberra, Australian Capital Territory	18 October 2016	ACT Electoral Commission
Sydney, New South Wales	18 November 2016	New South Wales Electoral Commission
Hobart, Tasmania	17 February 2017	Tasmanian Electoral Commission

New Zealand

In February 2016 the committee undertook a study tour to New Zealand as part of its inquiry into the 2014 Victorian state election. During the study tour the committee also discussed issues relating to electronic voting with the organisations it met in Wellington. Table 1.3 lists the dates and organisations met in New Zealand. Appendix Four provides a detailed list of the individuals the committee met whilst in New Zealand.

International study tour

From 16 September to 30 September 2016 the Electoral Matters Committee undertook an international study tour as part of its inquiry into electronic voting.

The Committee visited six cities as part of its international investigations:

- Dubai, United Arab Emirates
- Tallinn, Estonia
- Copenhagen, Denmark
- London, England
- Washington DC, United States of America
- New York, United States of America

Five of the seven members of the Committee participated in the study tour:

- Hon Louise Asher MP (Chair)
- Ms Ros Spence MP (Deputy Chair) – all cities except Dubai
- Ms Lizzie Blandthorn MP – all cities except Dubai
- Mr Martin Dixon MP
- Ms Fiona Patten MLC – Tallinn, Copenhagen and London only

The Committee was accompanied by Mr Robert McDonald, Assistant Clerk Committees, Legislative Assembly.

The international study tour provided an opportunity for the Committee to explore the extent to which other jurisdictions have implemented electronic voting and to learn from their experience. In November 2016 the committee

completed a report summarising the committee's meetings and topics discussed. Chapters Two, Three, Four and Five in this report discuss the evidence the committee received during the study tour.

Appendix Five is a complete list of the committee's meetings, and the organisations and individuals the committee met with.

1.5 Data analysis

The findings and recommendations in this report are based on the primary evidence – submissions, hearings transcripts and related documents – the committee received during the inquiry. Where appropriate, the committee secretariat prepares qualitative research to support the committee's investigations.

1.6 Report outline

This report is organised into five chapters, including this introduction.

Chapter Two – Background to the inquiry; electronic voting and election technology at Victorian state elections.

Chapter Three – Electronic voting and election technology in other Australian jurisdictions.

Chapter Four – Electronic voting and election technology in international jurisdictions.

Chapter Five – Electronic voting and election technology at Victorian state elections; evidence and proposals.

2 Background to the inquiry — electronic voting and election technology at Victorian state elections

Electronic voting is a broad term encompassing several different types of voting systems. In its discussion paper for the inquiry into the future of Victoria's electoral administration, the then Electoral Matters Committee said that electronic voting "...describes a broad range of practices involved in the casting or counting of a vote that involve the use of (electronic) technology".[8] There are many kinds of electronic voting, ranging from systems where the vote is collected and counted electronically to systems where the computer simply marks a ballot paper on the voter's behalf. Some electronic voting systems are exclusively available on the Internet, whereas others may be provided at a nominated location or require specific hardware or software, such as Victoria's vVote kiosk electronic voting system.

Technology also plays an integral part in the Victorian electoral process beyond casting a vote. In terms of enrolment, Victorians may update their electoral enrolment online via the VEC's website. Since 2010 the VEC has also administered a 'direct enrolment' system which allows the VEC to update details or directly enrol a person without the person having to initiate the action. In terms of vote counting, the *Electoral Act 2002* (Vic) provides for the VEC to conduct computerised vote counting for Legislative Council elections. The VEC develops and maintains a range of applications used in all phases of an election. This "software is used to help manage and administer each of the VEC's electoral events – examples include the computerised ballot draw software, and the computer count applications".[9]

Therefore, while this inquiry is primarily focused on electronic voting, the committee is also interested in how technology can improve the administration of Victorian elections generally.

This chapter provides background to the committee's inquiry. It first defines key terms, such as electronic voting, and then describes electronic voting systems currently used for Victorian state elections. It also describes important components of the Victorian electoral process and which rely on information technology, including enrolment systems, vote counting and election management systems.

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8 Electoral Matters Committee, "Inquiry into the future of electoral administration", Parliament of Victoria, Melbourne, March 2014, p.123.

9 Victorian Electoral Commission, "VEC's Election Management Systems", Victorian Electoral Commission, Melbourne. Accessed 3 January 2017.

2.1 Definitions

2.1.1 Electronic voting

Electronic voting, in general, involves the use of technology to cast a vote in an election. As noted by the AEC in a 2001 report, "in any discussion on electronic voting, it is important from the outset to be clear about what type of electronic voting is being discussed…some forms of electronic voting are simply not possible in the context of the Australian election environment".[10] As noted by the AEC Election Network, electronic voting can thus encompass a "broad range of voting systems that apply electronic elements in one or more steps of the electoral cycle".[11] Electronic voting in this report is therefore defined as the recording, casting and counting of votes electronically for Victorian state elections.

There are several different types of electronic voting system. In this report, the committee is specifically interested in three types of electronic voting systems: kiosk-based electronic voting systems, telephone voting systems and internet or remote voting systems.

Kiosk voting

Kiosk voting is usually associated with US-style voting machines, such as punch-card and direct record type voting machines. However, this definition is somewhat misleading in the Australian context. Kiosk voting in Australia is best understood as electronically assisted voting, in that the 'closed' system kiosks assist eligible electors to cast their vote with the assistance of electronic voting equipment. An elector may find it difficult to cast a paper vote due to a range of factors, such as a disability or lack of proficiency in English. For the ACT elections kiosks may also allow eligible electors to cast their vote in early voting centres; this is discussed in Chapter Three. Victorian electors in the United Kingdom at the 2010 and 2014 Victorian state elections were also able to vote on the VEC's kiosks located at authorised voting centres.

As shown in Figure 2.1, the kiosk is usually a booth with a touchscreen device similar to a tablet. The machine is a closed system and is not connected to the internet. Electors use the device to cast their ballot, with the device providing instructions and prompts at relevant points.

10 Australian Electoral Commission, "Electoral Voting and Electronic Counting of Votes", Australian Electoral Commission, March 2001, p.1.

11 ACE Electoral Knowledge Network, "Focus on E-Voting". Accessed 3 January 2017.

Figure 2.1 vVote kiosks at the 2014 Victorian state election

Another important distinction relating to kiosk voting in Australia is location. In Australia kiosks are only available at authorised voting centres. For instance, in Victoria the *Electoral Act 2002* (Vic) provides that electronic voting can only be made available at voting centres. As noted by the VEC, "this environment provides physical controls the VEC needs to enforce the secrecy and privacy required by the Act. In addition, the Act specifically requires the commission to control voting integrity at all times (Section 110F part (b)) and this has resulted in the Commission providing a new system that is end-to-end verifiable".[12]

Telephone voting

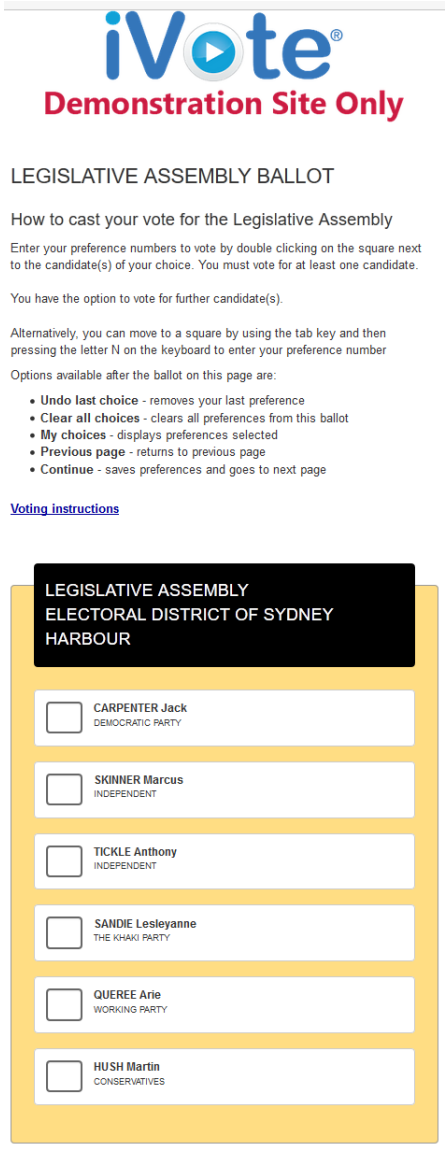
Telephone voting involves using a telephone device to cast a vote. Telephone voting services are usually provided in voting centres by an electoral authority. The service provides recorded instructions to the elector, sometimes in multiple languages, to guide them through the voting process. Electors then cast their vote using the keypad following the audio prompts.

12 Victorian Electoral Commission, "Electronic voting", Victorian Electoral Commission, Melbourne, 16 February 2016. Accessed 23 January 2017.

Internet or remote voting

Internet voting refers to the use of the Internet to cast and/or transmit the vote. Internet voting can take various forms depending on whether it is used in uncontrolled environments (remote Internet voting) or not (polling site Internet voting, or kiosk voting).[13] According to ACE Electoral Knowledge Network, under remote Internet voting neither the client machines nor the physical environment are under the control of election officials. Voters can cast their vote at practically any place (at home, at the workplace, at public Internet terminals etc.). The vote is then transmitted over the Internet. NSW's iVote system is a form of remote voting: Figure 2.2 is a screenshot of the iVote command interface from the 2015 NSW state election featuring a 'test' Legislative Assembly ballot paper.

Figure 2.2 Screenshot of test Legislative Assembly ballot paper, 2015 NSW state election



Source: NSW Electoral Commission, "iVote test ballot paper", NSW Electoral Commission, Sydney, 2017

13 ACE Electoral Knowledge Network, "Focus on E-Voting",

End-to-end verifiability

One of the key terms used in this inquiry is end-to-end verifiability (E2E), According to Ryan, Schneider and Teague, E2E "uses some of the novel properties of modern cryptography to offer something completely new and quite remarkable: the means for voters to confirm that their vote is accurately included in the tally while preventing any third party from determining how they voted, even with their cooperation".[14] In essence, E2E verifiability allows voters to privately create an encryption of their vote. All "encrypted votes are posted to a public website, where voters can confirm that their vote is correctly recorded. The batch of encrypted votes is anonymized and decrypted in a universally verifiable fashion and can then be tabulated".[15]

Chapter Four offers detailed analysis of the electronic voting systems the committee observed during its 2016 international study tour.

'Closed' versus 'open' electronic voting

The committee considers that there is a useful distinction between 'closed' and 'open' electronic voting systems.

Closed electronic voting systems are ones where voting is conducted in a closed operating environment, meaning that the system is not connected to a network and that voting is supervised by an electoral authority or government representatives. Kiosk voting is a form of closed electronic voting.

In contrast, open electronic voting means that the casting of the vote can take place anywhere outside a polling station, e.g. at home on a personal computer, laptop, tablet or smartphone. The vote is then transmitted over the Internet or mobile phone network.

2.2 Electronic voting in Victoria

Electronic voting is provided for by s100 and Part 6A of the *Electoral Act 2002* (Vic) and Part 5 of the *Electoral Regulations 2012* (Vic).

2.2.1 History

Electronic voting was first introduced for the 2006 Victorian state election, following the passage of the *Electoral and Parliamentary Committees Legislation (Amendment) Act 2006* (Vic).[16] The Act provided for electronic voting for a limited cohort of electors; in response, the VEC conducted a limited pilot in six 'E-Centres', five in Melbourne metropolitan areas and one in Geelong,

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14 Ryan, P, Schneider, S., Teague, V. "End-to-end verifiability in Voting Systems, from theory to practice". IEEE Security and Privacy, 13:3, p.59.

15 Ryan, P, Schneider, S., Teague, V. "End-to-end verifiability in Voting Systems, from theory to practice". IEEE Security and Privacy, 13:3, p.59.

16 *Electoral and Parliamentary Committees Legislation (Amendment) Act 2006* (Vic).

enabling electors to vote using one of either the touchscreen kiosk, telephone or keypad.[17] As noted in the VEC's submission to this inquiry, Hewlett Packard was engaged under contract as the project manager to deliver the 2006 platform, including the supply of hardware and the deployment of the voting kiosks.[18] The Spanish company SCTYL was subcontracted to supply and configure its electronic voting software for the Victorian environment. In contrast to 2010 and 2014, instructions on how to use the system were provided in English only. As electors voted, the preferences were stored in the voting kiosks in encrypted files for subsequent printing, sorting and distribution to counting centres for inclusion with other paper ballots. According to the VEC, this trial was successful; "the technology was proven to be reliable, accurate and secure".[19]

At the 2010 Victorian state election electronic voting was available at all 101 early voting centres, eight interstate voting centres and two locations in the United Kingdom. In July 2010 the *Electoral Amendment (Electoral Participation) Act 2010* (Vic) amended the electronic franchise to include electors with a motor skill impairment, electors whose first language is not English, and those with low or no English literacy.[20] SCTYL again developed the system but included language support for 12 languages other than English.[21]

In addition, electors with low vision were also given the opportunity to vote via telephone for the first time, or use the existing kiosk touchscreen with a headset for audio prompts. Every early voting centre had a least two telephone voting modules and at least half had touchscreen kiosks.

For the 2014 Victorian state election electronic voting was offered at a reduced number of early voting centres, 24 in Victoria and one location in London. The VEC deployed a completely new voting system (vVote), created in-house by local and overseas expert developers based on the Pret-a-Voter system. As noted by the VEC in its submission to the inquiry, the vVote "software provided voters with the ability to verify that their vote had been recorded and counted as cast, while still protecting the secrecy of their ballot. This system was the first of its kind to provide end-to-end independently verifiable EAV and fully open source software. Additionally, the software provided a range of functions specific to eligible electors including information in 20 languages. As electors cast their votes, they were transmitted to the VEC for subsequent decryption and printing on secure systems".[22]

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17 Victorian Electoral Commisison, "Report to Parliament on the 2010 Victorian state election", Victorian Electoral Commission, Melbourne, August 2011, p.30.

18 Victorian Electoral Commisison, *Submission 21b*, p.6.

19 Victorian Electoral Commisison, *Submission 21b*, p.6.

20 *Electoral Amendment (Electoral Participation) Act 2010* (Vic).

21 Victorian Electoral Commisison, *Submission 21b*, p.p.6-7.

22 Victorian Electoral Commission, *Submission 21b*, p.p.7-8.

2.2.2 Franchise

Electronic voting is currently available to a restricted franchise for Victorian state elections. At present this includes Victorian electors who:

- Have a vision impairment;
- Have a motor impairment;
- Have insufficient literacy skills. In this context literacy skills also refer to electors who are from culturally or linguistically diverse backgrounds and have difficulty reading, or whose first language is not English; and
- Is voting at an interstate or overseas voting location.[23]

These categories reflect statistics about disability, demography and mobility in the general Victorian population. As documented by the VEC in a 2010 position paper on electronically assisted voting, a considerable number of Victorian electors cannot vote without assistance or via assistive means. Some major barriers to voting for Victorians with disabilities include:

- "Vision impairment: A significant proportion (19 percent) of the Victorian population experience low vision or blindness. These electors may require special ballot material (printed in Braille) or they may require the help of a relative or a VEC election official to help them complete their ballot papers;
- Lack of English language skills where it presents an accessibility issue. As noted in the committee's report on the 2014 Victorian state election, one in four Victorians was born overseas and 44 percent were either born overseas or have at least one parent born overseas. Victorians come from more than 200 countries, speak more than 230 languages and dialects and follow more than 120 religious faiths. At the 2011 Census of Population and Housing, more than 195,000 Victorians rated themselves as speaking little or no English".[24]

Australian Bureau of Statistics figures from 2006 show that almost half (46 percent) of all readers in Australia are only capable to Literacy Levels 1 and 2 – Level 3 is considered to be the minimum for modern literacy needs. People likely to be assessed at Literacy Levels 1 and 2 include those who left school early, people from a culturally or linguistically diverse (CALD) background, people with an acquired disability (after a stroke or car accident), intellectual or physical impairment (acquired or otherwise) who can still understand the concept of voting, people with dyslexia, or people with mental health issues.

Interstate and international travel is also a major influence on how and when Australians vote at election time. Data from the Australian Bureau of Statistics shows that in February 2015, there were 551,500 short-term resident departures and in January 2016, there were 686,600 short-term resident departures. During

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23 s100 *Electoral Act 2002* (Vic).

24 Victorian Electoral Commission, "Electronically Assisted Voting", Victorian Electoral Commission, Melbourne, 2010, p.1.

the inquiry the committee learnt that 91 percent the 280,000 iVotes recorded at the 2015 NSW state election were cast by electors who were outside NSW on Election Day.

2.2.3 Statistics and voter satisfaction

The overall incidence of electronic kiosk voting at the 2006, 2010 and 2014 Victorian state elections has been low. At the 2006 Victorian state election there were 199 binding electronic votes, 961 at the 2010 Victorian state election and 1,121 at the 2014 Victorian state election. Binding electronic votes refers to the fact that the VEC's vVote system allows electors to 'practice' their vote before it is cast; the VEC records the number of practice votes relative to binding votes.

The major increase in electronic voting at the 2010 Victorian state election relative to the 2006 Victorian state election was due to the introduction of the interstate and overseas electronic voting franchise. In 2010 the total percentage of electronic votes cast overseas and interstate represented 85 percent of total electronic votes cast; in 2014 it was 78 percent.

The committee and the VEC have previously expressed their concern at the low take up of electronic voting. During the committee's inquiry into the conduct of the 2014 Victorian state election the committee discussed the low take up of electronic voting with the VEC at the August 2016 public hearings, and in its final report to Parliament tabled in May 2015. In the report the committee, and the VEC, expressed disappointment "at the low patronage of electronic voting, and committed to expanding opportunities for eligible Victorians to access the system".[25] The committee also committed to examining access to electronic voting as part of this inquiry, having received this reference from the Legislative Assembly during the 2014 Victorian state election inquiry.[26]

The major reason for the low take-up of electronic voting in Victoria proper, as opposed to interstate and overseas electronic voting, seems to be related to accessibility. As noted in Vision Australia's submission to the inquiry, many Victorians with low-vision or vision impairment find travelling to a static polling place to use the vVote kiosks an inconvenience due to a range of factors, including transport, the accessibility of the venue, directions and the availability of a support person.[27] Chapter Five addresses specific evidence about electronic voting and electoral participation, including evidence from disability advocacy groups and individuals with disability about potential improvements to the electronic voting experience for electors with disabilities, as well as other methods to enhance take up of vVote.

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25 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election", Parliament of Victoria, Melbourne, May 2015, p.47.

26 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election", Parliament of Victoria, Melbourne, May 2015, p.47.

27 Vision Australia, *Submission No 17*, p.p.2-3.

Voter satisfaction

Despite the low take up of electronic voting survey data commissioned by the VEC demonstrates that electors who use vVote are satisfied with the experience. In the VEC's report to Parliament on the 2014 Victorian state election, the VEC reported the results of these surveys; the surveys found that more than 80 percent of vVote users were satisfied or more than satisfied with the service. As noted by the VEC:

> "This was comparable to, or better than the findings in 2010, and pleasing considering the new steps introduced with the verification processes in 2014. Of the open ended questions asked of the London electors, almost all answers were positive about this system. Overall, this is an important finding that shows independent verification is not an impost on electors when voting electronically".[28]

Chapter Five further explores user views of the vVote system.

2.2.4 How it works

The VEC's report to Parliament on the 2014 Victorian state election describes the vVoting process. Key steps include:

- "Electors who voted electronically were marked off the roll by an election official and provided with a printed candidate list for their district and region. The candidate list is a new security feature forming part of the system's end-to-end verifiability. The elector placed the candidate list under a scanner in order to commence the voting session. A number of configurable options were available at this stage including language, print and audio settings.
- The elector then moved through the voting session, voting first for the relevant district then the region. When completing a region vote the elector could choose to vote above-the-line for a particular group or below-the-line for five or more candidates. It was not mandatory to vote formally. However, the system would alert the elector if they were about to make an informal vote, and would accept the vote as informal if the voter indicated that was their intention. On completion of the vote the elector was able to review their vote to confirm that they had voted as intended. Changes could be made at this stage.
- Once the elector was satisfied with their vote it was submitted and transferred to the VEC. On successful transmission a receipt automatically printed for the elector as a record of their vote. The receipt could be compared to the original candidate list to confirm that the VEC had recorded exactly how they voted. The receipt could be taken from the voting centre, but the candidate lists could not. The elector could then further check their receipt on the VEC website. The receipt did not display how the

28 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.32.

voter voted, and could not be linked to the elector's identity. However, the website showed the elector that the VEC had an exact copy of the same voting receipt.

- The website also offered public audit trails from the system that provided independent evidence that electronic voting has operated securely and that all receipts from all electors were present. After 6.00 pm on election night, the collected receipts were decrypted to reveal the votes, reconciled and printed ready for despatch to their relevant electorate for counting in the week after Election Day".[29]

2.2.5 Electronic voting and source codes – technical aspects

The VEC uses a universally verifiable electronic voting system that provides several voting services, ranging from device configuration to system staging, vote collection, decryption and vote printing.

The main software components of the VEC's electronic voting system are:

- suVote: which provides ballot generation, centralised vote collection, verification systems and client proxies
- Ximix: which provides vote decryption and proofs of mixing
- VPS (vote print station): which is the facility for configuration of voting options and printing candidate lists at voting centres
- EVM (electronic voting machine): which is the audio and visual voting interfaces for electors
- VVA: which is the VEC's device preparation, monitoring, configuration pre-processing and collected vote post-processing component of the system
- The system source codes are all open source GPL3 and available at bit bucket.[30]

Chapter Five further discusses evidence about verification.

2.2.6 Postal voting – email delivery of ballot material

In addition to vVote, the VEC also uses email technology to assist with the postal voting service. These services were first provided at the 2010 Victorian state election, and again for the 2014 Victorian state election.

As part of the service the VEC uses email to deliver ballot material "to electors in remote areas or overseas who would experience difficulty in accessing postal facilities".[31] Eligible electors can submit a postal vote application by email, and

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29 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.p.30-32.

30 Victorian Electoral Commission, "Electronic voting", Victorian Electoral Commission, Melbourne, 16 February 2016. Accessed 23 January 2017.

31 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

provide an email address for receipt of ballot material. The VEC "processed each application and then sent two emails to each elector who requested the email ballot material service; the first containing a secure file with all ballot material required to vote, and the second containing a password for the elector to access the ballot material file".[32]

A total of 2,603 emailed ballot packs were despatched during the 2014 Victorian state election compared to 1,212 at the 2010 Victorian state election.[33]

Chapter Five discusses evidence received about the potential to expand email ballot delivery, and evidence received about the administration of postal voting for Victorian state elections.

2.3 Technology and Victorian electoral administration

As noted earlier information technology is a major component of Victoria's electoral administration beyond casting a vote. The VEC uses technology to enrol electors via the direct enrolment system, communicate with electors, political parties and candidates as well as other important functions. As observed in the Introduction, during this inquiry the committee took a holistic view of the relationship between voting and electoral administration, and considered not just voting technology but how technology can improve electoral administration and Victoria's democratic processes overall.

This section reviews Victoria's non-voting related election technology.

2.3.1 Enrolment

Direct enrolment

Direct enrolment is where an electoral authority uses information held by it or other government agencies to enrol or update an elector's details on the electoral register. The electoral register differs from the state roll in that it is a database containing all eligible Victorian electors details on a continuous basis: an electoral roll is produced for a particular election comprising details from the register.

Since 2010 the VEC has administered a 'direct enrolment' system which allows the VEC to update details or directly enrol a person without the person having to initiate the action. This "process requires the VEC to notify the person in writing regarding the VEC's awareness of entitlement and its intention to enrol the person unless notified of any ineligibility. If notification of ineligibility is not

32 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

33 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

received, within a specified period of at least 14 days, the VEC will then place the person on the Victorian register of electors and advise the person in writing accordingly".[34]

The VEC undertakes direct enrolment using a number of data sources, including VicRoads and the Australian Electoral Commission (AEC). This allows the VEC to both update details and enrol electors for the first time without requiring a form to be completed. Where the VEC is unable to verify a "person's eligibility to enrol, a paper form is sent to them. In addition, while direct enrolment forms the core of the VEC's enrolment strategy, under its compulsory acquisition powers under s26 of the *Electoral Act 2002* (Vic), the VEC continues its continuous roll (CRU) process".[35] It consists of a range of strategies to ensure that the electoral roll is continuously kept up-to-date by using several data sources to direct roll review activities to targeted residences.

Further, the VEC continues to work with the AEC under the Joint Roll Arrangement, to maintain a joint enrolment process; this remains a significant input to the maintenance of the Register of Electors.

In 2015/2016 direct enrolment generated 191,834 enrolment transactions.[36]

Online enrolment

Electors may enrol for the first time, or update their enrolment details using the VEC Online Enrolment Service. The VEC's online enrolment service was introduced in August 2014. It allows Victorian electors to update their enrolment details directly with the VEC. In addition, electors are also able for the first time to enrol directly with the VEC using an online signature facility. The facility works in the following way:

- Electors using a touchscreen device can simply draw their signature in the signature panel.
- Electors using a keyboard and mouse hold down on the left mouse key and make their signature in the signature panel.

In the committee's report on the 2014 Victorian state election, between the issue of the writ and the close of rolls "10,459 Victorians enrolled or updated their address details directly with the VEC. This enrolment source represented 28 percent of the total transactions processed between the issue of the writs and the close of roll".[37]

It is important to note that any elector wishing to use a paper form to enrol is able to do so. These forms are usually available from Australia Post offices, the VEC's website and local government offices.

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34 Victorian Electoral Commission, "Annual Report 2015/2016", Victorian Electoral Commission, Melbourne, June 2016, p.56.

35 Victorian Electoral Commission, "Annual Report 2015/2016", Victorian Electoral Commission, Melbourne, June 2016, p.56.

36 Victorian Electoral Commission, "Annual Report 2015/2016", Victorian Electoral Commission, Melbourne, June 2016, p.136.

37 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.10.

Computerised roll look up / online roll mark off

Since 2010 the VEC has used Netbooks in early voting centres for roll look up purposes, and in some voting centres for online roll mark off.

At the 2010 and 2014 Victorian state elections all early voting centres were equipped with computers containing the electoral roll for the entire State. All voting centres were equipped with, in 2010, a personal digital assistant (PDA) and in 2014, a tablet device, containing the entire State roll for look-up purposes, enabling the entitlement of all electors to be checked before they voted.

In relation to online roll mark off, at the 2010 Victorian state election Netbooks (mini computers) were provided to 109 voting centres and were used at most mobile voting centres. The "Netbooks gave election officials access to a central copy of the entire State roll to mark each elector's name directly. Election officials could also see if an elector had been marked off as having voted previously. At the 2014 Victorian state election, the netbooks were provided to 109 voting centres and were used at most mobile voting centres. As for 2010, the netbooks gave election officials access to a central copy of the entire State roll to mark each elector's name directly".[38] Election officials could also see if an elector had been marked off as having voted previously.

Further, as occurred at the 2010 State election, some electors who applied for a postal vote also voted at an early voting centre prior to receiving their ballot packs. The VEC's report to Parliament on the 2014 Victorian state election describes this process:

> "The use of Netbooks at all early voting centres enabled the VEC to identify any elector who had been issued with, but had not returned a postal vote. The computerised system used to mark electors off the roll prior to issuing a vote cancelled the postal vote issued to any elector who wished to cast an early vote instead. If the postal vote was inadvertently returned, it was rejected by the system and not counted. Australia Post is an important partner in the postal voting system, and the VEC used the 'Express Post' network for delivery of election material in the week prior to Election Day. This helped ensure that material was delivered in sufficient time for electors to complete and return their ballot material. All processed postal vote applications were made available electronically to election offices (as a scanned image) progressively as they were processed. From the Monday prior to Election Day an elector's declaration could be quickly checked against that elector's signature on the scanned image of the postal vote application. As a result, a high proportion of postal votes were included in the count on election night.".[39]

38 Victorian Electoral Commission, "Report to Parliament on the 2010 Victorian state election", Victorian Electoral Commission, Melbourne, August 2011, p.24.

39 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

2.3.2 Computer counting of Legislative Council ballot papers

Counting

Since 2006 and constitutional reforms introducing proportional representation for Legislative Council elections, the VEC has conducted a computerised, centralised count for the Legislative Council. The count was located at Etihad Stadium for the 2010 and 2014 Victorian state elections.

The committee notes that it is important to distinguish between the type of electronic counting technique used by the VEC, and other available systems. Unlike for federal elections and the ACT, where the AEC, as an example, uses full or partial optical scanning / recognition systems to scan ballot papers into a computer count system prior to results calculation, the VEC uses a manual data-entry process. Teams of data entry operators, working under the supervision of senior VEC staff including the VEC's appointed Election Manager for the Legislative Council Region, complete the data entry of ballot papers. Operators are usually sourced from agencies and satisfy strict competency standards and complete a disclosure of political activities before their appointment is finalised. Operators "receive orientation training from the Team Leader responsible for the data entry immediately prior to commencing their operations. A number of election casuals are also appointed to assist with the management of ballot papers during the count".[40]

The computer count application tests the formality of all ballot papers as they are entered. The VEC's document, "Upper House Count: 2014 State election information series", describes in detail ballot paper handling processes, including how ballot papers are batched for data entry and securely managed and accounted for.

Chapter Three discusses alternative electronic counting methods in other jurisdictions, including for federal and ACT elections. It also examines changes to the central scrutiny process for the Senate count at the 2016 federal election as a result of the passage in 2016 of the *Commonwealth Electoral Amendment Bill 2016* (Cwth) introducing optional preferential voting above-the-line for Senate elections. Chapter Five also considers evidence about counting systems received from inquiry participants.

Results declaration

The VEC's computer count application also performs the results declaration/ validation for the Legislative Council count.

The VEC's information document on the Legislative Council count describes how this occurs:

40 Victorian Electoral Commission, "Upper House Counts: State Election 2014 Information Series", Victorian Electoral Commission, Melbourne, November 2014, p.p.3-7.

"The calculation of results take place after all Regions have been data entered and data entry verified and validated. The region election manager calculates the result in EMS. Results are calculated using the Proportional Representation count method as per legislation. Under the Proportional Representation system a candidate must achieve a 'quota' in order to be elected. The quota is proportional to the number of vacancies to be filled. For the Victorian Upper House, the quota required to be elected for a region is 16.7 percent of the formal vote. Observers are able to watch the progress of the count via projection onto a screen".[41]

2.3.3 Communication

The VEC uses a range of communication technologies, including social media and mobile applications, to interact with electors and maintain awareness of voting at Victorian state elections. The following programs and tools were used at the 2014 Victorian state election:

- Vote Victoria: For the 2010 and 2014 Victorian state election campaigns the VEC developed a voter advice application called Vote Victoria. The application used "the enrolled address input by users and provided voting information, locations and reminders during the voting period".[42] From 6.00 pm on "Election Night the app delivered live first preference and two candidate preferred results, along with a State-wide summary and the facility to share the count status with friends via Facebook or Twitter. The app was downloaded 16,255 times between 14 November and 19 December when it was removed from the Apple iTunes and Google Play stores".[43]
- Social media and website. The VEC focused its social media efforts during the 2014 Victorian state election period on Facebook and Twitter. The VEC's report to Parliament provides detailed usage and analytics on both channels.
- Telephone inquiry service.

Voter's Voice

In 2015 the VEC, in conjunction with Scope, an organisation focusing on assisting Australians with communication difficulties, commissioned Contact to develop a communication application native to iPad called Voter's Voice. The application was designed to assist Victorians who have difficulties communicating with voting.[44]

Approximately 300,000 Victorians experience communication difficulties. There is also evidence that many people with communications difficulties avoid voting because of the difficulty.[45]

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41 Victorian Electoral Commission, "Upper House Counts: State Election 2014 Information Series", Victorian Electoral Commission, Melbourne, November 2014, p.p.3-7.

42 Victorian Electoral Commission, "Report to Parliament on the 2010 Victorian state election", Victorian Electoral Commission, Melbourne, August 2011, p.18.

43 Victorian Electoral Commission, "Report to Parliament on the 2010 Victorian state election", Victorian Electoral Commission, Melbourne, August 2011, p.18.

44 Victorian Electoral Commission, "Voters Voice", Victorian Electoral Commission, Melbourne, 2016. Retrieved 1 March 2017 from www.vec.vic.gov.au/Voting/VotersVoice.html.

45 Victorian Electoral Commission, "Voters Voice", Victorian Electoral Commission, Melbourne, 2016. Retrieved 1 March 2017 from www.vec.vic.gov.au/Voting/VotersVoice.html.

Contact developed a communication board style application which allowed voters to bring a pre-determined message to a voting centre, thereby making it easier to communicate with voting centre staff. The application was initially used for the 2016 Victorian local government elections, and will be trialled at future Victorian state elections.

Chapter Five focuses specifically on evidence the committee received about the capacity for technology to assist people with disabilities to vote.

2.3.4 Election management – EMS

In addition to the above function, the VEC "develops and maintains a range of applications used in all phases of an election".[46] This software is used to help manage and administer each of the VEC's electoral events. The term most commonly used to describe this grouping of software is election management system (EMS). Key features of the VEC's EMS include:

- The Nomination module, to administer all parts of the candidate nomination process and contains functionality to conduct a randomised ballot draw; and
- The VEC's Computer Count application, which allows the VEC to calculate the result of an election based on either a preferential or proportional representation counting method. This application is the same application referred to above in discussion about the computerised count process.

2.3.5 How the VEC provides services to political parties

The VEC uses technology to provide several services to political parties and candidates for Victorian elections.

Nominations

The VEC's nomination transactions with political parties and candidates are predominantly carried out via EMS.

For each Victorian state election event, the VEC offers registered political parties an electronic application for recording nominations for each District and Region. This enabled parties to print pre-populated nomination forms for candidates to sign. The VEC also notes:

> "The VEC accept[s] electronic files that could be loaded directly into the Election Management System. The VEC again provided independent candidates with a facility to complete a nomination form online. Once the candidate was satisfied with the details they had entered, they could print the online form to lodge in person with the Election Manager. By scanning the barcode on the nomination form at the

46 Victorian Electoral Commission, "The VEC's Election Management Systems", Victorian Electoral Commission, Melbourne, 2016. Accessed 23 January 2017.

time of lodgement, details as entered by the candidate were loaded directly into the VEC's Election Management System. These facilities streamlined the processing of nominations and reduced waiting times for candidates and party representatives".[47]

Provision of roll data to candidates

The *Electoral Act 2002* (Vic) requires the VEC to make certain enrolment information available to registered political parties, Members of Parliament and candidates. At the time of a Victorian state election the VEC provides roll data to candidates in an encrypted format, with the files searchable by address type and name.

2.4 The Parliament of Victoria and electronic voting

While this is the first dedicated inquiry into electronic voting by the Parliament of Victoria, the Parliament has previously investigated how technology can enhance Victoria's democratic processes.

Inquiry into electronic democracy

In the 55th Parliament the Scrutiny of Acts and Regulations Committee conducted an inquiry into electronic democracy. The report was tabled in the Victorian Parliament in May 2005. The terms of reference focused broadly on increasing public participation in democratic processes in Victoria using technology. The committee was also specifically required to examine:

- Netcasting of Parliamentary proceedings;
- Online interactive and collaborative approaches to policy discussion, including citizen email and online forums;
- Other technology solutions to promote access and participation;
- Potential impact of new and emerging technologies on the democratic processes of government;
- Options available to improve democratic processes through the use of such technologies (for example, through electronically enabled voting); costs and benefits of new technologies that promote e-democracy; equitable access of all citizens to e-democracy; legal and regulatory factors; and
- Educational or social barriers to the implementation of e-democracy.[48]

The committee made 14 recommendations regarding electoral information, elections and vote counting in relation to technology. Of these, Recommendation 53 called for the VEC to develop a trial of electronic voting machines for a limited cohort of electors with disabilities, including vision

47 Victorian Electoral Commission, "The VEC's Election Management Systems", Victorian Electoral Commission, Melbourne, 2016. Accessed 23 January 2017.

48 Parliament of Victoria, Scrutiny of Acts and Regulations Committee, "Inquiry into Electronic Democracy: Terms of Reference – Discussion Paper", Parliament of Victoria, Melbourne, October 2002, p.iii.

impairment and linguistic impairment. This recommendation formed the operative provisions for electronic voting in the *Electoral and Parliamentary Committees Legislation (Amendment) Act 2006* (Vic).

The inquiry also recommended the VEC examine ballot scanning technology. This informed the VEC's 2008 trial of ballot scanning technology at the 2008 local government elections.

Chapter Five further discusses electronic ballot scanning.

Electoral Matters Committee inquiries

The committee in the 56th, 57th and 58th Parliaments examined electronic voting.

In the 56th Parliament the then committee discussed electronic voting as part of its inquiries into the 2006 Victorian state election, which was tabled in June 2008, and the inquiry into voter participation and informal voting, which was tabled in July 2009. In the 2006 state election report the then committee gathered evidence about the VEC's first implementation of electronic voting at the 2006 Victorian state election, focusing on user experiences and the very low turnout of 199 binding electronic votes. While the then committee supported further electronic voting trials at future Victorian state elections, the committee noted, at the time, that the VEC was reluctant to explore remote electronic voting due to cost and security issues.[49]

In the then committee's 2009 report on voter participation and informal voting, the committee recommended the Victorian Government amend the *Electoral Act 2002* (Vic) to allow very limited electronic voting trials for those eligible electors with a motor-impairment, people with poor English language skills and people who are illiterate in English.[50] This recommendation formed the operative provisions in the *Electoral Amendment (Electoral Participation) Act 2010* (Vic).

In the 57th Parliament, the then committee discussed electronic voting as part of its inquiry into the 2010 Victorian state election. The committee's only recommendation in this inquiry regarding electronic voting called for the Victorian Government to amend the *Electoral Act 2002* (Vic) to allow a trial of remote electronic voting at the 2012 Victorian local government elections. The Victorian government did not support this recommendation.

The then committee also considered election technology as part its inquiry into the future of Victoria's electoral administration, tabled in May 2014. The inquiry was self-referenced in response to a position paper given to the then committee by the VEC as part of the 2010 Victorian state election inquiry. Entitled "The Future of Victoria's Electoral Administration", the paper called for a broad-ranging, parliamentary review of Victoria's electoral administration

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49 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2006 Victorian state election", Parliament of Victoria, Melbourne, June 2008, p.192.

50 Parliament of Victoria, Electoral Matters Committee, "Inquiry into voter participation and informal voting", Parliament of Victoria, Melbourne, July 2009, p.174.

in light of the challenges of running a contemporary election due to social, economic and technology developments.[51] The paper specifically addressed the issue of remote voting, and asked the then Electoral Matters Committee to consider it.

Based on evidence it received from the VEC and several inquiry participants who have also participated in this inquiry, the then committee concluded that the risks of remote voting outweighed the potential benefits. While it did examine NSW's iVote system during the inquiry, the then committee reserved its views about iVote.[52]

The committee examines evidence about NSW's iVote system in Chapters Three and Five.

2.5 Chapter conclusion

As noted earlier, this inquiry is the first, dedicated inquiry into electronic voting at Victorian state elections. This chapter has described Victoria's electronic voting processes, and how the VEC uses technology to provide services to electors, political parties and candidates, and indeed, to efficiently administer Victorian state elections.

Chapter Three provides further insight into the development of electronic voting across Australia, including emerging, and past, debates about remote electronic voting and evidence for and against electronic voting, as well as contemporary calls for Internet voting at Australian elections. The chapter also outlines evidence the committee received about electronic voting in other Australian jurisdictions.

51 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the future of Victoria's electoral administration", Parliament of Victoria, Melbourne, May 2014, p.129.

52 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the future of Victoria's electoral administration", Parliament of Victoria, Melbourne, May 2014, p.129.

3 Electronic voting and election technology in Australia

In Chapter Two the committee reviewed the history and development of electronic voting and election technology in Victoria. In this chapter the committee considers evidence received during the inquiry about electronic voting and election technology in other Australian jurisdictions.

Electronic voting has been trialled or implemented in six of Australia's nine electoral jurisdictions, with each jurisdiction adopting different practices and systems. However, as noted by Taylor in his review of Australia's electronic voting systems, electronic voting "has mostly been used for those with [disabilities and a restricted franchise], and has not until recently been seen as an option for mass voting".[53] Given Australia's long history of electoral innovation as the creator of the secret vote and early adoption of flexible voting methods – postal voting was first developed in colonial South Australia – there has been considerable critical and public discussion about why electronic voting is not a more central component of Australia's electoral democracy. This chapter explores some of the reasons behind this.

The chapter begins by reviewing the history of electronic voting in Australia, documenting a brief timeline of electronic voting from the ACT's first adoption of electronic voting in 2000 to NSW's adoption of remote voting in 2010 and the expansion of iVote at the 2015 NSW state election. The chapter then reviews the major drivers of change in Australian electoral administration leading to calls for electronic voting, as well as arguments for and against electronic voting, focusing on remote voting, in both the electoral administration and political science literature and the evidence received from inquiry participants. This backgrounds the committee's discussion about policy proposals for Victoria in Chapter Five.

The chapter then reviews evidence about electronic voting and election technology at federal elections, in the Australian Capital Territory (ACT), the jurisdiction which arguably pioneered electronic voting in Australia, NSW's iVote system, then electronic voting and election technology in Queensland, South Australia, Western Australia, Tasmania and the Northern Territory respectively.

53 Taylor, G., "Electronic Voting in Australia", in Maurer, A., Barrett, J. (eds), *E-Voting case law: a comparative analysis*, Routledge, London, 2015, p.233.

3.1 History of electronic voting in Australia

During the inquiry the committee learnt that there have been a number of key developments in relation to Australia's experience with electronic voting. While these are not the only 'events' or developments in electronic voting, they have helped stimulate further discussion about electronic voting, or benchmark system functionality.

3.1.1 Timeline of electronic voting in Australia – key events

1983 – 'electronic' voting first discussed by Commonwealth JSCER

Electronic voting was first raised as a potential cost-saving method for federal elections during the Joint Standing Committee on Electoral Reform's – the predecessor to the Commonwealth JSCEM – first report on the 1983 federal election.[54] Two inquiry participants raised using the TAB computer network as a voting platform, arguing "that doing so would reduce the cost of a vote to less than 0.20 cents and making results available quickly after the close of polls".[55] While the then JSCER ultimately dismissed the idea, the committee did not rule out investigating electronic voting in future, or the potential for electronic voting in light of technology change and the advance of computer technology.

1998-2001 – electronic voting in the ACT

In 1998 the Australian Electoral Commission became the first State or federal electoral authority to officially investigate and then implement electronic voting for the October 2001 ACT election.

Electronic voting in the ACT should be seen as "the culmination of an extensive and complex project begun by the Commission after the 1998 Legislative Assembly election".[56] At the 1998 ACT election, the close result in the Molonglo electorate (when "two candidates were three votes apart at the point where one of them had to be excluded) and the resultant recount (which saw the relative order of these candidates change due to mistakes made in the original manual count) led to calls for computerised voting and counting processes" to increase the speed and accuracy of the ACT's Hare-Clark counting system.[57]

As explained by Elections ACT:

> "In 1998/1999 the Commission examined the available options for computerising the voting and counting processes, and in October 1999 the Commission published a Request for Proposal, seeking proposals for using technology to improve the speed and accuracy of ACT election counts". Fifteen proposals were received. After

54 Electoral Council of Australia and New Zealand, "Electronic Voting", Electoral Council of Australia, 2013, p.25.

55 Electoral Council of Australia and New Zealand, "Electronic Voting", Electoral Council of Australia, 2013, p.25.

56 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

57 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

> evaluating the proposals, the Commission decided that no one proposal provided a complete solution for electronic voting and vote counting that would meet all the Commission's needs. However, the proposals did clarify possible options for proceeding to some form of electronic voting and vote counting for the October 2001 election".[58]

The Commission's proposed model was legislated for with amendments to the *Electoral Act 1992* (ACT) which passed the ACT Legislative Assembly on 5 December 2000. This made the ACT's electronic voting system the first amongst Australia's nine jurisdictions, and one of the few applications in a preferential voting system.

2000

In 2000 a small delegation of representatives from the VEC and the AEC visited the USA to observe developments in the use of electronic voting and electronic vote counting at the 2000 US general election. The delegation's findings were published in 2001 in a report entitled "Electronic Voting and Electronic Vote Counting – A Status Report".[59] The report identified a number of applications for electronic voting in Australia, including the potential use of kiosks at early voting centres, for electors overseas and interstate and touchscreen technology for electors with disabilities.

Discussions were held with representatives of electoral administrations, commercial vendors and groups concerned about the integrity and security of electronic voting. According to the delegation, these people provided a "composite picture of the status of electronic voting in the USA together with the issues that would need to be addressed if electronic voting was to be further developed to the point where it could be considered for introduction in Australian elections".[60]

Despite these recommendations, the delegation also stressed that electronic voting should not replace traditional paper-based voting. The report noted:

> "This paper does not suggest that Australian electoral authorities should at this stage embark on a program to fully replace the easily understood, publicly and politically accepted efficient, transparent paper ballot system that currently exists".[61]

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58 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

59 Australian Electoral Commission / VEC delegation, "Electronic voting and vote counting – a status report 2001", Australian Electoral Commission, March 2001. Accessed 12 February 2017 from www.aec.gov.au/voting/report.htm.

60 Australian Electoral Commission / VEC delegation, "Electronic voting and vote counting – a status report 2001", Australian Electoral Commission, March 2001. Accessed 12 February 2017 from www.aec.gov.au/voting/report.htm, p.4.

61 Australian Electoral Commission / VEC delegation, "Electronic voting and vote counting – a status report 2001", Australian Electoral Commission, March 2001. Accessed 12 February 2017 from www.aec.gov.au/voting/report.htm, p.4.

2001-2007 – the Commonwealth JSCEM, the AEC and remote voting trials

The delegation's report led to further investigations at the federal level into electronic voting, which were predominantly conducted by the Commonwealth JSCEM.

In 2002 the JSCEM tabled its report on the 2001 federal election. The report addressed some of the arguments for and against electronic voting and the emergence of digital technology and how this might impact Australian electoral administration.[62] As part of the report the then JSCEM recommended that the AEC submit a detailed proposal regarding the administration of a trial of electronic voting; during the inquiry the AEC had published a discussion paper "e-Volution not revolution", which reviewed different electronic voting systems overseas.[63]

In 2005 the JSCEM gave further consideration to electronic voting as part of its inquiry into the 2004 federal election.[64] At this time the JSCEM expressed support for the use of electronic voting at future federal elections and recommended a trial of remote electronic voting for the Australian Defence Force (ADF) and Australian Federal Police (AFP), vision impaired electors and Antarctic electors at the 2007 federal election. This trial was explicitly designed not to replace or subjugate what the JSCEM referred to as the traditional Election Day experience. The JSCEM also noted that the trial was not a precursor to a widespread roll-out of remote voting.[65]

The trial was held during the 2007 federal election voting period. The vision impaired and ADF trial used the Defence Restricted Network (DRN) and was not accessible via the Internet, ensuring security of transactions. Approximately 3,000 votes were recorded; 840 for the vision impaired community with the remainder from ADF personnel. A detailed account of the logistics and outcomes of both trials was provided by the JSCEM in an interim report in 2009, along with a qualitative and financial assessment.[66] As noted in the report, the trial cost "over $4 million, with an average cost per vote cast of $2,597 for the trial of electronically assisted voting for vision impaired electors and $1,159 for the remote voting trial for the ADF".[67]

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62 Parliament of Australia, Commonwealth JSCEM, "Inquiry into the 2001 federal election and matters related thereto", Parliament of Australia, Canberra, May 2002.

63 Australian Electoral Commission, "eVolution not revolution", Australian Electoral Commission, Canberra, 2001.

64 Parliament of Australia, Commonwealth JSCEM, "The 2004 Federal Election: Report of the Inquiry into the Conduct of the 2004 Federal Election and Matters Related Thereto", Parliament of Australia, Canberra, 2005.

65 Parliament of Australia, Commonwealth JSCEM, "The 2004 Federal Election: Report of the Inquiry into the Conduct of the 2004 Federal Election and Matters Related Thereto", Parliament of Australia, Canberra, 2005.

66 Parliament of Australia, Commonwealth JSCEM, ""Report on the 2007 federal election electronic voting trials: Interim report of the inquiry into the conduct of the 2007 election and matters related thereto", Parliament of Australia, Canberra, 2009, p.iii.

67 Parliament of Australia, Commonwealth JSCEM, ""Report on the 2007 federal election electronic voting trials: Interim report of the inquiry into the conduct of the 2007 election and matters related thereto", Parliament of Australia, Canberra, 2009, p.iii.

On the basis of these figures, in the JSCEM's report on the 2010 federal election the JSCEM elected to not support further remote voting trials. The JSCEM justified the decision on the basis of cost but did not exclude the AEC from further investigating electronic voting technology.

2006 – Introduction of electronic voting in Victoria

As detailed in Chapter Two, electronic voting was first trialled in Victoria for the 2006 Victorian state election, following the passage of the *Electoral and Parliamentary Committees Legislation (Amendment) Act 2006* (Vic).[68] The Act provided for electronic voting for a limited cohort of electors with low vision; in response, the VEC conducted a limited pilot in six 'E-Centres', five in Melbourne metropolitan areas and one in Geelong, enabling electors to vote using one of either the touchscreen kiosk, telephone or keypad. The trial was considered successful by the VEC and the then Victorian EMC – although as noted in Chapter Two, the three Victorian Electoral Matters Committees have expressed disappointment at the low take up of electronic voting in Victoria – and further expanded by legislation in 2010 to include Victorians with motor impairments, those with insufficient literacy skills and overseas and interstate electors.

2006-2010 – Introduction of electronic voting in Tasmania

In 2006 the Tasmanian Electoral Commission (TEC) implemented a kiosk based system that had been developed in-house. This system facilitated the marking of preferences on the ballot paper. While the system was marketed for vision impaired electors it was also available for use by all Tasmanian voters. At the end of each voting session, the recorded ballot was printed and placed in the ballot box.

In 2010 Tasmania also introduced Express Voting for voters who were overseas or in remote areas at the time of Tasmanian state elections. Under this scheme, which is similar to Victoria's email-ballot scheme documented in Chapter Two, an approved voter receives his or her ballot paper and a special declaration form by fax or email.

2007 - 2010 – NSW, modernisation of NSW's electoral administration and the introduction of remote voting

In 2007 the NSW Parliament passed the *Parliamentary Electorates and Elections Amendment Bill 2006* (NSW). The Bill made a number of changes to the structure of NSW's electoral administration, including renaming the then State Electoral Office to the NSW Electoral Commission, as well as over 80 further minor and technical amendments to NSW's *Parliamentary Electorates and Elections Act 1912* (NSW). Like Victoria's electoral legislation prior to the *Electoral Act 2002* (Vic), NSW's electoral legislation was antiquated, hard to decipher and not contemporaneous with modern practices in electoral administration.

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68 *Electoral and Parliamentary Committees Legislation (Amendment) Act 2006* (Vic).

Many of the final clauses in the 2007 Bill came from recommendations in the NSW JSCEM's first ever report; the report was on the 2003 NSW state election, which was tabled in 2005. As part of this inquiry Colin Barry, then NSW Electoral Commissioner told the JSCEM that NSW should investigate electronic voting as a means to provide NSW electors with low vision the opportunity to cast a secret vote.[69] Australia is a signatory to the United Nations Convention on the Rights of Persons with Disabilities. Under the Charter Australian electoral authorities must provide electors with vision impairments the opportunity to cast a secret vote using whatever technology is available to assist with this process. Barry advised that NSW was then in breach of its obligations due to distribution methods relating to Braille ballot papers.

Following this, in 2008 a blind elector lodged a complaint with the NSW State Administrative Decisions Tribunal regarding the lack of access to a Braille ballot paper in his Legislative Assembly District at the 2007 NSW state election. He argued that the compromise made it impossible for him to have a secret ballot because he had to divulge his preferences to an electoral official who would fill in the vote for him. The complaint was upheld.[70]

In response to these issues, the Hon Kristina Keneally MP, the then Premier of New South Wales announced on 16 March 2010 that the "Electoral Commissioner will investigate internet voting for visually impaired people of New South Wales improving their democratic right to a secret ballot".[71] The report ultimately recommended that NSW consider adopting a remote voting system due to reasons of cost effectiveness and lack of Braille literacy in NSW (only one in nine people in NSW with vision impairment in 2010 could read Braille).

The *Parliamentary Electorates and Elections Further Amendments Bill 2010* (NSW) passed Parliament in November 2010 and provided for iVote, NSW's remote voting system. The Bill gave the NSW Electoral Commission considerable functions and responsibilities in relation to the voting system, as well as authority to determine the classes of electors to use the system. Further information about iVote is contained later in this chapter, and in Chapter Five.

2014 – Commonwealth JSCEM's second interim report on electronic voting options

In 2014 the Commonwealth JSCEM issued a second interim report as part of its inquiry into the 2013 federal election. The committee found that it could not recommend the wholesale adoption of a large-scale electronic voting system for Australia as it could not happen without compromising Australia's electoral integrity.[72] The report cited concerns regarding hacking, verification and the effect of electronic voting on Australia's electoral traditions as reasons for its

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69 Parliament of NSW, NSW JSCEM, "Administration of the 2003 NSW state election", Parliament of NSW, Sydney, 2005.

70 Taylor, G., "Electronic Voting in Australia", in Maurer, A., Barrett, J. (eds), *E-Voting case law: a comparative analysis*, Routledge, London, 2015, p.235.

71 Holmes, B., "e-voting; the promise and the practice", Australian Parliamentary Library, Canberra, 2012.

72 Parliament of Australia, Commonwealth JSCEM, "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, p.iv.

finding. Although reluctant to support electronic voting, the JSCEM did call for the roll out of electronic certified lists to all pre-poll centres and mobile voting teams initially, with the eventual introduction to all polling places. The JSCEM also recommended the consideration of electronic counting and storage of ballot papers.[73]

3.2 Major drivers of electronic voting in Australian electoral administration

The committee notes that there have been a number of major drivers of change in Australian electoral administration over the past two decades, and that these forces, to differing degrees, have played a role in the increasing demand for flexible voting services at all Australian elections. This section incorporates evidence from inquiry participants, as well as general information in the Australian electoral literature and political science about electronic and remote voting.

3.2.1 Social change

During the inquiry the committee explored the impact of social change on Australia's electoral process in general, and how the demand for 'digital' services has led to calls for electronic voting.

In 2013 the Electoral Council of Australia and New Zealand prepared a research paper on electronic voting, which is available on the organisation's website and was referred to in the Council's submission to the inquiry. In the paper the Council described how Australia's electoral processes had responded, over time, to various challenges since Federation, and how Australia was in the 21st century a vastly different place compared to when the *Commonwealth Electoral Act 1918* (Cwth) was first drafted. One of the major drivers of change in electoral administration has been the demand for flexible voting services. The paper noted that as Australia has grown in size, and communications and travel have increased, electoral commissions and parliaments have had to supplement the "basic model of voting at a polling place on Election Day with opportunities for people to vote at other times".[74] Postal voting is the oldest mechanism for this purpose. As documented in the committee's report on the 2014 Victorian state election, postal voting has a long history at Australian elections, having first been used in colonial South Australia.

Citizens now expect to interact with government via technology; several inquiry participants discussed this. The NSW Electoral Commission told the committee that technology has created an expectation of electronic interaction with government[75]; in its submission to the inquiry the VEC also shared this

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73 Parliament of Australia, Commonwealth JSCEM, "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, p.iv.

74 Electoral Council of Australia and New Zealand, "Electronic Voting", Electoral Council of Australia, 2013, p.19.

75 NSW Electoral Commission, *Submission No.24*, p.9.

view.[76] Australia Post, appearing before the committee's December 2016 public hearings, noted that "since the digitisation era arrived in the 1980s there have been wholesale changes to the way we live and work. Across the globe, the tools by which communities and individuals engage, transact and communicate are constantly being altered by new technology, introduced at an ever accelerating pace".[77] Further, Australia Post told the committee about the results of survey research it commissioned in 2015 about how citizens interact with government. A high proportion of respondents said that they expected to interact with government flexibly and via electronic means, including electronic voting at periodic elections.[78]

3.2.2 Australian households, the Internet and mobile phone technology

Electronic interactions with government have coincided with the rise of the internet. According to the ABS's 2016 report on the "Household Use of Information Technology, Australia", the number of households with access to the internet at home increased, "reaching 7.7 million in 2014–15, representing 86 percent of all households (up from 83 percent in 2012–13)".[79] Further, in 2014–15 for those households with children aged under 15 years, "97 percent had access to the internet compared with 82 percent of households without children under 15. Households located in major cities were more likely to have internet access at home (88 percent) compared to those in remote or very remote parts of Australia (79 percent)".[80]

Conversely, in 2014-2015 there were 1.3 million Australian households without internet access at home. According to the ABS, some of the main reasons for a household not having internet access were: "no need (63 percent), lack of confidence or knowledge (22 percent), and cost (16 percent). The main reason given for not accessing the internet differed according to whether or not children aged under 15 years were present in the household. For households with children under 15 years, the most common reason given for not accessing the internet was cost (43 percent)".[81]

Many Australians use mobile devices now to access the internet on a daily basis and to perform personal administration tasks such as banking and interacting with government agencies. Most households who accessed the internet did so through a "desktop or laptop computer (94 percent), followed by households who

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76 Victorian Electoral Commission, *Submission No.21*, part B, p.1.

77 Australia Post, *Submission No.19*, p.1.

78 Australia Post, *Submission No.19*, p.p.3-4.

79 Australian Bureau of Statistics, "8164.0: Household use of Information Technology, Australia, 2014-2015, ABS, Canberra, 2016.

80 Australian Bureau of Statistics, "8164: Household use of Information Technology, Australia, 2014-2015, ABS, Canberra, 2016.

81 Australian Bureau of Statistics, "8164: Household use of Information Technology, Australia, 2014-2015, ABS, Canberra, 2016.

accessed via mobile or smart phones (86 percent) and households who accessed via tablets (62 percent). Households may have used one or more of these types of devices".[82]

Several inquiry participants mentioned in their evidence Australia's high levels of internet connectivity. The NSW Electoral Commission, the VEC and the Western Australian Electoral Commission discussed digital fluency in their submissions. Further, during the committee's interstate study tour to NSW in November 2016 to meet with John Schmidt, NSW Electoral Commissioner, Linda Franklin, Director, NSW Electoral Commission and Mark Radcliffe, Manager, iVote, the committee discussed the iVote usage rates on portable devices. These issues as covered further later in this chapter and also in Chapter Five.

3.2.3 Population mobility and geographic change

Population mobility is another major driver of change in the Australian electoral landscape. There are two aspects to this; outward mobility, or the number of Australians living overseas, and internal mobility, or the number of people who change address in relative short periods of time.

In terms of outward mobility, the Australian Bureau of Statistics estimated that between 1999-2003, there were 346,000 Australian-born people living in other OECD countries: of these 96,900 lived in the United Kingdom, 65,200 lived in the United States and 42,000 lived in New Zealand.[83] More recent research suggests approximately one million Australians live overseas, with 450,000 of voting age. Considering that the AEC issued just under 75,000 overseas postal votes at the 2010 federal election, this suggests that approximately only one-sixth of eligible Australians living overseas at the time of a federal election are casting a vote.

Drilling down further, the "Australian Taxation Office (ATO) information indicates that residents of New South Wales (260,000 individuals), Victoria (203,000 individuals) and Queensland (180,000 individuals) were living abroad".[84] If we extrapolate these figures to the 2014 Victorian state election, when the VEC took around 900 votes in the United Kingdom, it is possible to conclude that many eligible Victorians living overseas are likely not casting a vote for Victorian state elections.

Outward mobility has a further dimension, as noted in Chapter Two. According to Advance.org, an organisation representing the interests of the Australian diaspora, Australians are a "well-travelled bunch, chalking up over eight million overseas departures in 2012 alone".[85] Of that number, 372,200 left Australia to

82 Australian Bureau of Statistics, "8164: Household use of Information Technology, Australia, 2014-2015, ABS, Canberra, 2016.

83 Australian Bureau of Statistics, "Australians Living in OECD countries", ABS, Canberra, 2007.

84 Advance, "Australians Abroad: Preliminary findings on the Australian diaspora", Advance. Accessed 12 February 2017 from www.advance.org/australians-abroad-preliminary-findings-on-the-australian-diaspora/.

85 Advance, "Australians Abroad: Preliminary findings on the Australian diaspora", Advance. Accessed 12 February 2017 from www.advance.org/australians-abroad-preliminary-findings-on-the-australian-diaspora/.

go "for good". The Department of Immigration and Citizenship anticipates that around 80,000 "of those Aussies will see that dream realised, starting a new life abroad".[86]

Internal mobility has also increased significantly in the past decade. As noted in the Electoral Council of Australia and New Zealand report on electronic voting, Australia's population is highly mobile. The 2011 ABS Census of Population and Housing demonstrated high levels of one-year address change; that is, 3.2 million had changed their usual place of residence in the year prior to the 2011 Census. Nearly eight million people moved in the five years prior to the 2011 Census. While the electoral literature suggests that population mobility is a marker of low electoral participation, in the Australian context Laziridis and Hoffman and Reader found that State-level electoral Districts with high levels of population mobility may exhibit high levels of flexible voting, such as early voting in person.[87]

3.2.4 Challenges associated with the postal service, and postal voting in general

While these issues are addressed specifically in Chapter Five in relation to evidence the committee received about Victoria, this section provides a general outline of this issue.

Across the developed world postal agencies have reduced regular mail services in response to rising cost pressures and a decline in mail services relative to package deliveries as a result of e-commerce sales. In August 2013 US Post ended its Saturday mail service; in 2013 the New Zealand government reduced its regular mail service to three days, citing cost pressures and continuing challenges associated with declining mail patronage relative to parcels.[88]

In Australia, Australia Post recently overhauled its postal service, reducing regular mail delivery to three-days – meaning that some parcels between regional centres could take up to six days – and increasing the price of a postage stamp to $1.

In light of these changes, Australia's electoral commissions have publicly suggested that the medium term viability of postal voting services is questionable. During this inquiry the VEC told the committee that "the urgent physical transfer of ballot material is reliant upon postal and courier services, which are proving less responsive".[89] Submissions from the NSW Electoral Commission and Western Australian Electoral Commission also referred to less responsive postal voting services as drivers for change in relation to electronic

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86 Advance, "Australians Abroad: Preliminary findings on the Australian diaspora", Advance. Accessed 12 February 2017 from www.advance.org/australians-abroad-preliminary-findings-on-the-australian-diaspora/.

87 Reader, N., "Assessing the demographic correlates of early voting in person at Victorian state elections", ERRN Working Paper, University of Melbourne Law School, August 2015, p.p.4-7.

88 NZ Herald, "NZ Post cuts deliveries to three days a week", February 2015. Accessed 12 February 2017 from www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11400921.

89 Victorian Electoral Commission, *Submission No.21*, part B, p.3.

voting. Further, the committee notes that Australia Post itself has acknowledged the material impact of its service changes of its capacity to provide postal voting services for federal elections to the Commonwealth JSCEM.

This fact was acknowledged by Australia Post before the Commonwealth JSCEM in 2014. Citing evidence from Australia Post, the JSCEM said:

> "Bodies involved in the electoral process have reported difficulties in providing and receiving voting and ballot materials overseas due to transit delays and tight legislative timelines. This has the potential to become even more difficult as postal services decrease".[90]

In the Victorian context, while local government elections are outside the scope of this inquiry, the VEC's submission reported that the 2016 Victorian local government elections would involve more than four million ballot packs, and that many would be rejected due to slow return times associated with the postal service.[91]

Chapter Five discusses postal voting returns at the 2014 Victorian state election, as well as other evidence received in relation to postal voting and how electronic voting might supplement or replace postal voting services at Victorian state elections.

3.2.5 2013 and 2016 federal elections, calls for electronic voting

2013

The 2014 Western Australian Senate re-election was unprecedented in Australian electoral history and sparked calls for electronic voting.

The 2014 Senate re-election was called after the result of the 2013 federal election for the seats was voided by the High Court of Australia, on 20 February 2014. The re-election was called as a result of 1,375 ballot papers being lost during an official recount in November 2013. The High Court ruled that because the "number of lost ballots far exceeded the margin for the two remaining Senate seats, the only acceptable remedy was to rule the result invalid and hold a fresh election".[92]

Subsequent to the lost ballot papers, in December 2013 the AEC released a report by Mr Mick Keelty AO inquiring into the circumstances of 1,375 missing Western Australian Senate votes. The report found "there were significant failures in some of the processes and procedures for the handling, movement and storage of WA Senate ballot papers. These failures were likely to have increased the risk of ballot papers being mislaid, as well as making it more difficult to detect or accurately

90 Parliament of Australia, Commonwealth JSCEM, "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.

91 Victorian Electoral Commission, *Submission No.21*, part B, p.3.

92 Australian Electoral Commission v Johnston [2014] HCA 5, 18 February 2014.

determine the fate of the ballots".[93] As a result of these failures, there were widespread calls for the AEC to adopt electronic vote counting as a way to prevent the mishandling of ballot papers.

Several inquiry participants, including the NSW Electoral Commission, also drew the committee's attention to the fact that the paper balloting system is not foolproof. These matters are considered later in this chapter and further in Chapter Five.

2016

The 2016 federal election saw fresh calls for electronic voting following the election. It took eight days after the federal election on 10 July 2016 for the Opposition Leader Bill Shorten to concede defeat. At the time five seats were still in doubt and 80 percent of the votes had been counted. This was due to a combination of factors, including the AEC adopting a cautious approach following the 2014 Western Australian Senate re-election, new ballot handling procedures introduced following the Keelty Report and a substantial increase in early voting, particularly pre-poll declaration votes, which are votes cast outside an elector's Home Division.

Following the election both Prime Minister Malcolm Turnbull and Opposition Leader Bill Shorten supported electronic voting as a means to speed up election results. The Commonwealth JSCEM is currently inquiring into the 2016 federal election and is considering the role of electronic voting at future federal elections; the JSCEM is expected to table its final report in mid-2017.

During its inquiry into the 2014 Victorian state election this committee considered evidence relating to the 2016 federal election about the potential for electronic voting to speed up election results. The committee elected to consider this evidence as part of this inquiry. Chapter Five contains specific evidence about electronic voting and election results.

Increase in fee-for-service internet elections

While electronic voting has limited use at Australian elections, fee-for-service, industrial elections and protected action ballots – all elections for organisations – occasionally use electronic voting.

Amongst Australia's electoral commissions, the AEC has investigated using electronic voting for its Industrial and Commercial Election program. Elections ACT has also developed software for commercial elections based on a 'yes/no' ballot. In the Northern Territory, the Northern Territory Education Union recently used electronic voting for its enterprise bargaining agreement, although there were concerns among some members about the security of the poll.

The Parliament of Victoria, like many organisations, also recently used a form of electronic voting via email to conduct the ballot for its *Parliamentary Officers Enterprise Agreement 2016*.

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93 Australian Electoral Commission, "Keelty report released", Australian Electoral Commission, Canberra, 2013.

3.2.6 'No major crisis' concept, or path dependency

Another school of thought suggests that Australia's electoral administration is facing increased challenges to its traditional, Election Day focused business model due to rapid advances in communication technology. This is a form of path dependency. Path dependency is a theory in economics and political science which was developed to explain the adoption of technological processes. It posits that 'history matters', i.e., that the development of one set of technological processes is immediately linked to what came before it, and so forth.

In relation to voting technology, the Electoral Council of Australia and New Zealand noted that electronic voting may well represent the 'end point' of a path dependent process.[94] While no one crisis may spark a broad shift to electronic voting by all Australian jurisdictions, a combination of the factors listed in this section, such as declining postal delivery services, the rise of technology and increasing levels of flexible voting, will place pressure on Parliaments and electoral commissions to adopt electronic voting.

Several inquiry participants couched the development of electronic voting in these terms. The NSW Electoral Commission explained that Victoria's adoption of electronic voting, and other Australian jurisdictions, was probably inevitable due to declining postal delivery services and the growth in the number of electors who require a flexible voting option, such as low vision electors and those living overseas and interstate.[95]

3.3 Arguments for and against electronic voting, focusing on remote voting

As a result of these pressures, there is an argument that electronic voting represents the next logical step in Australia's electoral 'evolution'. While Victoria already has a system of electronic voting for a limited cohort of Victorian electors, whether this system should be expanded to include widespread kiosk electronic voting for all Victorian electors, whether Victoria should adopt a remote voting system like iVote, or retain its current electronic voting framework and modify how it is rolled out, have been central concerns during this inquiry. Regardless of which approach, the committee notes Tom Rogers, the Australian Electoral Commissioner's comments to the Commonwealth JSCEM in 2014 that the widespread adoption of electronic voting would constitute a 'fundamental transformation of Australia's electoral processes'.[96]

This section considers the main arguments for and against electronic voting, focusing on remote voting, which the committee considered during the inquiry. Many of these categories reflect the JSCEM's research into this topic, as well as the Electoral Council of Australia and New Zealand's research.

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94 Electoral Council of Australia and New Zealand, "Electronic Voting", Electoral Council of Australia, 2013, p.11.

95 NSW Electoral Commission, *Submission No.24*, p.8.

96 Parliament of Australia, Commonwealth JSCEM, "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.

3.3.1 Arguments for electronic voting

During the inquiry the committee considered several arguments for remote voting in Victoria, including;

- Enfranchising vision impaired, elderly electors and overseas and interstate electors, with a secure ballot;
- Election logistics, including providing faster and more accurate election results;
- Secure handling of ballot materials; and
- Opportunities to reduce informal voting.

The following section explores these arguments in relation to evidence from inquiry participants. This discussion backgrounds more specific proposals about electronic voting and election technology in Chapter Five.

Enfranchising vision impaired electors and electronic voting

As noted earlier regarding the development of iVote, electronic voting is theoretically meant to provide electors with vision impairment an opportunity to cast a secret ballot independent of assistance from electoral officials.

The VEC's submission explained some of the key benefits of electronic kiosk voting in relation to vVote. Since 2006 over 1,100 Victorians with disabilities or insufficient literacy skills have cast an electronic vote. The VEC noted that, "as a primary benefit, electronic voting provides a facility for electors who are blind or have low vision, motor skill impairments or language barriers to independently cast a secret vote. At Victorian State elections, this capability has only been available in person at a VEC kiosk in designated electronic voting locations".[97] Craig Burton, a former VEC IT Manager and former manager of vVote, said that while "vVote was only used for a small catchment of electors, I believe its use can be expanded but that VEC needs support to both use it, understand it and to have it fully supported by its poll staff".[98]

However, some inquiry participants disputed these benefits in relation to electronic kiosk voting. The committee heard from Vision Australia regarding the organisation's experience with Victoria's electronic voting system, vVote. While Vision Australia supports the VEC's efforts to provide electronic kiosk voting, Vision Australia considers the form of electronic voting utilised at the 2010 and 2014 Victorian state elections to be ineffective, and argued that as a result Victoria has "regressed since the 2010 state election...falling well behind other states in providing accessible voting for people who are blind or have low vision".[99]

97 Victorian Electoral Commission, *Submission No.21*, part B, p.3.

98 Craig Burton, *Submission No.30*, p.13.

99 Vision Australia, *Submission No.17*, p.p.3-4.

Vision Australia argued that electronic kiosk voting failed to provide vision impaired electors with a reasonable voting avenue on a number of fronts. Firstly, vVote requires, according to Vision Australia, a high level of familiarisation with the system, and users were not given sufficient time to develop this awareness of the system. As a result, many of the 200 vision impaired electors who voted at the 2014 Victorian state election had to seek assistance from an electoral official, thus rendering their vote 'open' or not secret.[100] Secondly, Vision Australia noted that the low take up of vVote in 2010 and 2014 may be directly related to the limited number of locations available for accessible vision impaired electors, as well as overall concerns amongst the vision impaired community about the restricted franchise for vVote; Vision Australia said in its submission that the restricted franchise prevented family members and friends from voting together, thereby reducing the social aspect of Australia's democratic voting process.

As a solution, Vision Australia called for a nationally consistent approach to electronic voting.[101] At the public hearings and in their submission, Vision Australia identified remote voting as having great potential to alleviate many of the issues discussed above. In particular, Vision Australia nominated NSW's iVote system as the organisation's preferred model, and that vision impaired usage figures – in 2015, 5,296 vision impaired electors used iVote compared to the 200 vision impaired electors who used vVote at the 2014 Victorian state election – make a strong case for iVote to be adopted throughout Australia.[102]

Enfranchising elderly electors

During the inquiry the committee heard from National Seniors about electronic voting.

In general, National Seniors suggested that electronic kiosk voting offered the greatest potential benefits to older electors, given that many older electors might prefer to vote in polling places and receive assistance from electoral officials if they were unfamiliar or uncomfortable with the voting technology available.[103] National Seniors also recommended that any remote voting system should have high standards of verifiability and security, and that electronic voting should not replace ordinary paper-based voting mechanisms or the traditional Election Day experience.[104]

Enfranchising overseas and interstate electors

Throughout the inquiry the committee learnt that many overseas and interstate electors find it difficult to participate in Victorian state electors. As noted earlier, at any given time in November – the time of a Victorian state election – the VEC estimates that there could be as many as 90,000 Victorians outside the state,

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100 Vision Australia, *Submission No.17*, p.p.3-4.
101 Vision Australia, *Submission No.17*, p.1.
102 Vision Australia, *Submission No.17*, p.4.
103 National Seniors, *Submission No.31*, p.1.
104 National Seniors, *Submission No.31*, p.1.

with at least 40-50 percent of this figure part of the eligible voting cohort.[105] The committee also heard specific evidence about the significant costs associated with establishing overseas and interstate voting facilities for Victorian state elections.

Advocates for the Australian diaspora, such as Advance.org and the Southern Cross Group, have long advocated for electronic voting as a means to provide those outside Australia.

Election logistics

Electronic voting presents a number of benefits for election logistics and management.

During the inquiry the VEC told the committee about some of the logistical challenges it faces administering Victorian state elections. The VEC advised that one its key functions during an election period is to provide "the urgent physical transfer of ballot material...which is reliant upon postal and courier services, which are proving less responsive".[106] The VEC noted that a remote voting solution might negate the need for Australian electoral commissions to establish overseas and interstate voting centre facilities – evidence about the VEC's overseas and interstate overseas voting arrangements is discussed further in Chapter Five.

Secure handling of ballot materials

Following the 2013 federal election and the loss of 1,375 votes leading to the 2014 Western Australian Senate re-election, advocates for electronic voting in Australia have argued that both kiosk-based and remote electronic voting solutions could circumvent some of the problems associated with the physical handling of large numbers of ballot papers associated with an Australian general election. During the inquiry the committee heard from the NSW Electoral Commission, Ian Brightwell former IT Manager at the NSW Electoral Commission who stated that paper voting processes were not necessarily 'foolproof' and that the chances for a vote to be lost in the context of a paper count are higher than commonly assumed.[107]

Electronic voting also offers some benefits in terms of voting reliability for postal electors who manage to vote but do not have a vote admitted to the election count as a result of postal delays. As part of the briefing with the NSW Electoral Commission in November 2016, and during a Victorian Parliamentary Library presentation in May 2016, Mark Radcliffe, IT Manager, NSW Electoral Commission, explained that iVote has a higher success rate than postal voting in admitting final votes cast from overseas. For instance, at the 2015 NSW state election, 5,856 postal votes were sent overseas but only 129 entered the final election count.

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105 Victorian Electoral Commission, *Submission No.21*, part B, p.3.

106 Victorian Electoral Commission, *Submission No.21*, part B, p.3.

107 Ian Brightwell, *Submission No.18*, p.6.

The committee notes that during the Commonwealth JSCEM's inquiry into the 2013 federal elections, several participants in that inquiry noted that the paper ballot process relied on the competence of 'tiny groups' of people. Ralph McKay, who also made a submission to this inquiry, said that "many links in the paper vote processing chain, including movement and storage of ballots, rely on... sometimes just one person", and that large-scale paper systems are inherently insecure.[108]

Further evidence about the loss rates associated with different vote types is discussed in Chapter Five.

The committee also notes there is debate about the relative benefits of electronic voting, particularly remote voting, in relation to election logistics. Some evidence from computer scientists suggests that the problems associated with paper voting are in fact similar to electronic voting systems. Professor Rajeev Gore and Dr Vanessa Teague wrote in this submission to the inquiry about lost vote rates at the 2013 federal election:

> "Paper processes are not perfectly secure or reliable, but neither are computers. For example, the lost vote rate in the 2013 West Australian Senate race (1370 out of 1,348,797, slightly over 0.1 percent) was about the same as the demonstrated vote misrecording rate in Australia's largest Internet voting trial, the NSW iVote project (43 misrecorded electronic votes out of 46,864, slightly under 0.1 percent)...The WA Senate incident received much more attention because it impacted an election outcome, not because the system was inherently much less reliable. Even more importantly, the paper-based Senate process retained paper evidence of the 99.9 percent of votes that weren't lost; the iVote system produced no meaningful evidence of the correctness of any of the votes. Reliability, privacy and verifiability must be designed into electronic voting processes as carefully as they are designed into our existing paper-based processes".[109]

Potential to reduce informal voting

There has been a gradual increase in informal voting at the past three Victorian state elections. As documented in the committee's report on the 2014 Victorian state election, the rate of informal voting for the Legislative Assembly was 5.22 percent, the highest ever rate of informal voting for a Victorian state election.[110] Informal voting was also highest in Districts where there were a high number of candidates contesting the election, and in Districts with high proportions of electors from non-English speaking backgrounds. As examples, Frankston District, which had 14 candidates, recorded an informal voting rate of 8.88 percent, and Dandenong District with high levels of non-English speaking voters, recorded 8.3 percent.[111]

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108 Ralph McKay, *Submission No.29*, p.p.1-3.

109 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.4.

110 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the conduct of the 2014 Victorian state election", Parliament of Victoria, Melbourne, May 2015, p.98.

111 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the conduct of the 2014 Victorian state election", Parliament of Victoria, Melbourne, May 2015, p.99.

Electronic voting can potentially help reduce intentional and unintentional informal voting as these systems typically include a 'failsafe' mechanism which alerts electors when they have voted informally, providing an opportunity to amend their ballot. Electronic voting also theoretically provides electors from non-English speaking backgrounds a better opportunity to cast a formal vote as the system often provides language support and voting instructions in languages other than English. At the 2014 Victorian state election vVote provided instructions in 14 languages. Several inquiry participants supported electronic voting on these grounds, including the VEC, the NSW Electoral Commission and Ian Brightwell.

It is important to note vVote and iVote also allow electors to cast an informal vote deliberately.

3.3.2 Arguments against electronic voting

During the inquiry the committee also considered several arguments against electronic voting, including;

- The safety and security of electronic voting systems, particularly remote voting systems, and specific concerns about vVote;
- The cost of electronic voting systems; and
- The impact of electronic voting on Australia's democratic and electoral practices, including the traditional model of Election Day in Australia.

The following section explores these arguments and related evidence from inquiry participants. This discussion backgrounds more specific proposals about electronic voting and election technology in Chapter Five.

Safety and security

One of the most common themes in the evidence about electronic voting, focusing on remote voting, during this inquiry was that electronic voting systems are not secure. These comments mainly addressed remote voting, although some also relate to vVote at the 2014 Victorian state election.

General concerns about security and integrity

Several inquiry participants told the committee that remote voting could not replicate the security and safety of a paper-based voting system, and that adopting such a system would have serious consequences for Victoria's electoral integrity.

In terms of general comments, in their submission, Professor Gore and Dr Teague said that "secure and usable remote electronic voting, i.e. Internet voting, remains an unsolved problem. There are various software products available

that claim to provide security and verifiability, but experience in other states, particularly NSW, has shown serious problems relating to reliability, security and verifiability".[112]

Loss of trust was a major issue for some inquiry participants. In his submission, Christopher Glerum also said that "electronic voting...as a primary means of voting...[loses] the essential elements of democratic voting. Trust and anonymity are both at stake. This system asks the general public to trust that the machine is coded correctly, trust that it is audited frequently and expertly and trust that human error does not occur".[113] Similarly, Craig Burton, a former IT Manager at the VEC in which capacity he helped design the VEC's vVote interface, argued that remote voting should never be used for "high-stakes public elections".[114] According to Burton, kiosk voting systems, such as vVote, provide a safe, controllable electronic voting suitable for Australian elections.

Remote voting also presents challenges in terms of a user's capacity to interact safely with the internet environment. In his submission, Dr Chris Culnane noted that it was unrealistic to expect electors to ensure their computers were completely free of viruses and malware that could permit malicious hacking. He argued that:

> "Remote voting delegates the provision of secrecy to the voter themselves. The carefully constructed protections offered in a polling place no longer exist, it is left to the individual to enforce their own secrecy. Internet voting makes the challenge even harder, requiring the voter to not only secure the environment in which they cast their vote, but also to secure the computer and internet connection they will use for voting. Evidence suggests that users are not capable of securing their devices, and Australia particularly faces serious challenges. A report from Trend Micro showed that Australia ranks 3rd globally in terms of the number of users clicking malicious links, equating to 22 million malicious links being clicked in the 4th quarter of 2015 alone. In the face of such a challenging security environment, it is currently inconceivable to believe that the average user has the capability to secure their machine".[115]

Verifiability and transparency

Verifiability can be defined in several ways. In their submission, Professor Gore and Dr Teague defined verifiability as follows:

> "For each election, each voter should get good evidence that their vote is cast in the way that they intended, and scrutineers and the public should get good evidence that all the votes are properly input and accurately tallied. E-voting should provide a printout for voters to verify (a voter-verifiable paper trail), or some other form of direct verification (like the vVote system)".[116]

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112 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.2.

113 Christopher Glerum, *Submission No.2*, p.2.

114 Craig Burton, *Submission No.31*, p.2.

115 Dr Chris Culnane, *Submission No.20*, p.2.

116 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.4.

During the inquiry several inquiry participants questioned whether remote voting could provide verifiability. In this submission, Professor Gore and Dr Teague suggested that "no Internet voting solution exists that provides a degree of security and verifiability as good as postal voting for those who can fill in their own postal vote".[117] Professor Gore and Dr Teague also outlined, in their view, the four major technical challenges for remote voting related to verification. These are:

- Cast-as-intended (voter) verifiability, as a way of showing that a person's vote is as they intended it to be;
- Voter authentication. This means ensuring that the person casting the vote is the eligible voter they claim to be;
- Verifying the votes are counted as cast and reported or tallied correctly; and
- Privacy, involving observation of the person voting and electronic observation of the vote they have cast. Both aspects are obviously difficult in a remote voting context when a user's home computer is used to vote.[118]

The committee notes efforts to create remote voting systems with end-to-end verifiability; the Helios protocol is a good example. However, as noted by Professor Gore and Dr Teague, Helios can currently provide verifiability for simple counting processes but not the complex calculations involved in preferential voting.

During the inquiry the committee also received specific evidence about NSW state elections and iVote's verification systems. These are addressed below.

Security of remote voting and hacking concerns

One of the major concerns about remote voting, and to a lesser extent kiosk voting, is that electronic elections are more vulnerable to malicious activity than paper-based elections, and that this activity might ultimately affect the result of the election in favour of one candidate. The committee notes that Victorian elections are conducted peacefully, safely and with electors participating without the threat of violence or coercion. Yet, electronic elections present a different set of challenges. These challenges are summarised in Craig Burton's submission to the inquiry;

> "It is hard for a single person to affect a paper election outcome. On the other hand it is too easy for a single developer or operator to interfere in (or halt) an automated election. Computer issues during elections should not be treated like simple admin [sic] issues because a small technical hitch can have dire implications…Physical world risks and computer risks cannot be compared, even if it looks like they can. Errors in manual elections are usually random and do not favour candidates. Errors or fraud in software can systemically (not randomly) damage elections".[119]

117 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.7.

118 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.7.

119 Craig Burton, *Submission No.30*, p.1.

The committee notes that during this inquiry, there were allegations that several high-profile elections involving electronic voting were affected by malicious IT attacks. The highest profile of these attacks were allegations, aired in late 2016, that the Russian government interfered in the 2016 United States election, with the goal of undermining candidate Hilary Clinton and affecting her electability.[120] Earlier in 2016, the Office of the Director of National Intelligence (DNI), representing 17 intelligence agencies, and the Department of Homeland Security (DHS) jointly stated that Russia "hacked the Democratic National Committee (DNC)" and leaked its documents to Wikileaks, with a view to again undermining Clinton.[121]

During this inquiry the committee visited Estonia. Prior to iVote at the 2015 NSW state election, Estonia was home to the world's largest remote voting application, with nearly 25 percent of electors casting their vote remotely at the 2012 Estonian elections. As part of the tour the committee considered evidence from 2014, when a group of international computer scientists alleged that Estonia's remote voting system was vulnerable to hacking; subsequent media reports allege the system is not suitable for European elections and vulnerable to geopolitical interference from Russia.[122] These issues are addressed further in Chapter Four.

Hacking was also a major concern for the Commonwealth JSCEM during its inquiry into the 2013 federal election. In finding that it could not support electronic voting for federal elections without compromising Australia's electoral integrity, the Commonwealth JSCEM noted that the threat of hacking was a key consideration for the committee, noting that "the weight of evidence tells us that at present…electronic voting can be hacked, and an election outcome changed".

During this inquiry the committee was also told that hacking can occur in a non-malicious context, as discussed below.

Concerns about kiosk voting

While several inquiry participants, such as Professor Gore and Dr Teague, Dr Chris Culnane and Craig Burton considered kiosk voting a superior electronic voting mode, the committee received some evidence about the vulnerabilities of kiosk voting.

In their submission Dr Wen and Associate Professor Buckland discussed vVote at length. They noted that:

> "E-voting systems used in large-scale public elections in Victoria, other Australian jurisdictions and overseas have all suffered from critical failings and unacceptable risk, especially in terms of quality and security. Moreover none of these systems

120 Fortune, "Trump advisor message alleged DNC hacker during campaign", 12 March 2017. Retrieved 20 March 2017 from fortune.com/2017/03/11/roger-stone-guccifer-twitter-trump/.

121 Fortune, "Trump advisor message alleged DNC hacker during campaign", 12 March 2017. Retrieved 20 March 2017 from fortune.com/2017/03/11/roger-stone-guccifer-twitter-trump/.

122 Parliament of Australia, Commonwealth JSCEM, "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.

> provides verifiability, which is a key security requirement. The Victorian vVote project was a commendable attempt at designing a system to address this shortcoming in verifiability, but it was unsuccessful".[123]

Dr Wen and Associate Professor Buckland's evidence about vVote is considered in detail in Chapter Five.

Cost

Most evidence the committee received about electronic voting related to the cost of electronic voting kiosks. While this is addressed in Chapter Five in relation to vVote, some preliminary comments are relevant here.

One of the major criticisms of kiosk voting is that it is costly to roll out to a non-restricted franchise. Kiosk voting involves a substantial investment in the electronic voting machines which comprise the solution, and much of this technology is 'election specific' in that it can only be used at one election cycle before the technology needs updating. This is particularly the case at Victorian state elections, which are held every four years.

During the inquiry the committee heard from several inquiry participants about the cost-prohibitive aspects of vVote. The VEC told the committee that while kiosk voting has been successful at Victorian state elections and has helped establish that electronic voting can be deployed to assist electors with barriers to voting, the overall impact of kiosk voting has "been out of proportion to the votes taken". Noting cost, the VEC also said:

> "Deploying and supporting the kiosks, which requires specialist business and technical knowledge, has added additional overheads and risk to a business environment already managing critical processes and high volumes within short timeframes".[124]

The Western Australia Electoral Commission's submission also referred to cost and the "tyranny of distance" in relation to rolling out kiosk voting. The submission noted:

> "Despite these advantages, the tyranny of distance renders the deployment of electronic voting machines impracticable on any significant scale in larger jurisdictions such as Western Australia, Queensland and New South Wales...Victoria occupies the middle ground with regard to area, but is at the high end when it comes to elector numbers - 3,806,301 in 2014 - and polling places – 1786 – suggesting that the widespread roll out of voting machines in polling places would be equally problematic".[125]

In contrast, submissions from the VEC, the NSW Electoral Commission and the Western Australian Electoral Commission suggested that remote voting presented a cost-effective electronic voting solution. The issue of cost is explored further in Chapter Five.

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123 Dr Roland Wen and Associate Professor Richard Buckland, *Submission No.23*, p.1.

124 Victorian Electoral Commission, *Submission No.21*, part B, p.8.

125 Western Australian Electoral Commission, *Submission No.14*, p.2.

Impact of electronic voting on Australia's electoral practices

Elections are more than just the casting of the vote. As noted by the committee during its inquiry into the 2014 Victorian state election, they involve important rituals and traditions and have an important social function; in his submission Professor Graeme Orr discussed the important, in-person, aspects of voting together at a polling place. To this end, several inquiry participants suggested that electronic voting might have a negative impact on Australia's electoral practices.

In his submission, Professor Orr noted that while he was not necessarily opposed to electronic voting as a means to assist those electors who cannot make it to a polling place to cast their vote, he cautioned against allowing everyone to vote electronically when Australian elections already provide ample opportunities for flexible voting in person, such as early voting, and postal voting.[126] Professor Orr suggested that if Australia embraced direct democracy involving regular plebiscites, then remote voting would be essential. But the burden associated with a three-year or four-year election cycle did not justify the rapid expansion of electronic voting.[127]

Another issue addressed in submissions related to the integrity of electronic voting systems, and their suitability as a voting mechanism for members of the community who require assistance to vote, such as the vision impaired. In his submission Dr Chris Culnane said that "the problem with remote voting, online or postal, is that it undermines the democratic rights of the most vulnerable members of our society". He noted that remote voting, like postal voting, also theoretically enabled coercion in the context of a person voting at home being influenced, or told to vote in a certain way, by a third party, friend or family member. In their submission, Professor Gore and Dr Teague offered a similar perspective:

> "For voters who need assistance filling in their paper vote, the verifiable polling-place electronic voting solutions...provide superior security and verifiability to any Internet voting solution not available, or likely to be available in the near future. Disabled voters' democratic rights are not improved by providing an accessible remote voting solution that does not protect the integrity of their vote as well as an alternative method".[128]

3.4 Electronic voting and election technology in Australia

This section reviews some of the different electronic voting systems and election technology used in other Australian jurisdictions. This discussion backgrounds the committee's consideration of more specific policy proposals for Victoria in Chapter Five.

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126 Professor Graeme Orr, *Submission No.5*, p.p.1-2.

127 Professor Graeme Orr, *Submission No.5*, p.p.1-2.

128 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No.11*, p.3.

3.4.1 Federal elections

As noted earlier in this chapter, legislation does not permit electronic voting at federal elections. Electronic voting was trialled at the 2007 federal election but discontinued after the Commonwealth JSCEM withdrew support for the trials on the basis of cost.

Nevertheless, electors with vision impairment may use a telephone voting system. The current system evolved from the 2007 electronic voting trial.

During this inquiry the committee considered evidence about two methods used by the AEC to support electoral administration; electronic certified lists, and ballot paper scanning.

Electronic certified lists

At the 2013 federal election, the AEC piloted the use of electronic certified lists (ECLs) in selected locations to speed up finding and marking voters off the electoral roll.

As noted in Chapter Two, Victoria currently uses Smart roll lookup devices at early voting centres.

At the 2016 federal election, the AEC deployed up to 1,500 ECLs that were used in high volume early voting centres, "at large polling places (also referred to as super booths) on Election Day and by remote mobile voting teams in over 40 electoral divisions around the country. ECLs are currently also being used in all federal Divisions to ascertain the entitlement of those applying for a declaration vote".[129]

Electronic ballot paper scanning

The AEC introduced ballot paper scanning for Senate ballot papers at the 2016 federal election.

These changes came about following changes to the Senate's voting system with the passage of the *Commonwealth Electoral Amendment Bill 2016* (Cwth), which increased the complexity of the Senate count. Under the old Senate voting system, only preferences expressed below the line needed to be recorded and entered individually into the count system. At the 2013 federal election, most votes were cast by selecting one group only above the line; "approximately three per cent of Senate ballot papers needed to have their preferences manually keyed and verified in the count system".[130] Following the changes to the Senate voting system, 100 per cent of Senate ballot papers "need to have their individual preferences entered into the count system – whether the ballot paper is marked above or below the line".[131]

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129 Australian Electoral Commission, "Senate Counting", Australian Electoral Commission, Canberra, 2016.

130 Australian Electoral Commission, "Senate Counting", Australian Electoral Commission, Canberra, 2016.

131 Australian Electoral Commission, "Senate Counting", Australian Electoral Commission, Canberra, 2016.

The AEC used a semi-automated process to conduct the Senate count, scanning Senate ballot papers and using optical character recognition technology to capture preferences. Once captured, these preferences are then verified by a human operator.

The AEC's website provides further information about the technical aspects of the Central Senate Scrutiny process.

3.4.2 Australian Capital Territory

During this inquiry the committee travelled to Canberra to view the October 2016 Legislative Assembly elections. The purpose of the visit was to discuss the ACT's electronic voting system, and ballot paper scanning systems, with Elections ACT.

Elections ACT made a submission to the inquiry, inviting the committee to observe the 2016 ACT Legislative Assembly election.

Electronic voting in the ACT

As noted earlier in this chapter, the ACT was the first Australian jurisdiction to adopt electronic voting, with the system operating for the first time at the 2001 ACT election, and has been used at the 2004, 2008, 2012 and 2016 ACT elections. In 2016 electronic voting was offered at five locations across Canberra's main town centres.[132]

The system, known as eVACS, uses standard personal computers as voting terminals, with voters using a barcode to authenticate their votes. As noted by Elections ACT:

> "Voting terminals are linked to a server in each polling location using a secure local area network. No votes are taken or transmitted over a public network using the internet or communication devices. The electronic voting system is used in the pre-poll voting centres, which are open for three weeks before polling day, and which open on Election Day as ordinary polling places. In polling places that do not have electronic voting, voters still use traditional paper ballots. In electronic polling places, voters are given a choice of voting electronically or on paper".[133]

Any ACT elector is eligible to use electronic voting, where it is available.

Given that Elections ACT had, at the time of writing, not tabled its report on the 2016 ACT election in Parliament, the committee considered statistics about electronic voting at the 2012 ACT election during this inquiry. In 2012 electronic voting was provided at all pre-poll voting centres. A total of "61,660 pre-poll votes were cast, or 26.9 percent of all votes. In 2008, pre-poll votes accounted

132 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

133 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

for 20.3 percent of all votes. Of the pre-poll votes cast, 50,767, or 82.3 percent were cast electronically. In comparison at the 2008 ACT election there were 36,323 pre-poll votes cast electronically, or 81.4 percent of all pre-poll votes".[134]

eVACs; electronic voting process

Elections ACT's website describes how an elector casts a vote using eVACS. Figure 3.1 pictures the eVACS kiosk.

- "After you have your name marked on the electoral roll you are given a card with a barcode printed on it instead of a paper ballot. You use a private voting booth - equipped with a computer screen, cut-down keyboard and a barcode reader.
- Scanning the card through the barcode reader brings up the ballot paper for your electorate and registers that a vote is about to be made.
- By navigating the cursor with up, down and across keys you select the candidates you wish to vote for. When the cursor is on a candidate of your choice you use the *select* key to place a number in the square. The first candidate you select will be number 1, the second number 2 and so on. You can select as many candidates as you like. When you hit the *finish* key the screen will confirm your choices. You then have an opportunity to go back and change your choices or start again. If you do not choose any candidates, your vote will be counted as informal.
- Your vote is only recorded on the computer when you swipe your card for a second time. At that point you cannot change your vote. The swipe card can only be used to cast one vote.
- At the end of Election Day a data disk is removed from the polling place server and loaded into the counting program where your vote is counted. This process saves paper and data entry time and gives a fast and completely accurate result. The result is more accurate than a paper ballot because there is no possibility of misreading handwritten numbers. Numbers cannot be repeated or left out of a sequence".[135]

Like vVote, electors with vision impairment or physical disabilities are able to vote in secret using eVACS. The committee notes comments to the Canberra Times by Phil Green, ACT Electoral Commissioner, in September 2016 that electronic voting is not necessarily faster but that it allows for more accurate ballots, and the option to correct numerical sequence mistakes.[136]

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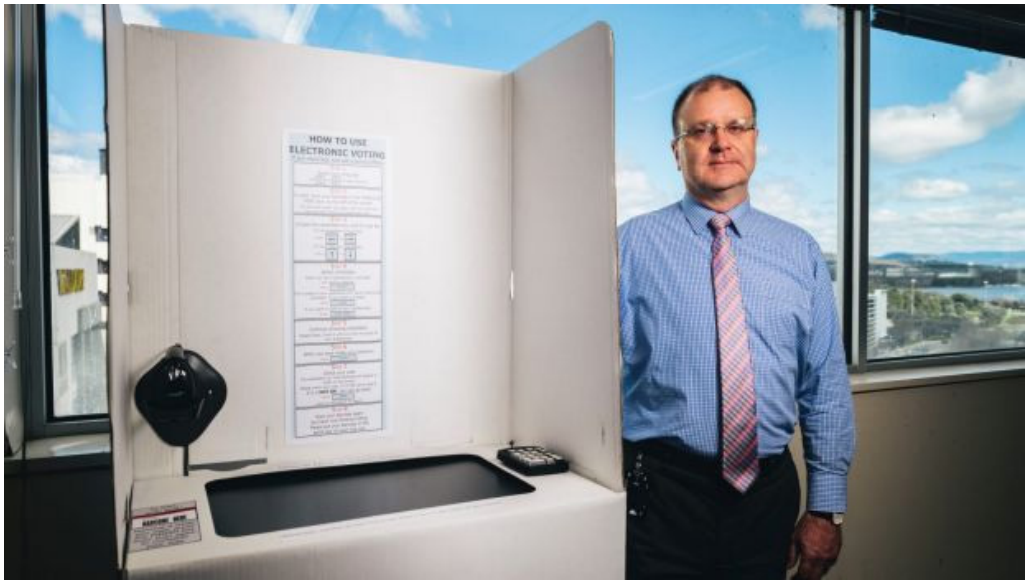
134 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

135 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

136 Canberra Times, "ACT Election; how to vote electronically", Canberra Times, 18 September 2016. Retrieved 1 March 2017 from www.canberratimes.com.au/act-news/act-election-2016/act-election-how-to-vote-electronically-20160914-grgjil.html.

Figure 3.1 Phil Green, ACT Electoral Commissioner, with eVACS kiosk



Source: Canberra Times, "ACT Election; how to vote electronically", Canberra Times, 18 September 2016. Retrieved 1 March 2017 from www.canberratimes.com.au/act-news/act-election-2016/act-election-how-to-vote-electronically-20160914-grgjil.html.

Electronic counting / ballot paper scanning

In addition to electronic voting Elections ACT uses electronic vote counting.

Electronic counting, which combines the counting of electronic votes and paper ballots, was first used in the ACT at the 2001 ACT election and was again used at the 2004 ACT election. In 2001 and 2004, "preferences shown on paper ballots were data-entered by two independent operators, electronically checked for errors, and manually corrected if required".[137] This process is similar to Victoria's Legislative Council computerised count process, as discussed in Chapter Two.

In 2008 and 2012, an intelligent character recognition scanning system was used to capture preferences on paper ballots, with intensive manual checks used to ensure a very high level of accuracy. According to Elections ACT:

> "This data was then combined with the results of the electronic voting, and the computer program distributed preferences under the ACT's Hare-Clark electoral system. This system was used again in 2016. The impetus for the electronic scanning system came from the 2004 ACT election. As noted on Elections ACT's website, the October 2004 ACT Legislative Assembly election saw the continued use of electronic voting and vote counting in the ACT, with a 70 percent increase in the number of electronic votes recorded. However, 176,340 ballot papers required data entry. The recruitment of skilled data operators capable of completing this task in a timely manner was a difficult and costly undertaking".[138]

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137 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

138 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

The VEC faces similar issues recruiting staff for Legislative Council counts at Victorian state elections.

Following the 2004 ACT election Phil Green, ACT Electoral Commissioner, identified that the human data entry process could result in errors that reduced the overall accuracy of the election count. Elections ACT "subsequently recommended scanning technologies for the 2008 ACT election. Following a consultation process, Elections ACT engaged Secure Vote Pty Ltd to develop the scanning solution; a review in 2008 found the software free of errors", and it was used at the 2012 and 2016 ACT elections (albeit with some software upgrades).[139]

Elections ACT's website describes technical aspects of the system in detail.

Electronic certified lists

Elections ACT introduced electronic rolls at the 2008 ACT election, to both search and mark off electors' names from the certified list of voters. These electronic rolls took the form of hand held personal digital assistants, or PDAs. In 2012, Elections ACT built upon the success of this system by broadening its scope;

> "...with the aim of creating an electronic polling place system to replace as much of the polling place's managerial paperwork as possible, as well as maintaining and improving upon the electronic roll functionality. eLAPPS, the Electronic Legislative Assembly Polling Place System, was the result. eLAPPS was based on netbook computers, on loan from the Tasmanian Electoral Commission. Each polling place received one netbook computer designated as the Officer In Charge's (OIC's) machine (connected to the main database via 3G) and then one netbook computer for each issuing point in that polling place, to serve as an electronic certified list (connected to the OIC's machine via Wi-Fi).
>
> In total over 600 netbooks were in use on Election Day. Each netbook computer contained an encrypted local copy of the electoral roll, which served as a safeguard against 3G network failure. Each polling place was equipped with a small 3G travel router (used for connecting issuing point computers to the OIC computer and connecting the OIC computer to the internet) and a USB dongle to house the 3G SIM card. Centrally the main database was housed in a Server environment with redundancy and security maintained and supported by eLAPPS' vendor".[140]

3.4.3 New South Wales – iVote

As noted earlier, the *Parliamentary Electorates and Elections Further Amendments Bill 2010* (NSW) passed Parliament in November 2010 and provided for iVote, NSW's remote voting system. The Bill gave the NSW Electoral Commission considerable functions and responsibilities in relation to the voting system, as well as authority to determine the classes of electors to use the system.

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139 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

140 Elections ACT, "Electronic voting and counting", Elections ACT, 2016. Accessed 12 February 2017 at www.elections.act.gov.au/elections_and_voting/electronic_voting_and_counting.

Most of the following section is based on information given to the committee by the NSW Electoral Commission, and information publicly available on the NSW Electoral Commission's website.

What is iVote?

iVote offers two types of remote voting; voting over the internet using a standard internet browser and voting using a telephone service involving a standard handset and dial tone technology.

The NSW Electoral Commission has authority to determine and approve all aspects of iVote's operation. This includes the registration system, secrecy of ballot, security of systems and scrutiny of ballot papers printed from the virtual ballot box. The Act also provides for the NSW Electoral Commission to determine the classes of elector to vote; as noted earlier, the committee notes that this is related to the initial access criteria for iVote including overseas and interstate electors, but this provision did not receive regulatory approval until 2012, after iVote's first application at the 2011 NSW state election.

Eligible electors were able to register to use iVote and vote anytime within the early voting period for the 2011 and 2015 NSW state elections.

Who can use iVote?

The *Parliamentary Electorates and Elections Act 1912* (NSW) provides criteria for iVote. Electors may use iVote if they;

- Are blind or have low vision;
- Have a physical impairment;
- Have insufficient literacy skills;
- Have a disability, within the meaning of *the Disability Discrimination Act 1992* (NSW);
- Are rural electors, or those who live more than 20km from a polling place; and
- Are outside NSW on Election Day.

Statistics

iVote was first used at the 2011 NSW state election and usage increased dramatically at the 2015 NSW state election. At the 2011 NSW state election 48,000 electors cast their vote using iVote, a substantial increase on the 10,000 electors the NSW Electoral Commission predicted would use the system in 2010/2011. In 2015, 283,669 votes were cast using iVote, an increase of 505 percent from the previous election.[141]

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141 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.13.

The committee notes that the majority of iVotes were cast by electors outside NSW. At the 2011 NSW state election 40,074 electors, or approximately 95 percent of iVotes, were cast on the grounds that the elector declared that they were outside NSW on Election Day. As noted in the NSW Electoral Commission's report on the 2015 NSW state election, "both early voting and iVote are based on self-affirmed eligibility as is postal voting. The Commission does not check compliance but relies on a declaration (oral or written) made by the elector".[142] As a result of this, the committee notes that it is likely that some electors who declared that they were outside NSW on Election Day may not have been, and therefore used iVote for reasons of convenience.

According to the Allen Consulting Group, the vast majority (95 percent) of voters who used iVote to vote in the 2011 state election voted online, with only five per cent of voters voting via the telephone:

> "A higher percentage (33 percent) of blind or vision impaired voters voted via telephone compared to online. While to a lesser extent, this method was also used by a relatively greater percentage of voters with a disability (12 percent). The majority of voters who registered because they live in remote locations or because they were going to be outside NSW on Election Day voted online. This "suggests that telephone voting was particularly important for the blind and vision impaired, and to a lesser extent to people with disabilities".[143]

How to use iVote

Voting

- The elector applies to use iVote as they apply for a postal vote. The system provides a digit PIN.
- A letter of affirmation is sent to the elector's enrolled address.

Electors receive an 8-digit iVote number, which is either mailed, sent by email or SMS or by telephone call. This enables them to access the iVote system and vote, via their PIN.

- The elector can vote over the Internet. Electors who are blind or vision impaired can use the phone to cast their iVote through the iVote call centre.
- After signing-in the elector is presented with the relevant ballot papers.
- The elector has the ability to review the completed ballot before submitting it.
- Once the vote is complete, the elector receives a receipt number that can be used later to confirm that the vote went into the count.[144]

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142 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011.

143 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.9.

144 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.9.

Registration

Besides meeting the legislative criteria for iVote, all electors registering for iVote must also be on the NSW electoral roll.

Electors can apply to register by phone or call the iVote Call Centre to register.

During the inquiry Mark Radcliffe, IT Manager, NSW Electoral Commission, told the committee that 90 percent of electors self-service registered for iVote within 5.3 minutes.[145] Thirty-five percent of voters voted within 10 minutes of registration, and 75 percent with 24 hours of registration. The average length of time taken to cast an iVote was four minutes.[146]

The committee notes that iVote has a high voting rate relative to registration, and compared to postal voting. As shown in Figures 3.2 and 3.3, 91 percent of those who registered to iVote used the system in 2011; this increased to 94.7 percent at the 2015 NSW state election. Put another way, 1.8 percent of those who registered to iVote in 2015 did note vote. In contrast, those who registered to postal vote at the 2015 NSW state election but did not vote comprised 11.40 percent of electors. The committee explores iVote registration further in Chapter Five.

Evaluation

At the 2015 NSW state election the NSW Electoral Commission conducted evaluation activities focused on iVote. Ninety-eight percent of respondents who used iVote said they would use the system again and recommend iVote to others. In comparison, 93 percent of electors said they would recommend early voting, and 95 percent postal voting.[147] Similar rates of satisfaction were recorded after the 2011 NSW state election – in 2012 Allen Consulting Group completed an independent evaluation of iVote and found high levels of elector satisfaction with the system.[148]

Security and verification

In 2015 the NSW JSCEM recommended that electors could verify that their vote was cast as intended by telephone.

As noted by the NSW Electoral Commission, some of the main security features of the system include:

- The system automatically excludes votes where a pre-poll or postal vote has already been accepted;

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145 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.16.

146 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.16.

147 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.14.

148 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011.

- The system can only be unlocked by a quorum of members of the Election Board;
- Independent auditors re-encrypt votes and compare to votes from independent Verification Service;
- Scrutineers and others may observe all aspects of the process, including ballot printing and reconciliation to expected votes from decryption and log file data;
- Counting of ballots done using standard counting and scrutiny; and
- Voters can use their receipt number to check their vote entered the count, beginning on Monday after Election Day.[149]

During a presentation delivered in the Victorian Parliamentary library in 2016, Mark Radcliffe also described iVote's technical system scrutiny. This includes:

- System scrutinised by independent software auditors for security and integrity of key software and encryption processes; and
- System tested by independent IT testing company, and the system audited by Price Waterhouse Coopers.[150]

Cost of vote

During the inquiry the committee learnt that the average cost of the iVote system per vote cast in the 2011 NSW state election was approximately $74. As noted by the NSW Electoral Commission during the committee's briefing in Sydney in November 2016, the actual average cost per vote for that election was significantly lower than estimates calculated prior to the event. The "reduction in cost per vote is due to the higher than anticipated number of users, rather than a reduction in actual costs".[151]

Using a similar estimation method, the NSW Electoral Commission advised that the cost per vote for iVote falls dramatically with an increase in users. Accordingly, it was estimated that with more than 200,000 users, as per the 2015 NSW state election, the cost per vote would be closer to $20 per vote.[152] As noted in the Allen Consulting Group's evaluation report, iVote has the potential to become cheaper with more users.[153] Chapter Five further discusses the costs associated with iVote.

Security and administrative issues

The committee notes that there have been several security and administrative issues with iVote.

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149 NSW Electoral Commission, *Submission No. 24*, p.p.8-10.

150 Mark Radcliffe, IT Manager, NSW Electoral Commission, "Presentation to Victorian Parliamentary Library", May 2016, p.10.

151 NSW Electoral Commission, *Submission No. 24*, p.p.8-10.

152 NSW Electoral Commission, *Submission No. 24*, p.p.8-10.

153 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011.

In mid-March 2015, during the 2015 NSW state election early voting period, two researchers discovered that the iVote system was vulnerable to a man-in-the-middle (MITM) hack. The researchers found that if a voter used the iVote system from a malicious network, such as a compromised computer, a MITM attacker "can manipulate the data returned by piwikpro.com to inject malicious JavaScript code".[154] This code can "arbitrarily change the function of the iVote web application without triggering any browser security warnings".

The committee notes that the NSW Electoral Commission has advised that no iVotes were compromised during 2015 NSW state election. The committee also notes continuing debate in the technical academic literature about iVote's security features based on this vulnerability.

Further, during the 2015 NSW state election an Outdoor Recreation Party candidate for the Legislative Council was left off the original iVote Legislative Council ballot paper. The error was brought to the NSW Electoral Commission's attention by the party; the Commission subsequently suspended iVote for a day while the error was amended. Approximately 19,000 votes were cast without the Outdoor Recreation Party on the ballot paper; affected users were permitted to log back in to the iVote to cancel their ballot and cast a new ballot.[155] This is discussed further in Chapter Five.

At the 2011 NSW state election, an independent audit of iVote also found that 43 iVote ballots involved the letter 'N' being shown on ballot papers rather than numeric preferences. The Electoral Commissioner was required to make a determination on each of the 43 votes cast resulting in one of the four affected Legislative Assembly ballot papers and eight of the 36 affected Legislative Council ballot papers being treated as informal. The NSW Electoral Commission subsequently corrected this error in iVote's software.[156] This is also discussed further in Chapter Five.

Expanding iVote

In the NSW Electoral Commission's report on the 2015 NSW state election, the Commission noted its concern about the long-term reliability of postal voting due to changes in Australia Post's service model for regular mail. The Commission also noted that while postal voting increased at NSW state elections until 2011, it decreased between the 2011 and 2015 NSW state elections. The Commission noted that the most likely reason for this large decrease can be attributed to the increase in the usage of iVote. Accordingly, the Commission recommended to the NSW JSCEM that the criteria for iVote be extended to registered postal voters.[157]

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154 Halderman, A., Teague, V. (2015). "Security Disclosure: New South Wales iVote System is Vulnerable to MiTM Vote Stealing Attacks", p.2. Retrieved 1 March 2017 from www.elections.nsw.gov.au/__data/assets/pdf_file/0019/205066/Security_Disclosure.pdf.

155 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.12.

156 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016.

157 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016.

Further comment about iVote and remote voting is contained in Chapter Five. The committee specifically addresses the views of inquiry participants about iVote, proposals to introduce an iVote-style system for Victorian state elections, as well as other evidence and proposals related to remote voting and iVote.

3.4.4 Queensland

Under s121 of the *Electoral Act 1992* (Qld) the Electoral Commission of Queensland provides electronically assisted telephone voting to electors. The system is available to electors who cannot vote without assistance as a result of:

- An impairment;
- Insufficient literacy skills;
- Cannot vote at a polling place due to an impairment;
- Are special postal voters;
- Are distance voters.

Distance voters in Queensland are electors, other than special postal electors, whose address on the electoral roll is at least 20kms away from a polling place.

Registration is available throughout the early voting period for Queensland state elections and closes at noon on Election Day. Registrations are carried out through a dedicated telephone service using an online application that is linked to the Queensland certified roll. The system is a double-blind system involving two operators; one for giving the elector instructions on how to vote, the other to listen to ensure that preferences are recorded accurately.

Electronic roll mark off

The Electoral Commission of Queensland piloted electronic roll mark off at the 2015 Queensland state election. Following this, the Commission procured 6,000 laptops to facilitate electronic mark-off across Queensland for the March 2016 referendum on fixed four-year parliamentary terms, which was held in conjunction with the 2016 Queensland local government elections.[158]

Electronic counting / ballot paper scanning

Ballot paper scanning was also used at the 2016 Queensland local government elections. The system scanned ballot papers using intelligent character recognition. The Councils participating in the pilot were Toowoomba Regional Council, Mackay Regional Council, Gladstone Regional Council, Noosa Shire Council and Livingstone Shire Council. According to the Commission, the pilot was successful with the innovation reducing the number of counting staff.

158 Electoral Commission of Queensland, "Evaluation Report and Statistical Returns; 2015 Queensland state election", Electoral Commission of Queensland, Brisbane, October 2015, p.3. Retrieved 1 March 2017 from www.ecq.qld.gov.au/about-us/our-organisation.

3.4.5 South Australia

South Australia does not currently provide an electronic voting option for South Australian state elections. However, the Electoral Commission of South Australia has indicated it would explore electronic voting options, including a trial, in time for the 2018 South Australian state election.

3.4.6 Western Australia

In March 2017 Western Australia became the second Australian jurisdiction to implement iVote for a state election. In 2016 the Parliament of Western Australia amended the *Electoral Act 1907* (WA) to "specifically allow for technology assisted voting for people who are blind or sight impaired, have literacy difficulties or are impacted by some form of incapacity that makes voting difficult or impossible to do in secret".[159] For the first time at a Western Australian state election, eligible electors have been able to vote independently over the internet. A total of 2,288 electors used iVote at the 2017 Western Australian state election.

Chapter Five provides further information about Western Australia's iVote trial, including the views of the Western Australian Electoral Commission about iVote and electoral participation.

3.4.7 Tasmania

As part of the inquiry, the committee received a submission from the Tasmanian Electoral Commission about its electoral voting initiatives. The committee also met with the Tasmanian Electoral Commission to discuss electronic voting on 17 February 2017.

During the committee's meeting with the Tasmanian Electoral Commission in February 2017 the Tasmanian Electoral Commission showed the committee an example of the voting machines used in Palm Beach County, Florida at the 2000 US presidential election. Figure 3.2 is a picture of the voting machine.

According to the *Tasmanian Electoral Act 2004* (Tas) the Tasmanian Electoral Commission can "approve any procedures that are reasonable and appropriate to assist an elector who is otherwise unable to vote. Additionally, the Commission may approve procedures to enable electors who are not in Tasmania on Election Day to vote".[160]

Tasmania provides vision impaired electors the opportunity to vote electronically using VI-Vote. The system operates in a similar way to Victoria's vVote system.

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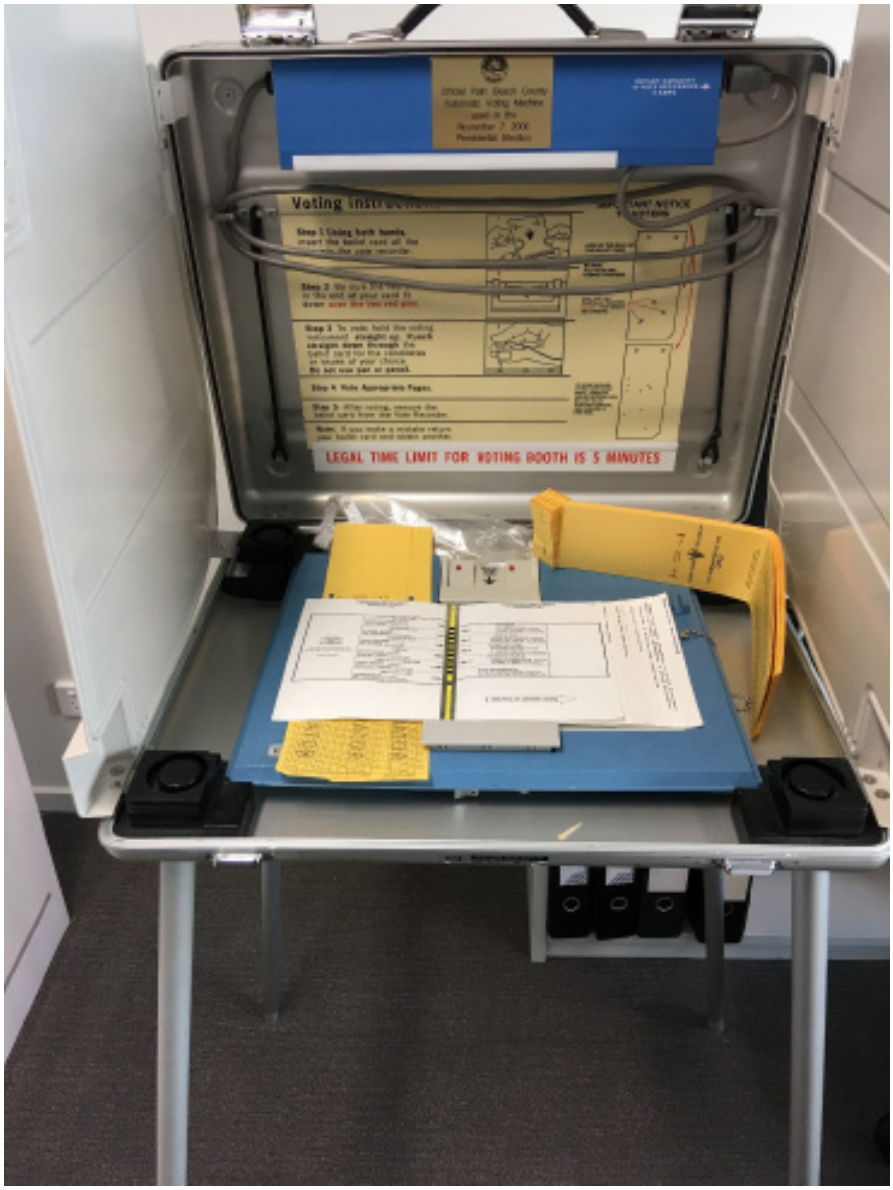
159 Western Australian Electoral Commission, "iVote", Western Australian Electoral Commission, Perth, 2017. Accessed 1 March 2017 from www.elections.wa.gov.au/ivote.

160 Tasmanian Electoral Commission, "Voting Systems in Tasmania: A Summary", Tasmanian Electoral Commission, Hobart, 2016. Retrieved 1 March 2017 from www.tec.tas.gov.au/Info/VotingSystems.html.

Figure 3.2 Votomatic voting machine, Palm Beach County, 2000 US presidential election



As noted earlier, the Tasmanian Electoral Commission also runs an Express Voting service. This service provides registered electors who are overseas with a ballot paper and a declaration form which they receive by fax or email. The ballot and declaration is returned by email. Importantly, while Express Voting is faster than postal voting, the Commission does not guarantee the security of Express Voting.

Chapter Five provides further commentary on electronic return of ballots.

3.4.8 Northern Territory

The Northern Territory introduced the ACT's eLAPPS electronic mark off system for the 2016 NT election. The NT Electoral Commission is currently preparing its report to Parliament on the election, and eLAPPs' operation.

4 Electronic voting in international jurisdictions

While several Australian jurisdictions have some form of electronic voting system, as seen in Chapter Three, Australia is not the only country to have adopted electronic voting for periodic elections. According to the International Institute for Democracy and Electoral Assistance (IDEA), 15 countries have a form of polling place, 'closed', electronic voting system, and 20 countries have attempted some form of remote voting, or 'open' system, trial (IDEA 2016, p.2). Prior to the implementation of NSW's iVote system at the 2015 NSW state election, Estonia was the world's largest remote voting, or 'open', electronic voting system, with nearly 30 percent of votes cast this way at the 2015 Estonian parliamentary elections.

This chapter considers evidence the committee gathered as part of its 2016 study tour. The chapter examines evidence from Estonia, focusing on remote voting, Denmark, the United Kingdom and some jurisdictions in the United States of America and New Zealand.

4.1 Estonia

4.1.1 Organisations with whom the committee met

The committee met with the Estonian National Electoral Committee, and the Estonian National Electronic Voting Committee. The committee also considered the Estonian Committee's recent report on "e-Voting in Estonia", which comprehensively analyses Estonia's remote voting system.

4.1.2 Estonia's electoral system

The Riigikogu, the Parliament of the Republic of Estonia, is composed of 101 members directly elected by universal adult suffrage for a four-year term of office. Elections to the Riigikogu are carried out by a three-stage proportional representation system. Political parties present lists of candidates in twelve multi-member districts, where independent candidates may also run for office. In addition, parties submit a national list of candidates, with candidates in both the parties' national lists and their corresponding district lists. District lists are open, and electors vote for a particular candidate in a district list rather than for a party. Since 2007, electors may cast electronic votes or e-votes in Riigikogu elections, using internet-connected personal computers or a mobile phone equipped with an ID card reader.

There are a number of different elections held in Estonia:

- Parliamentary elections, which are held every 4 years;
- Local government elections, which are held every 4 years;
- European Parliament elections, which are held every 5 years. Estonia elects 6 Members of the European Parliament;
- Referenda. If a referendum fails, Parliament has to dissolve itself;
- Consulting referendums; and
- Presidential elections every 5 years.

The electoral system is governed by a number of pieces of legislation:

- Riigikogu Election Act;
- Local Government Election Act;
- European Parliament Election Act;
- Referendum Act;
- President of the Republic Election Act; and
- Electoral Administration Act.

In contrast to Australia, Estonian elections are organised by a number of different electoral committees, including:

- The National Electoral Committee;
- The Internet Voting Committee;
- County Electoral Committee;
- City/Municipality Electoral Committees
- Polling Station Electoral Committees

The committee learnt that Estonia is currently reforming its electoral administration. From September 2017, the role of the National Electoral Committee will be to set the broad policy and management framework for elections, and to deal with complaints. There will be seven members of the Committee, appointed for a four-year term, one of whom will be an IT auditor. A State Electoral Office will also be established to professionalise Estonia's electoral administration and electoral processes. The Office will have responsibility for:

- Conducting and development of electronic voting;
- Election management at the national level;
- Procurement of election material, IT development;
- Supervision of lower level electoral administrators; and
- Training of election administrators.

4.1.3 History of electronic voting in Estonia

In 2005 Estonia became the first country to have nation-wide local elections where people could cast binding votes over the internet. This was followed by successful implementation of e-voting at local, national and European elections. Since 2007, all Estonian electors may cast electronic votes or e-votes in elections for the Riigikogu using internet-connected personal computers or mobile phones equipped with an ID card reader.

The committee notes that the first Estonian elections to use remote voting were affected by what is commonly regarded as one of the world's largest ever examples of electronic state warfare which affected most aspects of the country's critical information technology infrastructure. In April 2007 a series of cyberattacks crashed the websites of many Estonian organisations, including the Estonian Parliament, banks, newspapers, news broadcasters and other critical infrastructure. The hacking occurred at the same time of Estonia's disagreement with Russia about the relocation of the Bronze Soldier of Tallinn, a war grave marker.[161]

As of 2016, Estonia has held eight elections over ten years, where people could cast legally binding votes over the internet.

Digital eco-system in Estonia

The committee learnt that communication and information technologies are heavily integrated in Estonia, creating the right conditions for take up of remote voting. This is called the Estonian digital eco-system. In a report on e-Voting in Estonia, the ecosystem is defined as "an intertwined ecosystem of institutional, legal and technological frameworks that jointly facilitate independent and decentralized application development by public and private institutions to offer public services digitally".[162]

In the report's foreword, Toomas Hendrik Ilves, President of the Republic of Estonia, noted that Estonian society was heavily interconnected and computerised. He wrote that:

> "30 percent of participating voters cast their ballot online, nearly 100 percent of prescriptions and tax returns are done online, as are almost all banking transactions. Estonians have given more than 270 million digital signatures. Common e-services such a universal electronic ID for both public and private sectors are widely used and the whole of ICT infrastructure in a country should be regarded as an "ecosystem" in which everything is interconnected".[163]

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161 BBC World Service, "Estonia fines man for 'cyber-war', BBC World Service, 25 January 2008. Retrieved 1 March 2017 from news.bbc.co.uk/2/hi/technology/7208511.stm.

162 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.xiii.

163 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.xiii.

Further, the committee notes that the number of online public services that government offices offer to their "customers" are widely accepted and used by Estonian citizens and residents. Digital identification, "the foundation stone of modern digital democracy, is compulsory for all citizens". In 2014 digital IDs were used more than 80 million times for authentication and 35 million times for digital transactions, significant numbers in a country with a population of only 1.3 million. According to the Estonian National Electoral Committee, ninety-five percent of all personal income tax declarations are filed online in less than ten-minutes".[164]

The Estonian National Electoral Committee informed the committee that there are a number of characteristics of Estonian society that made it a good candidate for electronic voting, related to software development. Estonia prides itself on being a leader in digital technology applications. Four out of the five founders of Skype were Estonian. Estonia also allows non-citizens to be e-residents. This is attractive as there is no income tax for profits generated and then reinvested in Estonia.[165]

The committee learnt that increasing electoral participation was not a motivation for electronic voting. Culturally, encouraging turnout in Estonia is considered inappropriate given Estonia's independence from the Soviet Union, and a belief people should be free to do what they choose and not influenced to vote by the government.

Incidence of electronic voting

Electronic voting has grown incrementally since its introduction in Estonia in 2005.

As shown in Figure 4.1, the 2005 Estonian local government elections had low internet voting turnout, with less than 2 percent of votes cast online. Remote voting increased on average 4.3 percentage points at each election between 2005 and 2015. The highest remote voting turnout was at the 2014 European Parliament elections; 31.4 percent of votes were cast online, and 30.4 at the 2015 Riigikogu elections.

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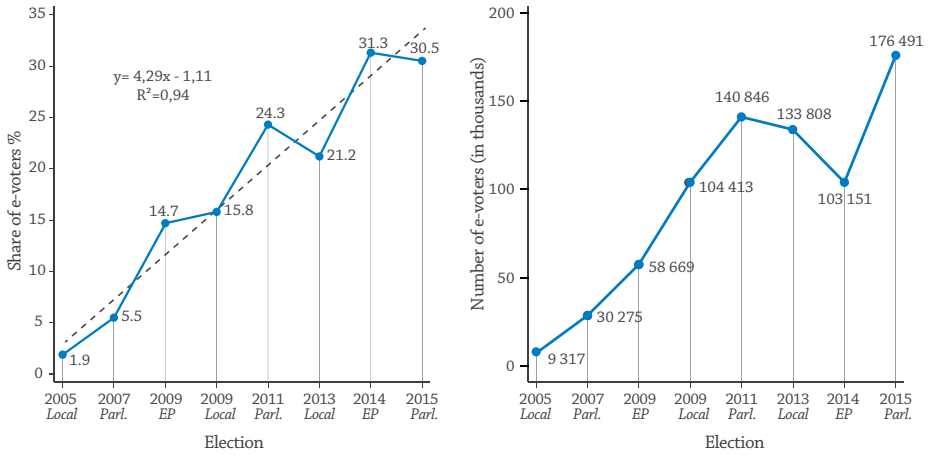
164 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.p.3-10.

165 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016.

Figure 4.1 Remote voting turnout at Estonia elections, turnout as share of voters, 2005-2015



Source: Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.4.

Estonia's electronic ID card

Estonia's success making their public services available online is first and foremost based on the widespread use of electronic identification cards. The Estonian National Electoral Committee explained:

> "Since 2002 about 1.2 million of these credit-card sized personal identification documents have been issued, allowing citizens to digitally identify themselves and sign documents or perform actions. ID-cards are compulsory for all citizens and they are equally valid for digital and physical identification. Due to their convenient size (unlike a passport they fit into a regular wallet) they are often used as the only identification document that people carry around. Physically, they are valid for identification in Estonia, but more importantly, they are also valid for travel in most European countries. Thus, in addition to their primary functionality – digital identification – ID-cards can be effectively used as replacements for traditional identification documents".[166]

How the system works

To vote, Estonian electors need access to a computer with an internet connection and a "smart-card reader", which are inexpensive and widely available. Citizens may also access e-voting in public libraries, community centres and anywhere with a secure internet connection. As of 2011, citizens can also electronically identify themselves with a so called "Mobile-ID". This is a SIM card with security certificates and two pin codes. With Mobile-ID "setup citizens can officially identify themselves using only their mobile phone. The ID card is however still the most widespread method of digital identification".[167]

166 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.5.

167 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.p.6-8.

Remote voting is available during the advance voting period, or early voting period, via a website hosted by the Estonian National Electoral Committee (from to 2005 to 2011). Advance voting is available for seven days for in person advance voting, and 10 days for remote voting.

To vote online;

> "...people are required to insert their digital ID card into a smart reader connected to an internet equipped computer. They then need to download a voting app which is a standalone program for Estonian remote voting. Using their ID-card and a four-digit pin, the user has to first verify their identity, after which the system checks whether the voter is eligible according to age and citizenship to vote in the election. If affirmed, the e-voting system displays the list of candidates in the voter's district. Voters can then browse the list of candidates and decide for whom to vote for. In order to cast a remote vote, the voter has to choose a candidate and provide a separate five-digit pin to vote. When certified correctly, the electronic vote is cast and sent to the server where it will be counted at an appropriate time, i.e. as prescribed by the procedures for online voting".[168]

A voter can vote again as many times as they like until the close of voting; the system will record their last vote. This provision is designed to prevent coercion.

Verification

In 2013 Estonia introduced the feature of individual vote verification to the e-voting system. This gave individual voters the ability to verify whether their e-vote was: cast-as-intended and recorded-as-cast. This option has now been available in three consecutive elections, the 2013 local government elections, 2014 European Parliamentary and 2015 national elections. As noted in Chapter Two, vote verifiability is a crucial element in ensuring a so called end-to-end (E2E) verifiable voting system. E2E verifiable systems add another layer of security and should ensure the integrity of the voting process. The definition of an E2E verifiable voting system is quite strict. The Estonian National Electoral Committee notes "it does not yet meet that of a fully implemented E2E system; it does however give individual voters the possibility to check if their vote was cast and counted as intended".[169]

Verification is based on a QR code. A voter can download a separate program "from Google Play and check that the system has correctly recorded how they voted by scanning the QR code. This can only be done for approximately 30 minutes after voting. If the vote has been recorded incorrectly, the voter can phone hotline to notify the election officials that their vote has been recorded incorrectly. If required, electoral officials will then inspect the computer used to cast the vote".[170]

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168 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.p.6-8.

169 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.127.

170 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.129.

Verification rates have been low in Estonia and are similar to NSW's iVote verification rates. At the 2015 Estonian elections 4.7 percent of voters verified the vote. The Estonian National Electoral Committee was sufficiently satisfied that there was no large scale manipulation of votes. The committee also notes that the number of verifications in 2015 was roughly the same as the total number of remote votes at the 2005 Estonian local government election.

User perceptions

The Estonian National Electoral Committee's report does not feature commentary about user perceptions of Estonia's remote voting system, other than to say that there is widespread support for remote voting amongst many age groups. Beyond this, comprehensive survey data does not exist to provide detailed insights.[171]

Impact of remote voting on voter turnout

The committee notes that there is a vast literature addressing the turnout effects of Estonia's remote voting system.

In general, remote voting turnout has followed a linear trend, rather than an exponential one. This means that the conversion from paper-ballot voters to e-voters was almost constant over time, i.e. there were no rapid growth periods at certain thresholds.[172]

Quantitative research by the Estonian National Electoral Committee also found particular demographic patterns for remote voting in Estonia. During the first three elections with electronic voting in 2005, 2007 and 2009, remote voting was predominantly used by "younger tech savvy people...and a substantial non-random segment not using it".[173] The data showed "that in the first three e-enabled elections, e-voters were indeed clearly distinct, they were younger, with better computer skills and mostly ethnic Estonians".[174] However, from the third election onwards compositional differences "started to disappear, meaning that e-voters became progressively less distinct from regular paper voters". In 2016 the Estonian National Electoral Committee concluded that: "by now we effectively cannot differentiate between e-voters and paper voters based on a list of socio-economic characteristics and can safely say that remote voting has become a tool of the masses, with all quite heterogeneous social groups engaging in this type of voting".[175]

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171 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016.

172 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.4.

173 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.p.126-129.

174 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.127.

175 Estonian National Electoral Committee, "E-voting in Estonia: Technological Diffusion and Other Developments Over Ten Years (2005 – 2015), Estonian National Electoral Committee, Tallinn, 2016, p.127.

Why has electronic voting been so successful in Estonia?

During its meetings in Estonia the committee learnt that four characteristics in Estonia have contributed to the success of electronic voting. These are:

- Widepsread internet penetration; 80 percent of the Estonian population has access to the internet and associated access to a smart card reader;
- That the legal framework for remote voting developed incrementally, giving Estonia's electoral authorities ample opportunity to 'stage' the system's development, consult with relevant stakeholders and inform the public at relevant stages about the system and what remote voting would involve;
- Estonia's unique digital identification system, and the broader Estonian digital ecosystem; and
- Strong political support for remote voting from the earliest stages of its adoption.

4.2 Denmark

4.2.1 Organisations with whom the committee met

The committee met with representatives from the Municipality of Copenhagen, including the head of the Copenhagen's Electoral Division, the Ministry of Economic Affairs and the Interior – Electoral Division, Ministry of Social Affairs and academics from the Centre for Voting and Political Parties, University of Copenhagen.

4.2.2 Denmark's electoral system

Denmark has had a unicameral parliament since 1953. (Prior to that the Folketing was the lower house of a bicameral parliament. This was amended following a constitutional referendum.) The parliament has "179 members: 175 are elected in Denmark, two in the Faroe Islands and two in Greenland. The country is divided into 10 multi-member constituencies (which in turn are divided into districts). Each constituency is assigned a set number of seats. A total of 135 seats are distributed in proportion to the votes in each constituency".[176]

The other 40 seats are supplementary, and allotted to balance any difference between district-level results and the nationwide vote share. This is meant to ensure that the number of seats each party secures matches as closely as possible each party's vote share, in accordance with Denmark's constitution which requires not only regional representation but "equal representation of the various opinions of the electorate".[177]

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176 Folketinget, "English publications on the Danish Parliament". Retrieved 1 March 2017 from webarkiv.ft.dk/Samling/19991/MENU/00278572.htm.

177 Folketinget, "English publications on the Danish Parliament". Retrieved 1 March 2017 from webarkiv.ft.dk/Samling/19991/MENU/00278572.htm.

4.2.3 Discussion about electronic voting in Denmark

The committee learnt that while the Danish Parliament has discussed electronic voting, Denmark has not adopted electronic voting.

Electronic voting was initially proposed in Denmark in 1996 by the Progress Party, which was at the time a minor party. The proposal was for kiosk voting at polling places and telephone and computer voting from home. While there was not widespread political support for the initiative, the then Danish Interior Minister, Berthe Weiss, supported some local government experiments with electronic voting.

The committee learnt that the introduction of electronic voting systems is not considered a realistic option for the time being. The mayors of eight of the largest urban municipalities in Denmark addressed the former Minister for Social Welfare in 2008 requesting the Minister to take steps to contribute to the creation of the necessary statutory authority that would enable the municipalities to carry out a pilot project on electronic voting at polling stations, i.e. non-remote voting. However, the then Danish government decided to turn down the municipalities on the grounds of being opposed to a replacement of the current public control with the counting and final counting of votes with a more sophisticated control of the electronic counting of votes that only specialists knowledgeable of IT-systems could reasonably undertake. Security was also cited as a concern.

The then Danish government also stated that it wished to await further experiences with remote voting in other countries before it wished to embark on pilot projects.

More recently, remote voting was most discussed during the legislation process following the introduction of electronic electoral registers for Danish elections. During Bill debate in the Folketing, remote voting was found to contravene one of the principles of Danish election legislation – that a "voter's casting of his or her vote shall be monitored by election authorities in the sense that an election official shall be present to ensure not only the identity of the voter before he or she is allowed to vote, but also that the vote is cast without giving others the opportunity to see how the voter has voted".[178] The secret vote in Denmark is more than just a right; maintaining it is also a duty imposed on electoral authorities. The only circumstances where this right is circumvented is when electors need assistance to vote "due to disability, poor health, or for similar reasons".[179]

178 Folketinget, "English publications on the Danish Parliament". Retrieved 1 March 2017 from webarkiv.ft.dk/Samling/19991/MENU/00278572.htm.

179 Folketinget, "English publications on the Danish Parliament". Retrieved 1 March 2017 from webarkiv.ft.dk/Samling/19991/MENU/00278572.htm.

4.3 United Kingdom

4.3.1 Organisations with whom the committee met

During its time in the United Kingdom the Committee met with representatives from the UK Electoral Commission to discuss the British experience with electronic voting, and the Hansard Society. The Hansard Society was founded in 1944 to promote democracy and an engaged citizenry both in the UK and worldwide.

The UK Electoral Commission was established in 2000. It is an independent body which oversees elections and regulates political finance in the UK. The Commission is overseen by ten Commissioners — six Commissioners must be non-partisan, and four Commissioners have party political experience. The Commission has 125 full time staff and is accountable directly to the Parliament, not the Government, by reporting to a Committee of House of Commons chaired by the Speaker.

The Commission has a role in elections which is largely advisory, assisting returning officers to ensure the elections are well run and reporting on their performance. The Commission is also a regulatory body for party registration and party finances. Prior to the establishment of the Electoral Commission, parties were registered as companies.

4.3.2 The UK's electoral system

There are six types of elections in the United Kingdom: United Kingdom general elections, elections to devolved parliaments and assemblies, elections to the European Parliament, local elections, mayoral elections and Police and Crime Commissioner elections. Elections are held on Election Day, usually a Thursday. Since the passing of the Fixed-term Parliaments Act 2011 for general elections, all six types of elections are held after fixed periods, though early elections to parliament and the devolved assemblies and parliaments can occur in certain situations. The UK has six different electoral systems: the single member plurality system or first past the post, the multi member plurality system, party-list proportional representation, the single transferable vote, the additional member system and the supplementary vote.

Elections are administered locally; in each lower-tier local authority, the actual polling procedure is run by the Returning Officer and the compiling and maintenance of the electoral roll by the Electoral Registration Officer (except in Northern Ireland, where the Electoral Office for Northern Ireland assumes both responsibilities). Unlike Australia, where electoral commissions have a statutory responsibility to run elections, the Electoral Commission does not run elections. The Electoral Commission only sets standards for and issues guidelines to Returning Officers and Electoral Registration Officers, but is responsible for nationwide electoral administration, such as the registration of political parties and directing the administration of national referendums.

Voting is not compulsory in the UK.

The 2001 UK Parliament election had a record lowest turnout of 59.3 per cent. Since that election the Electoral Commission has played a public awareness role to encourage turnout, particularly with younger voters.

4.3.3 Advance voting and postal voting

In the UK, advance voting is limited to postal voting. There is no attendance advance voting.

Postal voting has been available on demand since 2001 (other than in Northern Ireland). A voter must supply their signature and date of birth when they apply, which are then used for verification. Approximately 17 to 18 per cent of electors chose to vote by post, and the turnout for postal voters is much higher — approximately 86 per cent of ballots are returned.

Postal votes must be received by 10.00 pm on polling day. Late postal votes are not accepted, as finality is prioritised over counting every vote. There have been no reported problems with mail delays within Great Britain itself, but delays can be an issue for overseas voters due to the 25-day time period for an election.

4.3.4 Electronic voting pilots

Soon after its establishment, the UK Electoral Commission played a key role in evaluating e-voting and e-counting pilots.

The UK Government established a framework under which local government areas could apply to trial new methods of voting or vote counting in local elections. Funding was provided by the UK Government and each local government area could choose an option to try from the list of approved methods. Some of these included internet voting and phone voting.

The Electoral Commission assessed the pilots against certain criteria:

- Did it make voting or counting easier?
- Did it improve turnout?
- Did it help facilitate voting?
- What was the impact on electoral fraud?
- What was the impact on cost?

Overall, the Commission found the pilots were not well managed and there was insufficient lead in time for planning and implementation. Some systems were still being tested just weeks before the election. The Commission also found many of the quality and testing arrangements were inadequate, and in one case the electronic voting system failed on election day and people had to use a paper ballot instead.

Some other key findings included:

- Many voters reported electronic voting was more convenient, although some issues were experienced with preregistration;
- The take up of electronic voting was linked to whether it was available on polling day. The lowest uptake was in Sheffield because it was only available for advance voting but not on election day itself (approximately 3 per cent) much higher elsewhere (16 or 17 per cent) when it was available on polling day;
- There was no discernible impact on turnout; the majority who voted were likely to have voted anyway. However, this was contradicted by local surveys which suggested 25 to 30 per cent of those who voted electronically would not have voted if electronic voting channels were not available;
- There were no security incidents, but the risk was higher than it should have been; and
- There were wide variations in cost, but that was largely because the pilots did not have the benefit of economies of scale. In Shrewsbury, each vote cast electronically cost £625.

There have been no further applications for pilots since 2007. However, electronic counting has been used for the elections for the London Assembly and Mayor of London.

4.3.5 Speaker's Commission on Digital Democracy

The Commission on Digital Democracy was established by the Speaker of the House of Commons to explore how Parliament could make better use of digital technology to enhance and improve its work.

One of its targets is that by 2020, secure online voting should be an option for all voters.

The UK Commission is examining the significant work that would need to be done to implement this including examining the preconditions for internet voting, security, reliability, accessibility and cost issues. To realistically implement internet voting for the 2020 election, legislation would need to be put in place by 2019.

4.3.6 Attitudes towards electronic voting

The Hansard Society recently completed an audit of political engagement. The audit also assessed attitudes to electronic voting.

One of the Society's key activities is an annual audit of political engagement. It is a time-series study providing an annual benchmark to measure political engagement in Great Britain, gauging public opinion about politics and the political system, and more broadly the general health of its democracy.[180]

With voting being optional in the UK, one of the engagement indicators the Society measures is the likelihood to vote. Following a decrease in the number of people stating they were likely to vote to 41 per cent in 2013, this has risen to 59 per cent likely to vote in 2016. This has been impacted by a series of key votes, including the referendum on Scottish independence in 2014, a general election in 2015 and the Brexit referendum in 2016, which have generated considerable public interest.

As part of its 2015 audit, the Society examined the question; "What might encourage us to vote?". It looked at attitudes toward alternative voting methods and whether they were likely to increase participation. Online voting scored the highest with 45 per cent of respondents stating that it would encourage them to vote. This is contrasted with 26 per cent who supported compulsory voting and only 11 per cent who supported an all postal election. The audit also showed that younger voters are more likely to support online voting than older voters (49 per cent of under 55s compared to 37 per cent of over 55s).[181]

4.4 United States of America

4.4.1 Organisations with whom the committee met

The Electoral Assistance Commission (EAC) is an independent agency of the United States government created by the *Help America Vote Act 2002* (HAVA). The Commission serves as a national clearinghouse and resource of information regarding election administration. It is charged with administering payments to states and developing guidance to meet HAVA requirements, adopting voluntary voting system guidelines, and accrediting voting system test laboratories and certifying voting equipment. It is also charged with developing and maintaining a national mail voter registration form.

Following the 2000 US presidential election and its many logistical issues, including the 'hanging chads' controversy in Florida, the US Congress passed a bipartisan measure, the Help America Vote Act of 2002 (HAVA), in order to reform many facets of the voting process and increase voter education and turnout. HAVA led to the replacement of voting machines, voter registration reform, better access to voting for the disabled and a new regime for poll worker training. Congress established timelines for implementation and federal funds were provided to help with the process.

180 Hansard Society, *Audit of political engagement 13 — the 2016 Report*, p. 10.

181 Hansard Society, *Audit of political engagement 12 — the 2015 Report*, p. 17.

Virginia

The committee also met with three different local government authorities in the Commonwealth of Virginia – the Alexandria City Board of Elections, Arlington County Board of Elections and Fairfax County Board of Elections. Alexandria City is a local government area within the Commonwealth of Virginia and has approximately 86,000 registered voters. The Virginia Department of Elections provides overall guidance on elections and certifies electoral equipment, but each local jurisdiction can choose which equipment it uses. Arlington County is another local government area within the Commonwealth of Virginia. It was an early adopter of electronic voting, changing from lever machines to electronic voting in the 1990s. Fairfax County is the largest county in the Commonwealth of Virginia. It has approximately 730,000 registered voters and 650,000 active registered voters. On Election Day, Fairfax County has 243 precincts where votes can be cast.

New York

In New York the committee also met with the New York State Board of Elections, the United Nations Electoral Assistance Division and the Brennan Centre for Justice, New York University. The New York State Board of Elections is a bipartisan agency of the New York state government within the New York State Executive Department responsible for enforcement and administration of election-related laws. The United Nations Electoral Assistance Division, housed within the Department of Political Affairs, exercises key functions to ensure coherence and consistency within a broad array of UN entities working to provide United Nations electoral assistance in the field. The Brennan Centre for Justice, New York University, is a non-partisan public policy and law institute that focuses on the fundamental issues of democracy and justice.

4.4.2 US electoral system

The United States is a federal republic, with elected officials at the federal (national), state and local levels. On a national level, the head of state, the President, is elected indirectly by the people of each state, through an Electoral College. State law governs the running of elections, and local government authorities, or counties, usually oversee the administration of elections and voting systems. Given that there are 3,144 counties in the United States, there are thus thousands of different, potential electoral 'configurations'.

4.4.3 Electronic voting in the United States

Electronic voting is widespread in the United States. At the 2016 US general elections, the Pew Research Centre estimates that nearly half of registered voters (47 percent) "lived in jurisdictions that use only optical-scan as their standard voting system, and 28 percent lived in direct record-only jurisdiction. Another 19 percent of registered voters live in jurisdictions where both optical-scan and DRE systems are in use.

Types of voting systems

There are a number of different types of electronic voting systems that are used or have been used in the United States:

- Direct recording electronic machines. The voter votes on a machine, and the machine records the result; these machines are usually 'closed' voting systems;
- Optical scanners. The voter votes on pieces of paper, which they then feed through a machine that counts the vote;
- Digital scanners. The voter votes on pieces of paper, which they then feed through a machine that counts the vote and stores a scanned copy of the whole ballot; and
- Ballot marking devices. The voter uses an electronic system to cast their vote, which then prints a paper ballot paper. That ballot paper is then submitted into an optical or digital scanner.

For many years following the introduction of HAVA, many states preferred direct recording electronic machines, which were 'closed' systems. However, over time security concerns were raised, particularly the possibility of election results being manipulated, and the need for results to be auditable.

The committee was told that the majority of direct recording electronic machines have now been decertified, and preferred electronic voting systems have a voter verified paper audit trail (VVPAT). This can either be through a printer attached to a direct recording electronic voting machine which generates a paper record of the vote, or optical or digital scanners, where the vote is cast on paper and counted electronically.

There are some EAC certified systems that do not have a paper backup, but they must have a separate record of the vote that can be audited. Some states, such as California, have introduced legislation to require all voting machines to have a VVPAT.

The main advantage of electronic systems is the speed and accuracy with which votes can be counted. Most systems also give the voter a warning if their vote is informal, so the systems can assist to reduce voting informality.

Most elections held in the United States are first past the post, unlike Victoria which uses preferential or proportional voting. The EAC advised that no preferential voting (or as it is called in US, ranked voting) system has been certified against the VVSG. There would be significant challenges developing such a system, as each voting machine is separate and results are generally tabulated manually from the results reported from each polling place. Given this, it is not possible to accumulate votes across different polling places to accurately determine a result through preferential voting. Furthermore, as elections are run at a local level, often machines differ across jurisdictions within the one state. Unless the machines were compatible, this may cause issues for a preferential or proportional result across the whole state.

4.4.4 Meeting with Electoral Assistance Commission

The Committee met with the Executive Director and other representatives of the EAC.

In 2005, the EAC issued new Voluntary Voting System Guidelines (VVSG), which are a set of specifications and requirements against which voting systems can be tested to determine if the systems meet required standards. The guidelines are divided into two volumes:

- Volume 1 — Voting System Performance Guidelines — which set out the requirements for manufacturers of voting machines
- Volume 2 — National Certification Testing Guidelines — which set out the testing requirements for certification.
- An updated version of the guidelines, Version 1.1, was adopted in 2015. All new systems from 7 July 2016 must comply with the revised standards.

The EAC contracts private companies to test and certify that election equipment meets the required standards and guidelines. There are currently three voting system test laboratories that have been accredited by the EAC to test voting systems. The manufacturer is required to pay for the testing. If a system fails a certain aspect during the testing process, the manufacturer is given a set amount of time to fix the deficiency in order to continue the certification process. If the deficiency cannot be rectified, the system is normally withdrawn from testing process. Reports on certification are publicly available on the EAC website.

Compliance with the EAC guidelines is voluntary. Elections are governed by state law, and each state can choose which equipment it uses, and it can choose to use equipment that is not EAC certified. Some states have their own additional requirements, some adopt the Federal standards, and some do not have a certification process. Currently 47 of the 50 states have some sort of certification system.

Advance voting and postal voting

The legislation governing advance voting and postal voting varies greatly between states and between local government areas within states. Examples of this variance include:

- Oregon and Washington State conduct their elections exclusively by mail, having introduced all-mail elections in 2000;
- Colorado conduct its elections principally by mail, but a person can still elect to vote in person; and
- New York State allows postal voting on request, but does not offer advance voting in person.

The Federal Military and Overseas Voter Empowerment Act (MOVE) allows military personnel to receive a ballot paper electronically (by email or fax), which is then printed completed and returned. Some states require the printed

ballot to be returned by mail, whereas others allow for the ballot to be returned electronically. In Kansas a voter must include a signed statement saying "I understand that by faxing, e-mailing or electronically transmitting my voted ballot I am voluntarily waiving my right to a secret ballot".

Remote voting

No state currently uses remote voting for elections. The EAC advised that no internet voting systems have been submitted to them for assessment, and it would be difficult to develop a system that would meet the security requirements in the Voluntary Voting System Guidelines.

There is significant concern in the United States about voting systems connected to the internet, due to concerns about hacking and fraud. In most states, electronic voting machines are not networked or connected to the internet, and results are tabulated by taking memory cards out of voting machines and physically loading them into a centralised database at the election head office.

4.4.5 Meeting with Alexandria City

The committee was told that a number of different elections are held within Virginia, including federal elections, state elections, local elections and primaries. Elections can also be held on:

- Constitutional amendments;
- Local measures proposed by the local governing body;
- Bond referenda to approve taking out of bonds (counties only); and
- Certain localities' recall votes.

Turnout for presidential elections is about 85 per cent, and for local elections is about 20 per cent.

The City of Alexandria Office of Voter Registrations and Elections is staffed by six full time staff, two of whom principally focus on voter registration — adding voters, deleting voters and changing addresses.

Voter registration

Voter registration and voting is not mandatory. Electoral rolls are managed by the registrar in each local government area. In Virginia, a person can register up to 22 days prior to the general election. A person can register in person, by post or online.

An online voter registration (OVR) system was introduced in 2013. The system is linked to the Department of Motor Vehicles (DMV) and anyone with a Virginia driver's licence can use it to confirm their identity. A person can also check their voter registration online. Further, Virginia now has a single state-wide registration system, although registration is managed by the local registrars. This ensures a person is not listed in more than one local government area. There are

also arrangements in place to cross check Virginia voter registration lists with those in other states, although not all states participate in this system. One of the challenges faced by the Office is that in presidential election years, third party voter registration groups go out and collect paper registrations. Many of these are duplicates or poorly completed and have to be rejected.

Advance voting (Absentee ballots)

Virginia allows in person advance voting, which is called an absentee ballot. In 2012, 20 per cent of voters in Alexandria City voted prior to Election Day, and the number has been rising at each election. Absentee voting commences 45 days before an election and closes the Saturday before election. Absentee ballots are only permitted if a person has a reason why they cannot vote on election day. The voter must complete an *Absentee Ballot Application Form*, and select a reason for requiring an absentee ballot from the list of options on the form. Some are very broad, such as having business outside the City on Election Day or a disability or illness. For some categories, supporting information is required.

Electronic poll books

Alexandria City uses electronic poll books to mark off the electoral roll. The roll is finalised the Sunday morning before an election and loaded onto the electronic poll books. People that have requested an absentee ballot are not included on the electronic poll books. If they attempt to vote on election day, they must complete a provisional ballot so they do not vote twice.

Four to seven poll books are required for each district. A voter must vote in their precinct. The poll books are linked so that a person cannot vote twice. Party observers can scrutineer the marking off of the poll books and can challenge voters on the day. The rules allow for one observer per party per poll book, so precincts can get crowded.

Electronic Voting Equipment

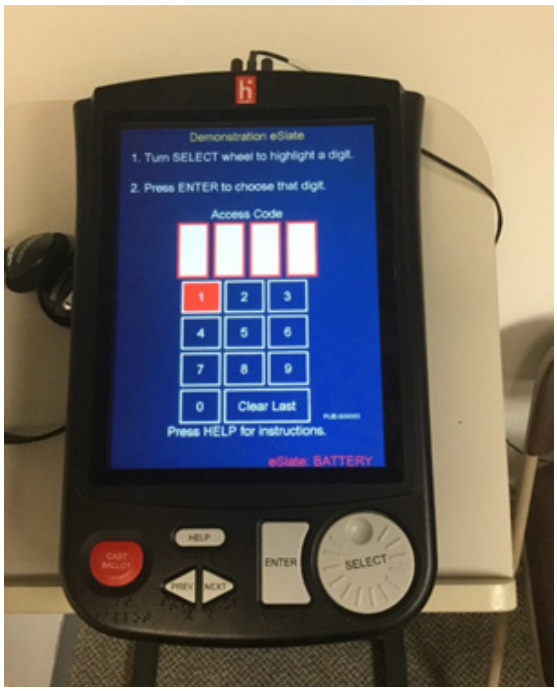
Following the Help America Vote Act of 2002, in 2004 the City of Alexandria introduced direct recording voting equipment. This allowed a voter to record their vote by turning a dial on a machine. Figure 4.2 is a picture of the direct recording machine.

Given the cost of the equipment, a limited number of these units were purchased for each precinct. As a result, some issues were encountered with people queuing to vote, particularly when there was a long ballot paper. The City still has one of the units available at each precinct for blind people and others if they choose to use it.

The current system uses a paper ballot with an electronic vote counting machine. The voter completes a paper ballot and then feeds it through a scanner into an electronic ballot box. The ballot paper can be inserted in any orientation, and the machine will reject a ballot if the vote is informal. A voter may proceed with

an informal vote if they choose. A person can be assisted by an election official if requested. Election officials are required to stand at least 5 feet away from the machine.

Figure 4.2 City of Alexandria direct record voting machine



The machine counts the vote and securely stores the paper ballot. This allows quick counting of the votes on election night, and keeps the paper ballot in case it is needed for a recount. The equipment is recalibrated and tested before every election. Political parties can view the testing process.

The machines are never connected to the internet. To prepare provisional election results on election night, election officials print a report from the machine and phone the details through to the head election office, which then enters them into the online state system. Following the election, all the machines are brought back to head office, where the seal is broken and a memory card removed which is used to tabulate the official results, which are checked against the phone through results. Other auditing also takes place to ensure the number of votes counted is in line with the number of ballots issued.

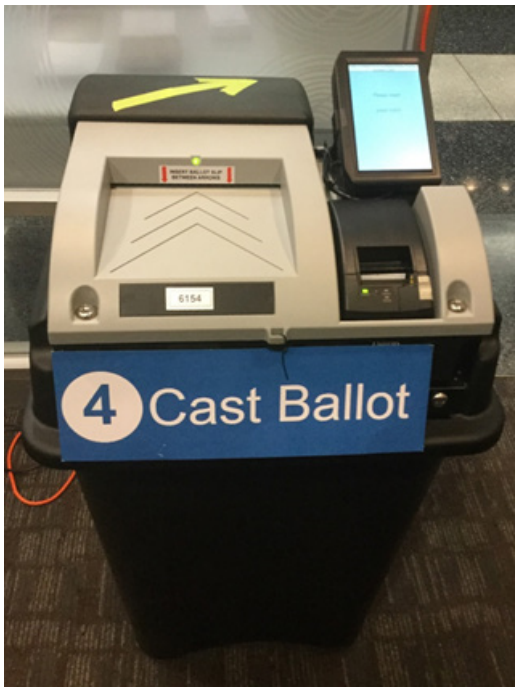
4.4.6 Arlington County Board of Elections

Electronic voting

The committee learnt that Arlington County used a touch screen machine / direct recording voting machine called WINVote. The machines were linked wirelessly, and the wireless connection was used to open voting, to program machines and to count votes. Security concerns were identified with the wireless technology, and the machines were decertified in 2015.

Arlington County now uses digital scanning voting machines. These are not connected to a network of any kind. They are similar to the machines used in the City of Alexandria, but in addition to counting the votes electronically, the machines also store a digital image of each vote. At most polling places, only one machine is needed, but at larger precincts, two machines are deployed. Figure 4.3 shows the precinct machines.

Figure 4.3 Arlington County Board of Elections touch screen voting machine

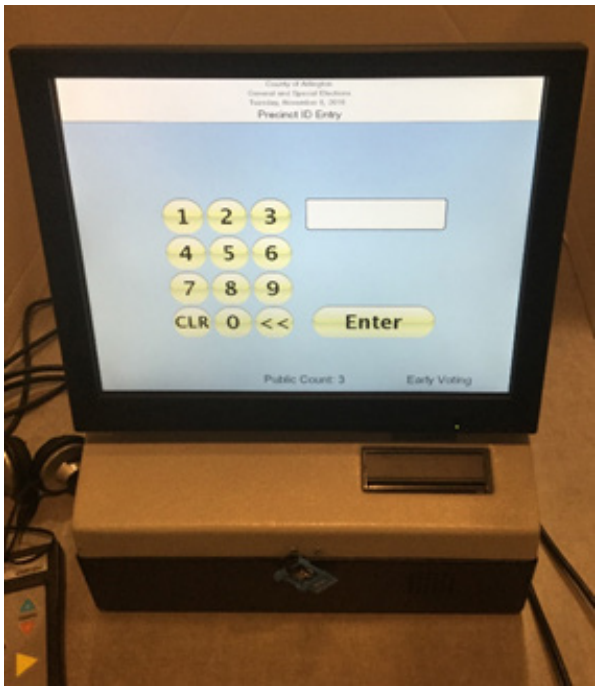


As in the City of Alexandria, votes are tallied manually from a printed count produced by the machines in each precinct. Significantly fewer staff are needed with digital scanners, as previously an election officer was needed for each voting machine in the polling station, whereas now only one officer is needed to oversee the scanner.

Arlington County no longer offers direct recording electronic voting. However, it does have a ballot marker device with a touch screen interface that disabled voters can use. As shown in Figure 4.4, the machine is visually similar to previous direct recording voting machines, but it prints out a paper ballot that is then scanned. This option is available to all voters and some voters choose to use it rather than voting on paper as they like voting electronically.

The committee was told that a key driver of the change was to increase public confidence in the voting system. There is greater public acceptance of the digital scanner system as there is a paper back up, which generates more trust than a completely electronic vote.

Figure 4.4 Ballot marker/touchscreen device, City of Alexandria



A high priority is placed on openness and transparency of the voting process. Party officials are invited to view the quality assurance testing of voting machines. They can also oversee the opening of the polls, vote check in, the close of the polls and vote counting.

Advance voting

Advance voting has also been increasing in Arlington County, particularly since 2008 when the Obama campaign heavily promoted early voting. There was a 25 per cent increase in advance voting in 2008, it dropped slightly in 2012, but has increased again in 2016. Arlington mailed out 45 per cent more postal ballots in 2016 than 2012, and 90 per cent more people voted on first day of voting.

Voter ID requirements

In 2014, Virginia introduced a requirement that all voters must show a photo ID. This replaced previous ID requirements that had been in place since 2001. The law limits the types of photo ID that can be accepted. Permissible forms of identification include a current Virginia Driver's Licence, a current Virginia DMV issued Veteran's ID card and a current United States Passport. Expired driver's licences and other states driver's licences are not accepted.

If a person does not have a valid form of photo ID, they can apply for a free Virginia Voter Photo ID Card. To obtain such a card, they need to complete a form which states their name, date of birth and social security number. There is no requirement to provide other proof of identification.

4.4.7 Fairfax County Board of Elections

Electronic poll books

Fairfax uses electronic poll books to mark off voters as they attend polling places. The system allows voters to scan their driver's licence and it will mark them off the roll by matching their driver's licence number. This can be done in less than 30 seconds per voter. Figure 4.5 shows the electronic poll book interface:

Figure 4.5 Electronic poll book, Fairfax County

Voting machines

Fairfax County currently uses Election Systems and Software (ES&S) DS200 voting machines for its elections, as shown in Figure 4.6. It has 525 such machines and provides one machine per 1,500 voters, which is between one and three machines per precinct.

The machine stores a digital image of every single ballot on two separate storage devices. This allows write-in votes and informal votes to be checked using the digital images and the paper ballots are only used in the event of a recount or audit.

The machines can also accept double sided ballot papers. To ensure voters don't forget to fill in the back of the ballot paper, they are handed out upside down so voters see the back first. Specific procedures have been put in place to ensure the security of the election:

- An American company manufactures and maintains the machines;
- Each version of software has to be certified by the Federal Election Assistance Commission, and prior to each election the machines are fully tested;

- All programming of the machines, including loading the ballots papers, is done by the County electoral officials, not third parties; and
- There is a physical lock and evidence seal on each machine and seals are individually numbered. If the seal is removed, it may indicate the machines has been tampered with.

Figure 4.6 Fairfax County Voting Machine

The machines are designed to only accept authentic ballot papers, which are printed on high quality paper with timing marks to authenticate the ballot.

The committee was told that although the machines have a feature that allows them to be connected to the internet, it is never used. It was also noted that a number of checks and balances were incorporated to negate any security threats to the voting machines.

Express Vote

In addition to the scanners, Fairfax County also used Express Vote ballot marking machines. They are fully ADA (Americans with Disabilities Act) compliant, and are used to assist voters with special needs, although they can be used by all voters. Fairfax has 600 Express Vote machines and provides approximately two per precinct. Figure 4.7 shows an Express Vote machine.

The election official gives the voter a custom sized piece of paper which they take to the machine. The machine can detect the very specific thickness of paper and notch in the corner of the paper to validate the vote. The voter completes the vote on the machine. It then prints the vote onto the piece of paper for the voter to check. If the vote has been recorded correctly, the voter puts the paper into the

same DS200 machine as hand marked ballots. Vision impaired voters can also use the machine with the assistance of headphones. The machine reads the vote back to the person, so they can record the vote has been recorded correctly.

Figure 4.7 Express Vote Ballot Marking Machine

The Express Vote machine also has an option to allow voters to precast their vote online, but this is not currently used. Voters are given a QR code, which they can bring to the polling station. They can then scan the code, and it will print out a ballot paper filled out as per the online vote. The voter can then check it is correct and cast their vote.

Election costs

Fairfax County has invested approximately US$6.4 million in election equipment. It recently purchased an additional 60 scanners for US$300,000. These plans are based on a 10- year life cycle. In addition to this, it has entered into a maintenance contract which includes yearly servicing of all the voting machines.

4.4.8 New York State Board of Elections

New York changed from lever voting machines to ballot scanning in 2009. It was one of the last states to comply with the HAVA. The New York Board of Elections representatives who met with the Committee advised that this had proved advantageous, as they were able to assess the suitability of equipment used in other jurisdictions before committing to a particular system.

The Board of Elections determined a paper backup was a key requirement, so elected to use digital scanning machines. Like Fairfax County, New York uses Election Systems and Software (ES&S) DS200 voting machines for its elections. For security reasons, the machines are not networked.

There are approximately 4.3 million voters in New York City. Conducting an election is a significant undertaking with 35,000 poll workers engaged for the election. There are 1,203 poll sites for election, which use 5,500 digital scanning machines and over 50,000 individual pieces of equipment.

New York also has at least one ballot marking device at each poll site, which can be used by people with disabilities. There are options which include audio ballots for blind people and in different languages and "Sip-N-Puff" or paddle devices for voters with limited hand dexterity. Braille and large print ballot papers can also be requested.

Security

The committee learnt about some of the security measures put in place in New York State:

- Voting machines used to program the election management system are never connected to the internet. They can be on an internal network only;
- Ballot programming must be done by election officials. It cannot be undertaken by vendors;
- There is a strict chain of custody of election equipment. Radio Frequency Identification Tags are attached to all equipment, which allows a map to be downloaded of where equipment has been;
- There are two flash drives in each machine. One is removed on election night for unofficial results and the other remains with the machine; and
- After each election, a three per cent random audit is required by statute. If discrepancies are discovered, further audits are then triggered.

The committee also learnt that New York state law is prescriptive about the technology allowed to be used in an election. Due to a strict statute on the form of the ballot, New York law does not allow Express Vote machines. New York State law also does not allow electronic poll books or internet voting.

In 2015, the Centre released a report titled *America's Voting Machines at Risk*, which discussed a number of issues that are confronting US states and their voting machines. Key concerns include ageing machines, outdated software and lack of funding to replace equipment.

4.4.9 Brennan Centre for Justice

The Centre discussed a number of issues relating to the status of electronic voting in the United States.

Funding to upgrade equipment was a significant issue. The Centre particularly noted that after initial funding of more than $2 billion was provided to states to implement the HAVA requirements, further funding has not been made available now the machines are ageing and towards the end of their useful life. A number of jurisdictions are now facing problems meeting the cost of replacing and maintaining their machines. These issues include:

- Increased maintenance costs, and using unauthorised maintenance contractors voids warrantees;
- Machines are too expensive to replace;
- Vendors have gone out of business and replacement machines and parts are not available. Some jurisdictions report sourcing replacement parts on E-Bay;
- Outdated software and additional costs to reprogram machines when electoral laws change.

Security concerns

The Centre noted there is also widespread concern about the security of voting machines, particularly as they age. Even when machines are not connected to the internet, computer scientists have raised other ways election results could be impacted, including loading viruses onto the memory card in the voting machine or tampering with the programming of ballot definition files. Whilst there have not been major reported incidents of this occurring, the fear that it may happen still exists.

The committee was told this has resulted in a strong move away from direct recording electronic voting machines and a move back to paper with electronic counting. This ensures that a paper record exists that can be used if the result is challenged. There is a focus on end to end verifiability and a number of states require public audit after election. The current preferred systems are digital scanning systems, with the potential for these to be used with touch screen ballot marking devices, which can add flexibility with languages and for voters with a disability.

Future of voting in the United States

There are a number of different voting options being explored in different US jurisdictions. There is a move towards allowing people to vote on their own devices. The next generation of voting machines has the option of allowing voters to complete a ballot on the phone or tablet, and take a receipt to a polling place where they can print out the ballot, check it and submit it.

The Presidential Commission on Electoral Administration also made a number of recommendations to improve electoral administration, including reforms of the standard-setting and certification process for new voting technology to address soon-to-be antiquated voting machines and to encourage innovation and the adoption of widely available off-the-shelf technologies.

Los Angeles County is exploring the development of a new system with open source code, so that anyone can service and make changes to the system.

Internet voting

The Centre noted that remote voting is not being actively pursued in the United States. The National Institute for Standards and Technology was asked to come up with guidelines for internet voting. They have reported the risks of votes being manipulated without detection are too great, and secure internet voting is not achievable. The Department of Homeland Security have also recommended keeping voting systems away from the internet.

Despite this, some states allow electronic submission of ballots for overseas and military voters as a way to meet the requirements of the MOVE Act. Five states do this through an online portal, and many others allow return of ballots by email or fax. In Alaska, any voter can request an electronic submission ballot, however certain identification requirements must be completed with the ballot.[182] Although there are still concerns about the security of these methods, this risk is balanced with giving military and overseas voters access to vote.

4.5 New Zealand

In February 2016 the committee met with several organisations to discuss New Zealand's consideration of electronic voting, focusing on online voting. Appendix 4 lists the organisations and individuals the committee met with.

4.5.1 Local government trials

The committee met with the New Zealand Parliament's Justice and Electoral Committee. Both committees discussed how a potential pilot of remote 'open' system electronic voting was first raised in 2010 in the New Zealand Parliament's Justice and Electoral Committee report into the 2010 local authority elections. The report recommended that the Government consider a trial of online voting at the 2013 local authority elections. The committee was told also that local authorities have pressured for regulatory change to allow online voting at local authority elections.

Following this report, on 4 September 2013, the New Zealand government established a working party to "consider the feasibility of online voting in local elections. The Online Voting Working Party's membership included representatives from across government (including the Department of Internal Affairs), local authorities, and information technology experts".[183]

182 www.elections.alaska.gov/vi_bb_by_fax.php

183 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

The working party released its final report in August 2014. The report noted that "changing expectations of how people want to access public services is a major driver of the need for innovation and a transformation in service delivery. The way that electors vote at local authority elections is also subject to changing expectations".[184] As a result of this, and other considerations, the Working Party advised that:

- Trialling online voting at the 2016 local government elections was feasible;
- There were several benefits to online voting, including improving overseas access to voting, making voting easier and more convenient, and reducing voter errors;
- There should be a coordinated approach between local and central government to oversee a trial, and then implementation, of online voting; and
- There should be a practical pathway to ensure online voting at the 2016 local government trials.[185]

The Working Party advised that the trial would involve a single online voting system tested by a range of councils, wards and "District Health Boards to fully test its performance and functionality. The precise nature of the trial was not determined by the Working Party"; this was left to the NZ government to propose.[186]

Following this report, on 9 December 2014, Associate Minister of Local Government, the Hon Louise Upston MP announced the Government had agreed to continue work to enable a small number of local authorities to trial online voting in the 2016 local elections. Eight councils had expressed interest in trialling online voting at the 2016 local elections: Selwyn, Wellington, Porirua, Masterton, Rotorua, Matamata-Piako, Palmerston North and Whanganui. Further, on 16 November 2015, the Associate Minister announced the next steps for the proposed trial of online voting. The eight councils above were invited to demonstrate they can meet requirements for an online voting trial. The Minister also issued an updated set of requirements for councils. Some of these conditions included:

- All electors in an election for which online voting is being used must be provided with an opportunity to "sign up to receive confirmation to find out if an online vote has been received and recorded under their name, and must be notified of this opportunity".[187] This opportunity "must be provided separately from the casting of a vote online, and provided regardless of whether and how an elector chooses to vote";

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184 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

185 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

186 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

187 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

- Removal of requirement for automated solutions for vote verification. The electoral officer in charge of the online voting trial was charged with keeping a copy of the verification in case this was requested by the elector;
- Ensuring that the online voting ID, and access code, were distributed to electors separately; and
- Several other procedural, administrative and technical amendments to the system requirements.[188]

Despite this, in April 2016 Associate Local Government Minister the Hon Louise Upston MP announced that the online voting trial proposed for this year's local body elections would not proceed.

The committee notes the Minister's justification for stopping the trial. She said "that voting is a fundamental right of New Zealand citizens and public trust in electoral systems and results is paramount. Maintaining public confidence and understanding of local electoral processes is more important than trialling online voting this year".[189] The Minister also committed New Zealand to learning more about online voting and did not rule out a trial at a future New Zealand local government election.[190]

4.5.2 Electoral participation at New Zealand elections

The committee also met with the Electoral Commission of New Zealand to discuss national approaches to encouraging electoral participation at New Zealand elections.

The committee learnt that voter turnout at New Zealand parliamentary elections is falling sharply, due to a lack of compulsory voting and other factors. At the 2011 election, "turnout as a percentage of those eligible to enrol dropped to 69.57 percent, the lowest recorded at a New Zealand Parliamentary election since the adoption of universal suffrage in 1893".[191] The 2014 result, 72.14 percent, is the second lowest. The Electoral Commission noted that New Zealand has a major problem with declining electoral participation.[192]

One of the major ways which the Electoral Commission has attempted to encourage electoral participation is through advance voting, or early voting. Overall, 29.3 percent of those who voted in 2014 did so before Election Day (compared with 14.7 percent in 2011). More people "voted in the last three days

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188 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

189 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

190 The Department of Internal Affairs, "Online Voting", New Zealand Government, 2016. Retrieved 19 March 2017 from www.dia.govt.nz/online-voting.

191 Electoral Commission of New Zealand, "Electoral Commission Report on the 2014 General Election", Electoral Commission, 2016. Retrieved 19 March 2017 from www.elections.org.nz/events/2014-general-election/election-results-and-reporting/electoral-commission-report-2014-general.

192 Electoral Commission of New Zealand, "Electoral Commission Report on the 2014 General Election", Electoral Commission, 2016. Retrieved 19 March 2017 from www.elections.org.nz/events/2014-general-election/election-results-and-reporting/electoral-commission-report-2014-general.

of advance voting than in the entirety of the advance voting period in 2011. The ability to vote early proved popular across all electorates and age groups and we can expect further substantial growth in 2017".[193]

As noted in the Electoral Commission's report on the 2014 New Zealand general election, the size of the increase "was a surprise to the Commission. Before 2014, the numbers voting in advance had increased significantly (by about 25 percent on average) from election to election. In 2014 the number increased by 100 percent".[194] The Commission told the committee that commission staff were very pleased with the increasing turnout, as this indicated a positive acceptance for early voting.

The Electoral Commission also told the committee that electronic voting was not a priority for the Commission, or New Zealand in general, for the 2017 parliamentary elections. New Zealand would nevertheless follow developments in electronic voting overseas and particularly in Australia and NSW's iVote system.[195]

193 Electoral Commission of New Zealand, "Electoral Commission Report on the 2014 General Election", Electoral Commission, 2016. Retrieved 19 March 2017 from www.elections.org.nz/events/2014-general-election/election-results-and-reporting/electoral-commission-report-2014-general.

194 Electoral Commission of New Zealand, "Electoral Commission Report on the 2014 General Election", Electoral Commission, 2016. Retrieved 19 March 2017 from www.elections.org.nz/events/2014-general-election/election-results-and-reporting/electoral-commission-report-2014-general.

195 Electoral Commission of New Zealand, "Electoral Commission Report on the 2014 General Election", Electoral Commission, 2016. Retrieved 19 March 2017 from www.elections.org.nz/events/2014-general-election/election-results-and-reporting/electoral-commission-report-2014-general.

5 Electronic voting and election technology in Victoria; evidence and proposals

As noted in the Introduction, during the inquiry the committee received evidence about two types of electronic voting systems for Victorian state elections. Several inquiry participants proposed that Victoria should adopt an 'open' or remote electronic voting system like the NSW iVote model, given that vVote, Victoria's current electronic voting system, was poorly patronised at the 2006, 2010 and 2014 Victorian state elections. In contrast, several inquiry participants told the committee that Victoria should not adopt a remote voting system, due to reasons of security, verification and the overall risk profile associated with remote voting. Accordingly, this chapter examines what type of electronic voting system Victoria should use at future Victorian state elections; i.e., should the Parliament recommend 'open' remote voting, or in contrast, increase access to vVote, a 'closed' system, and not amend legislation to support voting from outside a polling place?

The chapter first discusses evidence and proposals about remote voting. It discusses evidence from the VEC, the NSW Electoral Commission and other inquiry participants about the benefits of remote voting and what type of system Victoria could adopt. It also enables evidence about specific aspects of a remote voting system, including registration, independent auditing and what role the VEC might have administering remote voting. Evidence about remote voting and security and verification is also addressed. Following this, the chapter discusses evidence and proposals based on the assumption that Victoria does not introduce remote voting and provides extra resources for vVote. Arguments for and against this approach are assessed, including evidence from inquiry participants proposing different types of kiosk voting systems for Victorian state elections. The committee then outlines its view on the best approach for future Victoria state elections.

This chapter also considers evidence about how Victoria might use technology to enhance its electoral administration, including expanding electronic roll mark off and introducing electronic ballot paper scanning. Evidence about the impact of electronic voting – both remote voting and kiosk voting – on electoral participation for different communities of electors in Victoria, including overseas voters, the vision impaired community, seniors, Victorians experiencing homelessness and Victorians from multicultural backgrounds, is also discussed.

5.1 Remote electronic voting

To repeat the definition first provided in Chapter Two, remote voting is a type of 'open' electronic voting system where an elector registers to vote and casts their vote using a device connected to the internet, such as a personal computer, tablet or smartphone. As shown in Chapters Three and Four, Estonia was the first country to introduce remote voting for national elections in 2009; NSW was the first Australian jurisdiction to allow voters to cast a vote remotely in 2011 – iVote was expanded at the 2015 NSW state election, with more than 280,000 votes cast, making iVote the world's largest remote voting application.[196]

5.1.1 Proposals for remote voting – adopting iVote

During the inquiry several inquiry participants suggested that Victoria should adopt a remote voting system for Victorian state elections. Inquiry participants who discussed remote voting said that the only viable option for Victoria was to adopt NSW's iVote, given the costs of establishing a standalone remote voting system.

Victorian Electoral Commission

The Victorian Electoral Commission provided a detailed submission to the inquiry. The VEC recommends that "the *Electoral Act 2002* (Vic) be amended so that a limited category of electors (blind or with low vision, motor impaired, insufficient language or literacy skills, interstate and overseas) be allowed access to a remote voting system where their vote could be cast and transferred electronically, subject to regulatory protocols established by the Electoral Commission".[197]

As noted in the Introduction, the VEC's views on remote voting have evolved since the 57th Parliament. The VEC acknowledges that it has "shifted its position in relation to the use of remote electronic voting solutions as further developments with this form of voting have progressed".[198] During the then committee's inquiry into the future of Victoria's electoral administration, the VEC said that "within the current Victorian context, the VEC considers that the risks associated with internet voting options are too high at [that] point in time. However, the VEC will continue work in this area and follow relevant research so that an efficient and accessible option can be offered in the future for electors in remote locations or who experience difficulties accessing appointed voting locations".[199]

In the 58th Parliament, the VEC has supported remote voting. In the VEC's report to Parliament on the 2014 Victorian state election, the VEC also recommended that a limited category of electors (blind or with low vision, motor impaired,

196 NSW Electoral Commission, *Submission No. 24*, p.7.
197 Victorian Electoral Commission, *Submission No. 21b*, p.16.
198 Victorian Electoral Commission, *Submission No. 21b*, p.12.
199 Victorian Electoral Commission, *Submission No. 21b*, p.12.

insufficient language or literacy skills, interstate and overseas) be allowed access to a remote voting system where their vote could be cast and transferred electronically subject to regulatory protocols established by the Commission.[200] As part of the committee's report on the 2014 Victorian state election, the committee deferred further consideration of issues relating to electronic voting to this inquiry.

In its submission to this inquiry, the VEC explained the key factors behind its support for remote voting. The VEC noted it "is now of the view that an efficient and accessible remote electronic voting option exists in the form of the NSW iVote system". The VEC cited several factors, including:

Low take up of vVote. The VEC noted that kiosk-based voting is not a sustainable method of reaching the target cohort of electors who may access electronic voting services at Victorian state elections. As shown in Chapter Two, since 2006 the VEC's electronic voting systems have only processed 2,281 binding votes. Of this number, electors with vision impairment, physical impairment or language difficulties cast 605 votes, or 26 percent of total electronic votes. The only category of electronic vote that has grown is overseas voting; 973 electronic votes were cast in the UK for the 2014 Victorian state election.[201]

Retaining technical specialists. The VEC noted that retaining technical staff over a four-year election cycle was costly and impractical. The VEC noted:

> "The VEC, along with other electoral commissions, is reliant on a very small Australian pool of technology specialists who truly understand what is required to deliver such projects. Retaining this talent within a commission between electoral events is not a sustainable way of ensuring the successful delivery of electronic voting projects. This poses an enormous risk…Any long term future for electronic voting needs to address this issue in order to be sustainable".[202]

Changing nature of Victorian electoral participation. The VEC acknowledged that the nature of electoral participation at Victorian state elections has changed. The VEC noted "electors have particular demands around involvement and engagement in the voting process. Relevant information should be continuously available and all necessary services provided online. The act of voting should be quick and conducted at a time and location of their choosing without restrictions. Results should be available without delay".[203] As noted in Chapter Two, increased early voting at Australian elections has also reinforced elector expectations that they are able to engage with electoral processes when they want, in a way they want.

Declining viability of postal voting. The VEC's submission also noted the VEC's concern about the medium-term viability of postal voting in light of the increasing cost of postal services, and service changes to regular mail at Australia Post. The VEC noted that an electronic voting "solution can entirely negate

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200 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.7.

201 Victorian Electoral Commission, *Submission No. 21b*, p.12.

202 Victorian Electoral Commission, *Submission No. 21b*, p.7.

203 Victorian Electoral Commission, *Submission No. 21b*, p.11.

the need to courier time-critical ballot material over long distances". Further, at the public hearings in August 2016, Warwick Gately AM, Victorian Electoral Commission, explained his concerns about the impact of postal service changes on future Victorian state elections:

> "Where are we going to be in four years time, given the continuing withdrawal of postal services and also the rising cost as well?...I do not know where we will be, as I said, in 2020, because that is a real issue. As much as we have tried to keep the costs to the minimum — those service costs, particularly Australia Post, and material costs as well, with transport costs all on the increase as well — that is quite a relevant question".[204]

In addition, at the August 2016 public hearings, David Kerslake, Western Australian Electoral Commissioner, said that postal voting was under threat;

> "While on the subject of postal voting, there is a serious threat to the current system posed by the recent decline in postal standards. We are perhaps not far away from the time when we will be unable to guarantee electors in some rural areas that their votes will be received in time to be counted. In making these points I am not suggesting that our current system cannot be trusted; all I am saying is that, whether or not we are in favour of internet voting, to have a sensible discussion on that topic we need to be careful not to overlook risks that already exist. No system of voting is or ever will be absolutely risk free".[205]

The Victorian Electoral Commission and iVote – adapting for Victoria

During this inquiry the VEC told the committee that its preferred remote voting option was for Victoria to adopt NSW's iVote model. The VEC noted that "there is a current opportunity to build on a proven system, take advantage of NSWEC's base investment in the core technology, and build an aggregated demand around a harmonised Australian-based electronic voting solution available to all jurisdictions".[206]

In its submission, the VEC explained that the only "logical" way for Victoria to proceed with remote voting was to work in partnership with the NSW Electoral Commission to develop an iteration of iVote for Victorian state elections. The VEC explained:

> "The NSWEC has established a working remote electronic voting application, which has been developed and built in discrete components. These components can be used by the VEC, or any other Australian electoral commission, with changes required only to the core voting system. Of the four components identified... three of them (registration, verification and decryption) were developed by NSWEC and could be used by the VEC with few, if any, changes required. The core voting system has been developed under contract to NSWEC by the Spanish company SCYTL. The core system would have to be enhanced to accommodate the different Victorian voting requirements, primarily the formality rules and the structure of the Upper House".[207]

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204 Warwick Gately AM, Victorian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.p.3-4.

205 David Kerslake, Western Australian Electoral Commission, *Transcript of Evidence*, 24 August 2016, p.2.

206 Victorian Electoral Commission, *Submission No. 21b*, p.16.

207 Victorian Electoral Commission, *Submission No. 21b*, p.16.

The committee notes that the NSW Electoral Commission assisted the Western Australian Electoral Commission to develop and implement iVote at the 2017 Western Australian state election.[208]

The committee also notes that the VEC's remote voting proposal does not involve electronic voting, of any form, replacing traditional paper ballots. At the August 2016 public hearings, Warwick Gately AM, Victorian Electoral Commissioner, said:

> "These factors lead me to the conclusion that Victoria's future voting system must contain a remote voting solution for a limited category of electors that operates alongside and does not replace our present early voting and election day voting arrangements and options. I will say that again: a remote voting solution for a limited category of electors that operates alongside and does not replace our present early voting and election day voting arrangements and options. I believe that such a system will strengthen the franchise of currently disadvantaged electors and present Victoria as a progressive and inclusive state operating an election system available to all, irrespective of their circumstances".[209]

NSW Electoral Commission

During the inquiry the committee received a submission from the NSW Electoral Commission about iVote. In November 2016 the Committee also met with John Schmidt, NSW Electoral Commissioner, and Linda Franklin, Director, NSW Electoral Commission, to discuss electronic voting at NSW state elections.

While the NSW Electoral Commission does not specifically recommend that Victoria adopt iVote, the NSW Electoral Commission "believes that staying at the leading edge of electronic voting (in service delivery and security) would be made easier if multiple Electoral Commissions in Australia were to share and contribute to the iVote platform".[210] In its submission, the NSW Electoral Commission explained that remote electronic voting "offers the bigger benefits to voters and the electoral process when compared to [kiosk voting, or 'closed' voting], and is also the only financially sustainable electronic voting option. While iVote can support hundreds of thousands of voters from cost-effective central infrastructure, kiosk voting requires "the deployment of hardware to voting centres and the quantity of hardware must scale with the number of voters to be supported".[211]

During the inquiry the committee considered evidence about the reasons why NSW adopted remote voting. As noted in Chapter Three, remote voting was originally envisaged as a way for vision impaired electors to cast a secret ballot at NSW state elections. In 2011 Allen Consulting Group completed an

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208 Western Australian Electoral Commission, "iVote", Western Australian Electoral Commission, Perth, 2017. Accessed 1 March 2017 from www.elections.wa.gov.au/ivote.

209 Warwick Gately AM, Victorian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.p.2-3.

210 NSW Electoral Commission, *Submission No. 24*, p.1.

211 NSW Electoral Commission, *Submission No. 24*, p.5.

evaluation of iVote at the 2011 NSW state election. It discussed the incidence of vision impairment in NSW, and the voting experience for people with vision impairment:

> "There are approximately 70,000 electors in New South Wales who are blind or vision impaired and 330,000 with other disabilities. Most of these individuals vote by appointing another person to mark the ballot paper on their behalf. This precludes the possibility of their ballot remaining secret (AEC 2008a; NSWEC 2010). Furthermore, as blindness and vision impairment tend to increase in prevalence with age, the total number of persons affected is anticipated to rise as the Australian population grows older...The provision of an accessible and private voting system for individuals who are blind or vision impaired will therefore become increasingly important".[212]

Further to this, in 2008 the NSW Administrative Decisions Tribunal awarded a vision-impaired elector $5,000 after the Tribunal found that the NSW Electoral Commission discriminated against the elector when it failed to provide him with a Braille ballot paper for the 2004 Randwick Council elections. In response to this matter, and in response to concerns expressed by the NSW JSCEM about the inability of the NSW Electoral Commission to provide vision impaired electors with a secret vote, the Hon Kristina Keneally MP, then Premier of New South Wales announced on 16 March 2010 that the "Electoral Commissioner will investigate Internet voting for visually impaired people of New South Wales improving their democratic right to a secret ballot".[213] Although the initial scope of the Electoral Commissioner's report related only to blind and visually impaired voters, it became apparent through consultations that an electronic voting system would be of benefit to a broader audience of stakeholders, including electors outside NSW.

iVote and voter turnout

The NSW Electoral Commission's submission discussed how iVote increased, in the Commission's view, voter turnout at the 2015 NSW state election.

During its inquiry into the 2014 Victorian state election, the committee learnt that most Australian jurisdictions are experiencing declines in voter turnout at general elections. This 'decline' is usually contextualised by three measures; declining voter turnout, increased informal voting and declining electoral enrolment as a proportion of the total eligible voting population. While turnout at Victorian state elections has remained relatively stable, turnout at NSW state elections declined 1.3 percent between the 1995 and 2015 NSW state election.[214] Informal voting also increased at the 2015 NSW state election to 3.2 percent, compared to 2.7 percent at the 2011 NSW state election.[215]

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212 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011, p.2.

213 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011, p.3.

214 NSW Electoral Commission, "Electoral Statistics", NSW Electoral Commission, Sydney, 2017. Retrieved 11 March 2017 from www.elections.nsw.gov.au/about_elections/electoral_statistics.

215 NSW Electoral Commission, "Electoral Statistics", NSW Electoral Commission, Sydney, 2017. Retrieved 11 March 2017 from www.elections.nsw.gov.au/about_elections/electoral_statistics.

The NSW Electoral Commission's submission suggests that iVote has stimulated turnout. Table 5.1 shows iVote turnout by criteria type. Overall, iVote turnout increased 505 percent between the 2011 and 2015 NSW state elections. The only difference between the two elections in terms of iVote's administration was a regulatory amendment introduced in 2012 allowing electors outside NSW to use iVote.

Table 5.1 iVote turnout by criteria type, 2011 and 2015 NSW state elections

	Total votes	Percentage
2011 NSW state election - iVote criteria		
Outside NSW	43,257	92
More than 20km from a polling place	1,643	4
People with disabilities	1,296	3
People with vision impairment	668	1
Total	**46,864**	**100**
2015 NSW state election - iVote criteria		
Outside NSW	257,730	91
More than 20km from a polling place	8,407	3
People with disabilities	12,714	4
People with vision impairment	4,818	2
Total	**283,699**	**100**

Source: NSW Electoral Commission, Submission No. 24, p.13.

As noted in Chapter Two, at the 2011 and 2015 NSW state elections, most iVoters were those who registered for the system as being an elector outside NSW. 92 percent of iVotes were cast by electors who registered as outside NSW at the 2015 NSW state election. Further, there was a significant increase in the other three criteria categories at the 2015 NSW state election. Over 4,000 more electors with vision impairment cast an iVote in 2015 compared to 2011. In addition, over 10,000 more electors with disabilities cast an iVote in 2015 compared to 2011.[216]

At the August 2016 public hearings, Ian Brightwell explained that iVote increased turnout at the 2015 NSW state election because it was likely, in his view, that many of the electors outside NSW who used iVote in 2015 would otherwise not have voted:

> "...I think, to be frank, we are struggling to hold our participation rate. I think we are all seeing participation is creeping down. I think all that iVote did at the last election was stop that decline; iVote picked up those that might have otherwise not voted, partly because we picked up probably a larger cohort of the overseas voters who could not have voted".[217]

216 NSW Electoral Commission, *Submission No. 24*, p.13.

217 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.4.

NSW Electoral Commission – postal voting returns compared to iVote

An important theme in the NSW Electoral Commission's evidence is how iVote, compared to postal voting, admits a greater number of votes to the final election count.

Referring to Figure 5.1, the NSW Electoral Commission's submission shows return rates for postal voting and iVote at the 2011 and 2015 NSW state elections, comparing these to postal voting returns from the 2010 and 2014 Victorian state election.

Of 5,856 postal votes sent overseas at the 2015 NSW state election, only 129 entered the final election count. At the 2015 NSW state election, Figure 5.1 also demonstrates that the number of unattempted iVotes, or electors who registered for iVote but did not vote at all, is considerably less than postal voting. Just under two percent of iVote registrations at the 2015 NSW state election did not result in a vote, compared to 18.8 percent for registered postal votes which did not result in a vote.[218]

Figure 5.1 Postal votes versus iVotes admitted to final count – 2011 and 2015 NSW state elections, and 2010 and 2014 Victorian state elections

	SGE 2011		SGE 2015	
iVote	**No. Votes**	**%**	**No. Votes**	**%**
Registered for iVote but voted some other way	2,756	5.40%	10,827	3.60%
iVoted	46,864	91.70%	283,669	94.60%
Registered for iVote but **did not vote at all**	1,483	2.90%	5,394	1.80%
Accepted iVote Registrations	51,103		299,890	

	NSW				Victoria			
	SGE 2011		SGE 2015		SGE 2010		SGE 2014	
Postal	**No. Votes**	**%**	**No. Votes**	**%**	**No. Votes**	**%**	**No. Votes**	**%**
Registered for Postal but voted some other way	34,709	11.00%	54,736	18.80%	23,292	7.82%	10,893	3.27%
Postal Voted	245,295	77.80%	203,577	69.90%	257,441	86.43%	302,878	91.04%
Registered for Postal but **did not vote at all**	35,178	11.20%	33,122	11.40%	17,138	5.75%	18,926	5.69%
Accepted Postal Registrations	315,182		291,435		297,871		332,697	

Source: NSW Electoral Commission, Submission No. 24, p.10.

Western Australian Electoral Commission

As noted in Chapter Three and earlier in this Chapter, in March 2017 Western Australia became the second Australian jurisdiction to implement iVote for a state election. In 2016 the Parliament of Western Australia amended the *Electoral Act 1907* (WA) to "specifically allow for technology assisted voting for people who are blind or sight impaired, have literacy difficulties or are impacted by some

218 NSW Electoral Commission, *Submission No. 24*, p.13.

form of incapacity that makes voting difficult or impossible to do in secret".[219] For the first time at a Western Australian state election, eligible electors have been able to vote independently over the internet or by telephone.

A total of 2,288 electors used iVote at the 2017 Western Australian state election. It is important to again note that eligibility criteria for iVote at the 2017 Western Australian state election was tighter than in NSW for the 2015 NSW state election. Only electors with vision impairment, physical disability or some other incapacity were allowed to use the system. During the parliamentary debate in the Legislative Council, Hon Peter Collier MLC, the Minister for Electoral Affairs, indicated that the availability of internet voting for electors in remote areas will be considered in future.[220]

In addition to the NSW Electoral Commission, the committee also received a submission from David Kerslake, the Western Australian Electoral Commissioner, about the potential for remote voting to be implemented at Victorian state elections. The submission did not make a formal recommendation but suggested that Australian jurisdictions should eventually provide authority to electoral commissions to "develop robust Internet voting systems...and to deliver the product initially...to groups disadvantaged by the current system but with an eye to making internet voting available to all electors in the not too distant future".[221]

Mr Kerslake's submission also addressed the similarities between iVote and Western Australia's iVote system. As in NSW, the Western Australian Electoral Commissioner is given considerable authority to authorise procedures for iVote. However, some mandatory conditions were required for the 2017 Western Australian state election, including;

- Electors' votes to be kept secret;
- A mechanism to allow users to verify that their vote has been stored as cast;
- Votes cast to be securely transmitted and stored; and
- The Western Australian Electoral Commissioner can also make a determination not to proceed with remote voting at a particular election.[222]

Further, the committee notes that telephone voting at the 2017 Western Australian state election differed slightly to the system used for federal and Victorian state elections. Instead of telling an electoral official how they wish to vote (which makes some users uncomfortable even though that official does not know their identity), electors "will be able to record their votes via an IVR/telephony facility using special telephone keypads in their own homes".[223] With this system in operation, the WAEC discontinued its previous Vote Assist telephone system.

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219 Western Australian Electoral Commission, "iVote", Western Australian Electoral Commission, Perth, 2017. Accessed 1 March 2017 from www.elections.wa.gov.au/ivote.

220 Western Australian Electoral Commission, "iVote", Western Australian Electoral Commission, Perth, 2017. Accessed 1 March 2017 from www.elections.wa.gov.au/ivote.

221 David Kerslake, *Submission No. 14*, p.7.

222 David Kerslake, *Submission No. 14*, p.7.

223 David Kerslake, *Submission No. 14*, p.6.

5.1.2 Proposals for remote voting – iVote 'modified'

Some inquiry participants also proposed remote voting in a modified format compared to the NSW Electoral Commission's iVote implementation at the 2015 NSW state election.

Ian Brightwell

In his submission Ian Brightwell, former Chief Information Officer at the NSW Electoral Commission, recommended that Victoria consider a "minimal implementation"[224] of iVote. He suggested the following features of Victorian state elections;

- Availability to blind and low vision electors;
- Availability, due to elector disability preventing the elector from attending a polling place;
- Absent voting at any early voting venue or on Election Day; and
- Voting at a remote venue under the control of the VEC at an interstate or overseas location.

Mr Brightwell estimated the number of iVotes Victoria might receive with these criteria. The first two categories "could result in some 10,000 to 20,000 voters at the next parliamentary election, while the last category could be as much as 50,000 to 100,000 depending on the number of pre-poll and polling place venues the system was installed".[225] He also recommended that Victoria add, in addition to the four criteria above, an additional criteria for electors who will be interstate and overseas on Election Day and use their own device to vote. This could result in an additional 200,000 voters.

The other chief modification to iVote proposed by Mr Brightwell was to offer iVote in attendance mode. This would involve using iVote at large polling places in addition to regular ballot papers. Mr Brightwell noted:

> "While the iVote design includes an attendance mode, it is only expected to be used in limited circumstances – NSWEC designed this mode as an alternative to absent voting for selected, larger polling places, but the [*Parliamentary Electorates and Elections Act 1912* (NSW)]...does not yet provide for its use in this manner - and would only be cost effective as part of the overall iVote system".[226]

Mr Brightwell reiterated his view about replacing absent and postal voting with remote voting at the August 2016 public hearings:

> "I would, however, recommend that the more complex and expensive alternative voting channels such as absent and postal are in part or fully replaced by e-voting. I will not dwell on the pro side of the e-voting argument more than to say that the committee would be aware the most prevalent question asked of election officials is:

224 Ian Brightwell, *Submission No. 18*, p.12.
225 Ian Brightwell, *Submission No. 18*, p.12.
226 Ian Brightwell, *Submission No. 18*, p.B-2.

> 'When will I be able to vote over the internet?' The committee would also be aware of the high satisfaction levels achieved by iVote and the benefit it offers to sections of the electorate who are either unable to vote unassisted or unable to access a voting centre. Most people in this room now understand that the arguments against e-voting are substantially about the perceived increase of security risks of e-voting compared to the alternate paper voting channels. This committee will be presented with evidence from experts about e-voting security, which will be either highly technical or anecdotal".[227]

The committee notes that the VEC did not provide commentary about attendance mode iVote.

5.1.3 Proposals for remote voting – do not adopt iVote

Several inquiry participants suggested that Victoria should not adopt iVote at all. Professor Gore and Dr Teague told the committee that the risks associated with iVote outweigh the benefits, and that iVote, or any other remote voting solution, cannot provide the same level of security and verifiability offered by the current, paper-based voting system.[228] Professor Gore and Dr Teague also argued that the remote voting is a problem "still to be solved"; in lieu of this, they also recommended to the NSW JSCEM in 2016 that iVote be discontinued altogether.[229]

Several other inquiry participants also recommended that Victoria not adopt iVote. In his submission Craig Burton explained that while remote voting was acceptable for "99 percent of the world's elections" – he cited how internet voting was used by the Academy of Motion Picture Arts and Sciences to vote for the Oscars – "it was not acceptable for the high stakes elections, such as federal elections".[230] Mr Burton said:

> "Since 2011 I have been directly opposing the use of Internet voting in any high stakes elections. This is because I have now occupied roles of system provider, electoral commission staff, security analyst and voter and have a well-rounded picture of the total risk surface of elections. I have seen the growing panoply of Internet borne crime and I have read books with titles like Insider Threats which catalogue that about half of computer crimes come from within organisations. I have directly experienced that software bugs are a serious risk to elections. I agree with the writings of many academic specialists on computer risks to elections. These experts include Vanessa Teague, Steven Wagner, Arvi Rubin, Alex Halderman, Richard Buckland and many more".[231]

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227 Ian Brightwell, *Submission No. 18*, p.3.

228 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.3.

229 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.3.

230 Craig Burton, *Submission No. 30*, p.2.

231 Craig Burton, *Submission No. 30*, p.2.

Ralph McKay, representing BigPulse, an Australian technology firm, also suggested that Victoria should not adopt iVote because of the threat associated with remote voting, and iVote in particular, that the system was susceptible to voter tampering and that this could not ultimately be detected by the electoral commission.[232]

In 5.1.4 below, the report addresses specific evidence from inquiry participants about concerns with the iVote system, focused on security and risk-management.

5.1.4 Specific evidence about remote voting systems

In addition to general recommendations for Victoria to adopt remote voting for Victorian state elections, during the inquiry the committee also received specific evidence about the type of features of a potential remote voting system. Evidence corresponded to nine main themes; registration; verification; re-voting; the powers of the VEC to set procedures for remote voting; responsibility for auditing remote voting; cost of remote voting versus traditional paper ballots and postal voting; role of scrutineering in relation to remote voting; distribution of remote voting data, and; remote voting and unintentional informal voting. Further, the committee also considered some technical issues related to remote voting, including concerns with security and design features of iVote, preference data, how electronic voting registration data is shared with political parties, and other matters.

These themes are addressed below.

Registration

Currently, when an elector presents to vote for a Victorian state election, their name is marked off the certified list by an electoral official. This applies for in person ordinary voting and early voting. Postal voting requires that an elector provided a signed and witnessed declaration with their returned postal ballot pack and ballot. As discussed shortly, at the 2014 Victorian state election the VEC used Netbooks connected to the VEC's network to mark electors off the roll at early voting centres.

For electronic voting using vVote, electors are marked off the roll by an electoral official and then given access to a kiosk facility, or telephone, depending on their preferred voting method. There is no link with the elector's identity and the electronic vote that is cast.[233]

Some inquiry participants discussed registration in the context of a remote voting system. The NSW Electoral Commission discussed registration under iVote. The registration period for eligible electors usually commences two weeks prior to Election Day. The registration period is published on the NSW Electoral Commission's website within two business days of the writ being issued.

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232 Ralph McKay, *Submission No. 29*, p.1.

233 Victorian Electoral Commission, "Electronic voting", Victorian Electoral Commission, Melbourne, 2016. Retrieved 11 March 2017 from www.vec.vic.gov.au/Voting/ElectronicVoting.html.

Eligible electors have two ways of registering for iVote under the procedures approved by the NSW Electoral Commission. An "elector may self-register using a web based application service on the NSW Electoral Commission's iVote website, or telephone the NSW Electoral Commission's iVote call centre during the registration period".[234] At the time of registration the elector must provide their elector enrolment details to identify themselves on the electoral roll, i.e., "their full name, date of birth and address and a 6 digit PIN which will be required when voting using the iVote system. Further, a silent elector will identify themselves on the electoral roll by providing only their full name and date of birth".[235]

The committee notes that iVote registration relies on the elector self-reporting their entitlement. The elector will make a declaration by affirming the contents of the declaration on the screen, "or by listening to the declaration that is read to the applicant by the Call Centre operator and affirming the declaration verbally":[236]

> **"I DECLARE**
>
> **That:**
>
> **I am the person identified on the electoral roll**
>
> **I have not previously voted in this election**
>
> **The ground on which I apply to vote using the iVote system is;**
>
> **(a) my vision is so impaired, or otherwise I am so physically incapacitated or so illiterate, that I am unable to vote without assistance;**
>
> **(b) I have a disability (within the meaning of the Anti-Discrimination Act 1977) and because of that disability I have difficulty voting at a polling place or I am unable to vote without assistance;**
>
> **(c) my real place of living is not within 20 kilometres, by the nearest practicable route, of a polling place;**
>
> **(d) I will not be within New South Wales throughout the hours of polling on election day".**

During the registration process, secondary confirmation of identify is requested, such as a driver's licence or Australian passport number. Providing such information will remove the requirement for an acknowledgement letter to be sent to the elector's enrolled address.

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234 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

235 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

236 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

Registration, iVote and false declarations

During the inquiry, the committee was told it was possible that some of the 280,000 iVotes recorded at the 2015 NSW state election were cast on the basis of a potentially false declaration:

> "I dare say that some of the people were not entirely truthful in their declarations and they were in fact local voters who probably would not have bothered voting locally anyhow. So it is hard to say with self-declarations what exactly happened, but the participation was a little softer for New South Wales. It is a struggle to get the venues and get the people to them. We are all seeing that; all states are seeing it and the feds are seeing..."[237]

Similarly, during a presentation to the Victorian Parliamentary Library in May 2016, Mark Radcliffe, the NSW Electoral Commission's iVote Manager, said it was likely that some electors deliberately self-reported their declaration as being outside NSW so that they could access iVote.

The committee explored these issues further with Ian Brightwell at the August 2016 public hearings, particularly in the context of how an electronic voting system with a self-reporting declaration feature might only encourage electoral participation from those who might be otherwise be able to cast a vote on Election Day:

> "...I think, to be frank, we are struggling to hold our participation rate. I think we are all seeing participation is creeping down. I think all that iVote did at the last election was stop that decline; iVote picked up those that might have otherwise not voted, partly because we picked up probably a larger cohort of the overseas voters who could not have voted".[238]

Verification of registration

Another issue raised in relation to iVote was the low rate of verified registrations at the 2015 NSW state election, and the fact that the verification protocol does not guarantee that errors or fraud will be detected during the verification process.

Once an iVote is cast, all electors receive a receipt number. This receipt number can then be used to check whether the iVote was cast-as-intended and captured correctly. To do this, at the 2015 NSW state election anyone who cast an iVote could call the "iVote Call Centre. After the 2015 NSW state election, electors could use the iVote receipt number to confirm that the vote was included in the count".[239]

The NSW Electoral Commission told the committee that only 1.7 percent of iVotes – around 4,500 votes – were verified using the iVote verification service.

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237 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.4.

238 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.4.

239 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

Nevertheless, several inquiry participants questioned the veracity of iVote's verification system. Professor Rajeev Gore and Dr Vanessa Teague's submissions argued that iVote was "not verifiable, despite repeated claims to the contrary." They said:

> "Voters could telephone a verification service, enter their iVote ID and the receipt number they got when they voted, and hear a recorded vote read back to them. There are two main problems with this: 1. Privacy. The verification service could read all the votes. If someone called from an identifiable telephone number, it would be possible to link that person to their vote. 2. Verifiability. There was only a very poorly-described process for a limited number of participants to verify the subsequent vote processing. There are numerous ways to circumvent iVote's verification mechanism, even without access to the central system. We wrote to the NSW Electoral Commission in 2013 to explain serious weaknesses in the verification protocol, which have never been addressed. More importantly, almost no information about the actual iVote run in 2015 has yet appeared. In 2011, the 'N' ballot problem was only revealed when PWC's audit report was published. For 2015, the equivalent report remains unavailable. NSWEC stated that some 1.7 percent of electors who voted using iVote also used the verification service and none of them identified any anomalies with their vote".[240]

Further, Professor Gore and Dr Teague explained that verification was one of the four major challenges, in their view, relating to any electronic voting system:

> "Verifying the votes are counted as cast and reported or tallied correctly. This means producing an electronic analogue of the scrutineered paper-handling or paper-counting process in which observers watch the ballot boxes all day, including as they are opened and their contents counted. Some electronic systems produce a paper record for manual counting; others input the electronic vote directly into an electronic count. Either way, they need to prove that the (paper or electronic) vote record matches what the voter cast".[241]

In addition, the committee explored the link between verification and confidence in electronic voting with Ian Brightwell. Mr Brightwell explained that 1.7 percent was a low number of verifications for iVote at the 2015 NSW state election, and that a higher figure would impart greater confidence in electronic voting;

> "That is what came through in the surveys, and to be frank, I think it is fairly easy to overcome...It is fairly easy for us to go out there and push people. We know who has voted. We certainly know who is registered. We can actually go back and say, 'Please verify'. I think if we prodded the people that voted, we could get them to verify. I think 5 per cent is a nice healthy figure. We have 1.7. I think 5 per cent would be a good figure to get. At that level statistically you are in the 99.999 per cent sort of confidence level".[242]

240 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.6.

241 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.6.

242 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.5.

Option to re-vote

As noted above, electors registered for iVote at the 2011 and 2015 NSW state elections could, once their vote was cast, verify their vote via the iVote website or Call Centre. In 2015 iVote used receipts from a verification component, called the Verification Server. This component "allowed voters to hear on any phone, at any time during the election, their vote after entering a given voter's PIN".[243] As noted in a public research paper on iVote, this gives voters the possibility of checking that their votes have been received by the system according to their intentions, and "constitutes a defence against a potentially compromised voting device (particularly when the phone used for verification is different to the device)".[244]

During the inquiry the committee discussed the re-vote facility with several inquiry participants. Ian Brightwell discussed the mechanics of recasting a vote, in his capacity as the former Chief Information Officer for the NSW Electoral Commission at the 2015 NSW state election;

> "First of all, it is a design feature. I know it sounds strange. You have got to remember first of all that in paper-based systems — and I think this is a point everyone needs to take on board — once you have dropped your ballot paper into a ballot box or you have filled out your envelope and stuck it into a letterbox, you have no idea whether your vote is counted. Most people would be horrified to know the percentage of rejected postal votes and absent votes. There is quite a significant percentage rejected. In fact the AEC used to send out reports telling people their vote was accepted or rejected. They stopped doing that because they got too many complaints. So we now have a verification system. You have to have a means of dealing with someone saying, 'I didn't want to vote that way; I was coerced', or, 'I didn't vote that way because I pushed the wrong button' — we had very few of those. Many people said they made a mistake voting in some way. We had an attitude, and it was in our protocol, that if anyone wanted to remove their vote prior to the close of poll, they could remove it and revote. The process was automatic, contrary to what you were told this morning. We had a central mechanism which basically removed them both from the verification server and from the voting server simultaneously. So those two were always in [sync]. We had a mechanism which allowed us to reconcile the two on an ongoing basis — not that we could actually see the votes, but we could actually tell they were aligned, that the two systems had the same number of votes and that they were the same votes".[245]

The committee also explored some of the data provided for reasons for re-voting. The committee was particularly interested in whether votes had been changed because of coercion. Ian Brightwell cited a report from Rodney Smith, from the University of Sydney, which found no evidence of widespread coercion at any Australian election.

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243 Brightwell, I., et al (2015). "An overview of the iVote 2015 voting system". Retrieved 11 March 2017 from www.elections.nsw.gov.au/__data/assets/pdf_file/0019/204058/An_overview_of_the_iVote_2015_voting_system_v4.pdf.

244 Brightwell, I., et al (2015). "An overview of the iVote 2015 voting system". Retrieved 11 March 2017 from www.elections.nsw.gov.au/__data/assets/pdf_file/0019/204058/An_overview_of_the_iVote_2015_voting_system_v4.pdf.

245 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.6.

In contrast to Mr Brightwell's evidence, some inquiry participants told the committee that there was no real way of verifying whether someone had been coerced. Professor Gore and Dr Teague explained their concerns around the verification process and the difficulties associated with proving coercion in iVote;

> "Voters needed to remember a 12-digit receipt number to verify, so it's unlikely they would all have succeeded even if the system had been secure and reliable. But there are other reasons for failure: if votes had been dropped, or if a security problem had been exploited to manipulate votes, we would expect the victims either not to call the correct verification number at all, or to call and find that they couldn't retrieve a vote. So like any kind of audit, the important thing is not the number of successes, but the rate of failure".[246]

Further, in his submission Ralph McKay critiqued voter verification standards for iVote at the 2015 NSW state election. He said that the iVote "vote-as-cast verification process was clumsy...[and that] few could be expected to use it – apparently just 1.7 per cent did use it. All who did use it exposed their vote to loss of secrecy and none received a genuine verification that their vote was recorded as intended".[247] He also criticised the NSW Electoral Commission for not releasing statistics on re-voting.

As noted in Chapter Four, electors registered for remote voting in Estonia may also re-vote at any point during the seven-day electronic voting period.

Powers of electoral commission to set procedures for remote voting

In 2010 the *Parliamentary Electorates and Elections Further Amendment Bill 2010* (NSW) amended NSW electoral legislation to provide for iVote. The Bill inserted Division 12A into the *Parliamentary Electorates and Elections Act 1912* (NSW) "giving the NSW Electoral Commissioner power to be able to approve procedures (the approved procedures) to enable eligible electors to vote at a State Parliamentary election by means of technology assisted voting, being a method of voting where the eligible elector votes by means of a networked electronic device, such as by using a computer linked to the internet or by using a telephone".[248]

The approved procedures for iVote are listed on the NSW Electoral Commission's website.

Several inquiry participants discussed the powers of an electoral commission in relation to approving procedures for remote voting, particularly in relation to iVote. In their submissions, the NSW Electoral Commissioner, the VEC and the Western Australian Electoral Commissioner saw this as a crucial function of remote voting. As mentioned, the VEC's recommendation for remote voting provides that the VEC be given authority to determine the relevant procedures for remote voting.

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246 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.6.

247 Ralph McKay, *Submission No. 29*, p.p.1-3.

248 *Parliamentary Electorates and Elections Further Amendment Bill 2010* (NSW).

In contrast, Dr Chris Culnane argued for a more cautious approach in relation to providing electoral commissions with the power to set procedures for iVote. For Dr Culnane, the problem in this instance was not so much with giving electoral commissions power to oversee remote voting procedures, but more to do with the relationship electoral commissions might establish with external technology providers which help build the electronic voting system. In his submission, Dr Culnane wrote:

> "More crucially, the engagement of external corporations to develop and run election systems leads to a critical skills shortage within the Electoral Commission itself. Any pursuit of electronic voting in polling places should be coupled with the creation of an expert team within the Electoral Commission. In the same way that the Electoral Commission currently employs experts in delivering and planning paper based elections, it needs to build up an equivalent knowledge base on electronic voting and counting. To not do so leads to a tacit privatisation of elections. If the Electoral Commission does not have the capability, and legal right, to understand, publish, support, and deploy, all of the software components it uses, it by definition, does not have full control over them".[249]

Ian Brightwell also raised these issues in his submission:

> "The role of technology in elections is challenging the ability and budget of many Australian election bodies. Given that the election processes in Australia follow a common pattern it is reasonable to believe that a common supplier will be able to provide a set of technology solutions which will meet the needs of most election bodies. The strategy questions which Australian electoral bodies collectively need to address is whether they want to individually work with third party suppliers to obtain their own customised technology solution, or work jointly with a commonly owned and governed organisation which will provide technology for jurisdictions in Australia".[250]

Responsibility for auditing remote voting

During the inquiry several inquiry participants discussed how a potential remote voting system could be audited by a parliament, or an independent body appointed by an electoral commission.

The committee considered arrangements in NSW for reviewing iVote. The NSW Electoral Commission's submission described these arrangements. The *Parliamentary Electorates and Elections Act 1912* (NSW) requires the NSW Electoral Commissioner to engage an independent auditor (PriceWaterhouseCoopers) to conduct both pre and post implementation audits of the information technology under the approved procedures for the 2011 and 2015 NSW state elections.[251] The auditor's reports are available on the iVote website.

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249 Dr Chris Culnane, *Submission No. 20*, p.p.3-4.

250 Ian Brightwell, *Submission No.18*, p.16.

251 NSW Electoral Commission, *Submission No. 24*.

In addition, in 2011 the NSW Electoral Commission commissioned the Allen Consulting Group to perform an independent evaluation of iVote at the 2011 NSW state election. The evaluation focused on "assessing the effectiveness of iVote in meeting the stated aims of the legislation introducing it, obtaining feedback from iVote users, identifying areas for service improvement, and assessing the overall satisfaction, benefits, applicability and cost effectiveness of using iVote in other elections".[252]

Further, the NSW Electoral Commission has collaborated with various academic institutions in relation to iVote, including the University of NSW.

As discussed in Chapter Three, the committee also notes that the NSW JSCEM has reviewed iVote's operation as part of its inquiries into the 2011 and 2015 NSW state elections. As part of the 2015 NSW state election inquiry, the NSW JSCEM recommended that iVote not be expanded for the 2019 NSW state election.[253] Further to this, the report also recommended that "the NSW Government establishes an independent panel of experts to conduct a full inquiry into the iVote internet and telephone voting system to consider security, auditing and scrutineering issues well before the 2019 State Election. The panel should contain members with expertise in at least the following areas of information technology: online voting; privacy; security; and cybercrime".[254]

The NSW JSCEM also noted that iVote should only be used for the 2019 NSW State Election if the security concerns highlighted by the independent panel have been addressed.[255]

Electronic Election Board proposal

Some inquiry participants proposed alternative audit and oversight models for a potential Victorian remote voting system. Ian Brightwell advised the parliament should consider appointing an Electronic Voting Board to oversee remote voting during the election period. The board would feature experts in electronic voting and expertise in the management and use of information technology in a "mission critical business environment. Members of the committee should also collectively have expertise in cryptography and cyber security and security audit processes".[256]

As noted by Mr Brightwell's submission, "scrutiny of electronic voting is quite different to the scrutiny of other election processes". Effective scrutiny of electronic election processes requires knowledge of the underlying technology. Mr Brightwell provided further details about the structure and functions of the Board in his submission:

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252 Allen Consulting Group, "Evaluation of technology assisted voting provided at the New South Wales State General Election March 2011, July 2011, p.p.3-4.

253 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.12.

254 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.12.

255 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.12.

256 Ian Brightwell, *Submission No. 18*, p.14.

> "The board should provide reports to the VEC during the election period of any issues identified and post-election provide the Electoral Matters Committee with a full report on the integrity of all aspects of the election process which only have voting records held electronically. The board members should be selected by the electoral matters committee on a bipartisan basis prior to each electoral event or be appointed for a period to cover events in that period. The board could be constituted using normal Victorian board guidelines. The board should be remunerated for time spent in session and conducting audits. The board should be able to engage specialists to report on specific issues. The board should hold a part of the election decryption key in conjunction with the Victorian Electoral Commissioner".[257]

Estonian model

As noted in Chapter Four, the committee explored remote voting governance arrangements in Estonia. Since the 2011 Estonian parliamentary elections, Estonia made several amendments to the governance of remote voting, based on the findings of the Organisation for Security and Cooperation in Europe review and other Estonian-led review activities. One amendment was to establish the Electronic Voting Committee (EVC), under the auspices of the National Electoral Committee (NEC), to organise remote voting and verify the electronic voting results. According to the Estonian National Electoral Committee, the EVC's work enjoys broad public confidence in Estonia. At the same time, the Estonian National Electoral Committee also introduced a verification process for voters to confirm that their online vote was cast as intended and recorded on the ballot storage server as cast. However, the system does not allow for end-to-end verification.

In contrast to NSW's legislation, "Estonian legislation does not require formal certification of the remote voting system by an independent organisation. Despite this, the National Electoral Committee contracted an auditor to assess compliance of Internet voting with procedural requirements and published summaries of audit reports in 2015".[258]

Role of scrutineers in relation to electronic voting / remote voting

During the inquiry the committee investigated how scrutineers from political parties could oversight electronic voting arrangements, particularly remote voting arrangements.

Current scrutiny arrangements for vVote in Victoria

As broadly noted in Chapter Two, scrutineers are able to overview various aspects of the vVote system. According to the VEC, vVote incorporates a number of security features which provide that the "system must also be open for scrutiny and analysis to prove that it is of a sound design and that it fulfils the accuracy, formality, safety, privacy and anonymity requirements for Australian elections".[259] There are three processes open to scrutiny:

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257 Ian Brightwell, *Submission No. 18*, p.15.

258 OSCE, Office for Democratic Institutions and Human Rights, "Estonia: Parliamentary elections", March 2015, p.1.

259 Victorian Electoral Commission, "Electronically assisted voting: guide for observers and scrutineers", Victorian Electoral Commission, Melbourne, 2010 State Election Information Series, p.2.

- End-to-end voting observation. This includes observation of the passage of votes from voter roll marking to printout of electronically assisted votes and distribution to election offices. Scrutineers can observe these processes as they observe the parallel handling of conventional paper votes;
- Real time election management. This includes observation of the process of running and supporting the election including reports and information emitted from the system in real time; and
- Reports and analysis commissioned by the VEC from external experts.[260]

The committee discussed current scrutiny arrangements for vVote at the August 2016 public hearings. Warwick Gately AM, Victorian Electoral Commissioner, and Liz Williams, Deputy Victorian Electoral Commissioner, explained that due to the low take up of electronic voting at the 2010 and 2014 Victorian state elections, it was probable that no scrutineers were present at the 2014 Victorian state election at early voting centres with vVote facilities;

> "**Mr GATELY** — Given the very limited take-up of vVote, as we saw no more than 1000 electors, I do not know that there was very little scrutineering of that system at all and the votes that were cast on the day. On election night when the ballot papers ultimately were printed — because as a requirement of vVote we had to print off the 1000 ballot papers and then insert them into envelopes and then send them out to the various districts…Certainly the vVote team had specialists there observing it, but as for party scrutineers or candidate scrutineers, I do not think they were there at that part of the process.[261]
>
> **Ms WILLIAMS** — They were invited, but as far as I recall, at the opening of the electronic ballot box for 2014, I do not think any scrutineers attended".[262]

Remote voting and scrutineering

Under s90 and s120 of the *Parliamentary Electorates and Elections Act NSW 1912* (NSW) candidates may appoint scrutineers to observe various aspects of the iVote system.

According to the NSW Electoral Commission's approved procedures for iVote, a candidate may appoint a scrutineer to observe:

- Any production of the printed ballot papers and bundling and sealing of those ballot papers in accordance with the approved procedures; and
- Any other element of the technology assisted voting process that is approved by the Electoral Commissioner for the purposes of this section.[263]

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260 Victorian Electoral Commission, "Electronically assisted voting: guide for observers and scrutineers", Victorian Electoral Commission, Melbourne, 2010 State Election Information Series, p.2.

261 Warwick Gately AM, Victorian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.p.4-5.

262 Liz Williams, Deputy Victorian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.p.4.5.

263 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

The NSW Electoral Commissioner will write to registered political parties and provide a timetable of the events that scrutineers can attend. When iVotes are physically printed, as described in section 4.12 of the approved procedures, a scrutineer may observe all aspects of the process, including the comparison of encrypted votes in the Verification System. In contrast to ordinary voting scrutiny, candidates may view all 93 Legislative Assembly Districts and the Legislative Council.[264]

During the inquiry process the committee was particularly interested in the relationship between scrutineering, traditional scrutineering and iVote. The committee notes that scrutineers at polling places with paper ballots do not require specific technical skills to carry out that role. Several inquiry participants suggested to the committee that remote voting offered limited opportunities for scrutiny given that much of the process involved was highly technical. At the August 2016 public hearings, Ian Brightwell noted that scrutineers of iVote at the 2015 NSW state election did not possess the technical expertise needed to scrutinise iVote; "to be frank, as well intentioned and carefully considered these people were in their views, they did not have much of a capacity to take on a lot more of the technical detail, which is the difficult part about this technology".[265]

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Supplementary scrutineering role

The committee also received evidence from some inquiry participants who recognised that remote voting required a different form of scrutiny arrangement compared to paper ballots, involving both political party and candidate representatives and academics and people with appropriate technical expertise.

Craig Burton proposed that Victoria consider a model used in the United Kingdom:

> "In the UK the Electoral Commission can receive applications by anyone to become an Independent Observer for an election. There is some vetting of known troublemakers but in effect any citizen can become an observer without being a representative of a candidate, as is the case in Australia. As a supplier in the UK I have hosted observers to access election computers I set up either at the electoral authority or at a data centre. I was obliged to answer any and all technical questions of technical observers and there were many. VEC has been able to offer this role by proxy – that of a technical election volunteer and such volunteers were vital to my work at the VEC. However, it would be much better if the Electoral Act recognised these people who, after all, want to commit their time and expertise for free to make Victorian elections better. Technical observers could be present at key transactions in running an e-voting system and the observer could or should be free to report to Parliament or the Court of Disputed Returns".[266]

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264 NSW Electoral Commission, "Technology Assisted Voting: Approved Procedures for NSW state elections", NSW Electoral Commission, Sydney, 17 March 2016. Retrieved 20 March 2017 from www.elections.nsw.gov.au/voting/ivote/procedures/technology_assisted_voting_approved_procedures_for_nsw_state_elections.

265 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.4.

266 Craig Burton, *Submission No. 30*, p.12.

Ian Brightwell also discussed how 'traditional' scrutineers should be given joint access to remote voting scrutineering alongside technical experts. He also suggested that scrutineers might form part of the Electronic Election Board he proposed.[267]

Cost of electronic voting / remote voting

One of the major considerations for the committee in relation to considering what form of electronic voting system Victoria will have into the future is cost. In Australia two measures are used to assess election costs; cost per vote, and cost per elector. The second measure is used when discussing an overall election cost based on the number of total enrolments.

During the inquiry the committee learnt that one of the major reasons that the Commonwealth JSCEM chose to recommend that the AEC discontinue remote voting trials after the 2007 ADF remote voting trials was cost. As noted in Chapter Three, the cost per vote of the ADF trials was around $1,159. When only the AEC's costs were taken into account the average cost per vote fell to $521. Had all 2,500 eligible participants cast their vote electronically, the average costs would have been around $700 per vote. In comparison, the average cost of each ordinary vote per elector at the 2007 federal election was approximately $8.36.

In Victoria, the conduct of the 2010 Victorian election cost just over $36 million and public funding payments of $8,819,695.71 were paid to political parties and candidates. There were 3,582,232 people enrolled to vote at the election. Accordingly, the cost per elector for the conduct of the 2010 Victorian election was approximately $10.20 and the cost of public funding was $2.46 per elector.

During the inquiry the VEC provided the committee with a breakdown of the cost by vote type for the 2014 Victorian state election, as show in Table 5.2. The committee notes the figures for vVote were tracked separately through the VEC's finance system and do not capture the staffing costs associated with the support and delivery of the service across the 25 locations where vVote could be used in 2014. The VEC also advised that figures for early voting were difficult to obtain due to estimates associated with the number of staff working at early voting centres at the 2014 Victorian state election, and how these costs were tracked through the VEC's finance system.

267 Ian Brightwell, *Transcript of Evidence*, 22 August 2016, p.4.

Table 5.2 Cost by vote type, 2014 Victorian state election

Description	Cost ($)	Votes counted	Cost per vote ($)
vVote[(a)]			
Capital development cost and implementation	2,535,529	1,121	2,261.85
Implementation only	444,427	1,121	396.46
Postal votes[(b)(c)]			
Includes staff cost for processing applications, extracting ballot papers from returned envelopes, counting, mail costs and postage	1,312,344	294,571	4.46
Ordinary votes			
Includes staff costs for assessing 1,786 voting centres to apply an accessibility rating, building hire and voting centre staff costs (excluding declaration vote issuing officers)	6,970,626	2,074,838	3.36

(a) Both cost figures do not include the cost of VEC staff at early voting centres with vVote.

(b) Cost does not include any capital costs for system development. The VEC uses an application within its Election Management System for processing postal vote applications.

(c) The figures here, as noted by the VEC, assumes a percentage of postal vote applications were received via registered political parties. Postage is paid by the party in this case.

Source: Liz Williams, Deputy Victorian Electoral Commissioner, *Correspondence*, Thursday 30 March 2017.

The committee notes that the cost per vote for vVote at the 2014 Victorian state election including capital development and implementation was $2,261.85 per vote. Excluding capital implementation costs, the cost of a vVote at the 2014 Victorian state election was $396.46. In contrast, regarding NSW and iVote, the committee learnt that the average cost per vote (excluding iVote) for the 2011 NSW state election was around $9.50, and around $10.60 at the 2015 NSW state election. In contrast, the cost per vote of iVote at the 2011 NSW state election was approximately $75. During its meeting with the NSW Electoral Commission in November 2016 the committee was told that this higher cost was associated with the relatively low take up of iVote relative to the investment in the system. The committee was also told that iVote is scaled and the costs decrease as the number of votes increases; hence, at the 2015 NSW state election, the NSW Electoral Commission's submission suggested that the cost per vote for iVote was below $20.[268]

In his submission, Ian Brightwell discussed the cost savings associated with a remote voting system. He "assessed marginal cost per vote for internet voting as about half that of the cost of a paper vote issued at a general election if the internet voting involves more than 200,000 votes".[269] This would potentially mean that the total cost of elections could be reduced by between five percent to ten percent if internet voting was introduced in Victoria for between 10 and 20 percent of votes issued.[270]

268 NSW Electoral Commission, *Submission No. 24*, p.p.8-10.

269 Ian Brightwell, *Submission No. 18*, p.8.

270 Ian Brightwell, *Submission No. 18*, p.8.

Preference data

At the 2015 NSW state election, the NSW Electoral Commission data entered all Legislative Assembly ballot papers. In doing so, the Commission also allowed iVote preference data to be merged with ordinary ballot papers for the final distribution of preferences. In his submission, Ian Brightwell proposed that the parliament, if Victoria adopted iVote, "recommend that all Legislative Assembly ballot papers be data entered or scanned so as to remove the need to print electronic ballots and perform a manual preference allocation for the printed electronic votes".[271]

Capacity for electronic voting / remote voting to eliminate unintentional informal voting

As part of its inquiry into the 2014 Victorian state election, the committee reviewed evidence about the increasing incidence of informal voting at Victorian state elections. The informal voting rate for the Legislative Assembly at the 2014 Victorian state election was 5.22 percent, the highest ever recorded for a Lower House election, and an increase of 0.26 percentage points on the 2010 Victorian state election.[272] The informal voting rate has increased at every election since 1999, when it was 3.02 percent.[273]

The committee also reviewed evidence about the different types of informal voting captured by the VEC's informal ballot survey. These surveys are completed after each Victorian state election and released in the VEC's report to Parliament. While the largest category of informal votes at the 2006, 2010 and 2014 Victorian state elections was blank ballots, more than forty percent of the informal voters at the 2014 Victorian state election indicated a clear preference, but one that could not be counted due to formality provisions in the *Electoral At 2002* (Vic). This corresponded to 2.13 percent of all votes, or more than 75,000 votes.

The committee also heard evidence about informal voting in NSW and informal iVotes. Informal voting is generally lower at NSW state elections compared to Victorian state elections given that NSW electors are allowed to vote '1' only on the Legislative Assembly ballot paper – this is known as optional preferential voting (OPV). Despite OPV, informal voting was 3.44 percent at the 2015 NSW state election, and 3.20 percent at the 2011 NSW state election.[274] However, the rate of informality among iVotes was noticeably lower (2.8 percent) at the 2015 NSW state election. In comparison, 1.4 percent of postal votes were informal, and 2.6 percent of early votes were informal.[275]

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271 Ian Brightwell, *Submission No. 18*, p.13.

272 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election and matters related thereto", Parliament of Victoria, Melbourne, May 2016, p.12.

273 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election and matters related thereto", Parliament of Victoria, Melbourne, May 2016, p.13.

274 NSW Electoral Commission, "Electoral Statistics", NSW Electoral Commission, Sydney, 2016. Retrieved 1 March 2017 from www.elections.nsw.gov.au/about_elections/electoral_statistics.

275 NSW Electoral Commission, "Electoral Statistics", NSW Electoral Commission, Sydney, 2016. Retrieved 1 March 2017 from www.elections.nsw.gov.au/about_elections/electoral_statistics.

During the inquiry the NSW Electoral Commission told the committee that one of the major innovations of iVote was the system's ability to "reduce systemic errors in current voting processes. This would include reducing informality in ballots cast".[276]

Ian Brightwell also regarded iVote's capacity to reduce unintentional informal voting as a positive benefit of the system.

Deliberate informal voting - functionality

During the inquiry the committee also considered evidence about electronic voting systems generally and deliberately informal or spoiled ballots. The committee learnt that the Estonian remote voting system allows voters to cast an invalid vote if they wish. In NSW, electors casting an iVote can also cast an informal 'blank' ballot if they wish to do so.

Further, at the August 2016 public hearings the committee discussed the concept of deliberate informal voting with the VEC. Warwick Gately AM, Victorian Electoral Commissioner, agreed with the suggestion put to him by the committee that any remote voting system should permit deliberately informal votes:

> "**Mr GATELY** — I think with respect to that question the electronic voting process should replicate what is available to the individual. So if an individual chooses to vote informally, either consciously or unconsciously, or do whatever they choose to do with that ballot paper, that should be reflected in the electronic voting arrangement as well. One advantage certainly is that it could alert the elector to the fact that they are about to cast an informal vote. Now if it is unconscious to them, then that might force them to correct that. So you could possibly argue that it could influence that number of informal votes — it could reduce the number of them. But you should be able to replicate the same process".[277]

Layout of remote voting ballots

Following the 2015 NSW state election ABC Election Analyst Antony Green analysed iVote returns for the Legislative Assembly and Legislative Council. He found that the left hand side of the ballot paper received a much bigger donkey vote than with traditional paper-based voting. His analysis showed that the "first four parties on the NSW Upper House ballot paper appeared to gain an advantage over parties that drew positions on the right".[278] This problem is caused by voters having to scroll left to right on many devices to see candidates on the right of the ballot.

Following the election the NSW Electoral Commission acknowledge this issue and committed to creating better functionality at the 2019 NSW state election. Further, during the NSW JSCEM's inquiry into the 2015 NSW state election

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276 NSW Electoral Commission, *Submission No. No. 24*, p.2.

277 Warwick Gately AM, Victorian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.p.4-5.

278 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.p.12-13.

Mr Green recommended that iVote have a randomised presentation of the ballot landing position so as to mitigate the effect of the left-hand column bias he analysed for the ABC.[279]

5.1.5 Security and ballot design concerns

Several inquiry participants discussed vulnerabilities within the iVote facility. During the inquiry the committee was told that the most common type of attack for a remote voting system would be a man-in-the-middle (MitM) attack. This involves "a hacker altering the connection between the voter's device and the electoral commission's server to first pass through their system. From here, the hacker can relay only the information they want seen through to the electoral commission".[280]

In their submission Professor Gore and Dr Teague discussed a man-in-the-middle attack vulnerability which Dr Teague and Alex Halderman detected during the 2015 NSW state election early voting period. The vulnerability "would have allowed a network-based attacker to take over the voting session, expose how the person wanted to vote, change the vote before it was submitted, and prevent the voter reading the manipulated vote from the verification server".[281]

Further, in his submission Ralph McKay, of BigPulse, said that the "most effective way to inhibit any motivation for criminal interference in an election is to ensure that any vote corruption is easily detected".[282]

iVote ballot flaw

On 17 March 2015, during the 2015 NSW state election early voting period, approximately 19,000 iVote users cast a ballot which did not include the full complement of above-the-line voting groups. The excluded parties were the Outdoor Recreation Party and the Animal Justice Party. While the Animal Justice Party ultimately won a seat in the Legislative Council, the committee notes that the party threatened legal action for a time in relation to this incident, and that the NSW Electoral Commission shut down iVote for a day in order to rectify this issue.

NSW Electoral Commission – response to security and ballot design concerns

The committee notes that the NSW Electoral Commission has consistently supported iVote against criticism of its security architecture. In 2015 the NSW Electoral Commission told the NSW JSCEM that the "likelihood of someone intercepting votes online as suggested by Dr Teague and Professor Halderman is low".[283] Further, the commission has argued that a coordinated attack against

279 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.p.12-13.

280 Christopher Glerum, *Submission No. 2*, p.3.

281 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.5.

282 Ralph McKay, *Submission No. 30*, p.1.

283 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.p.12-13.

iVote would require a high level of technical expertise, as well as the "motivation to want to bring down a NSW state election".[284] The NSW Electoral Commission's submission said that the risks associated with iVote were roughly commensurate with the current paper balloting system, citing the misplaced 1,370 votes which led to the 2014 Western Australian Senate re-election.[285]

Ian Brightwell also offered a similar view about remote voting, saying that the benefits outweighed the risks. At the August 2016 public hearings, Mr Brightwell also discussed his experiences as a polling place manager at federal elections, and how these experiences suggested to him that the paper ballot process was no more secure than remote voting:

> "There is failure in electors multi voting, failure in postal votes being lost in the mail or not received in time by electors, failure in absent and other declaration votes envelopes not being completed correctly, failure in counting and handling of votes, etc. In general terms these failures represent a small percentage of the votes cast but they can be significant in terms of electoral outcome. In general terms the failure associated with internet voting systems is lower in normal operation but it is arguable that if a failure did occur it could be very significant, however if internet voting is done with paper voting a major failure in either channel is unlikely to occur without detection".[286]

Ian Brightwell also explained the 'philosophy' that guided his view of the risks of remote voting during his time as the Chief Information Officer for the NSW Electoral Commission:

> "There will always be a chance that an attacker will breach an internet voting system and corrupt votes. The author believes the probability of this happening is low and happening without detection is very low. A significant amount of monitoring is present in internet voting systems used for parliamentary elections, there is also the verification system used by electors and the end to end verification done by auditors. Finally, if a breach did occur and votes were tampered with it would be expected that the ratio of internet votes for given candidate would differ from the paper votes for the same candidate. The author does not believe, as has been suggested by some computer science academics, the wrong person will be elected undetected, it is more likely the worst case scenario is that a re-run election will be required, as happened in WA".[287]

The committee also notes that the NSW JSCEM has reviewed the NSW Electoral Commission's response to the Animal Justice Party issue, and the left-hand column bias identified by Antony Green, and supported the Commission's attempts to rectify both situations.[288]

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284 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.p.10-13.

285 NSW Electoral Commission, *Submission No. 24*, p.p.8-10.

286 Ian Brightwell, *Submission No. 18*, p.6.

287 Ian Brightwell, *Submission No. 18*, p.6.

288 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.p.10-13.

5.1.6 Contact details of electronic voters

One of the issues the committee considered during this inquiry was the implications of a wide-scale adoption of an electronic voting system in Victoria for political communication. In Victoria, Section 101 (2) (c) of the *Electoral Act 2002* (Vic) provides that a written application to vote by post may be physically attached to, or form part of, other written material issued by a person or organisation. Pursuant to s101 (5), if a person "other than the owner of the copyright in the postal vote application form reproduces the form, that person is not taken to have infringed the copyright. These provisions mean that political parties and candidates may legally print postal vote application forms as part of their campaign material to distribute to electors."

In its report on the 2014 Victorian state election, the committee supported a recommendation from the VEC to allow Victorian electors to apply for a postal vote online. The committee noted that this initiative "will help Victoria keep pace with best practice in other Australian jurisdictions". However, during that inquiry the committee also learnt that the NSW Electoral Commission shares data with NSW political parties relating to the details of electors who apply electronically for a postal vote. Accordingly, the committee's full recommendation was that the *Electoral Act 2002* (Vic) be amended so that an application for a postal vote can be applied for by electronic means, contingent on the VEC providing registered Victorian political parties with a data file containing the details of electors who have applied for a postal vote.[289]

The committee explored whether the details of electors who register to use a potential remote voting system in Victoria should be shared by the VEC with registered Victorian political parties. While the committee did not receive any evidence directly from inquiry participants, the committee notes that the NSW JSCEM considered this issue during its inquiry into the 2015 NSW state election, but did not reach a conclusion.

5.1.7 Alternative electronic voting systems

During the inquiry some participants also proposed alternative electronic voting systems for Victoria.

Australia Post offered to build Victoria "an independent e-voting application that links to [Australia Post's] identity platform".[290] Australia Post's submission discussed how the voting application would rely on blockchain technology:

> "We envisage a vote being an electronic transaction whereby a number of voting "credits" can be "spent" by the voter to attribute preferences. Permission to vote would be secured through the use of secure digital access keys sent securely to each voter. A ballot would be cryptographically represented within the blockchain, with each vote linked to the voter through their preference choice stored within

289 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election and matters related thereto", Parliament of Victoria, Melbourne, May 2016, p.53.

290 Australia Post, *Submission No. 19*, p.2.

> the blockchain in a way that anonymises and protects that information from being publically accessible. Once the election closes the system would simply compile the results from the database. The votes will be verifiable by candidates and voters, while preserving the secrecy of the ballot through a combination of key encryption and digital signatures implemented within the voting solution".[291]

According to Australia Post, their electronic voting application would; "anonymise votes to ensure identities cannot be matched to voting preference; ensure one vote per identity and monitors against misuse; and incorporate robust compliance and audit engines and processes to ensure government and public trust in the system".[292]

Lockstep Consulting also proposed an alternative electronic voting system for Victoria. This system is based on publicly available technology and smart personal authentication devices, such as smartcards or SIMs. According to Lockstep Technologies' submission, "the solution can be deployed on a variety of modern smartcards, SIMs and so on, featuring built-in cryptographic processors".[293]

Electronic delivery – postal returns

Professor Gore and Dr Teague also proposed a system of electronic voting which incorporated electronic delivery of blank ballot material but returns via post. According to Professor Gore and Dr Teague:

> "The idea would be that voters access their list of candidate and party names online, fill out their ballot at home, and then mail it in. Although this remains subject to some of the same vulnerabilities as postal voting, it at least gives voters the opportunity to verify that they send the vote they intended to send...This could be combined with electronic delivery of ballot information, and might improve convenience for some postal voters in Australia...We should consider alternative methods of using the Internet without necessarily trusting it alone to carry completed ballots".[294]

5.1.8 Specific evidence about electoral participation and electronic voting

During the inquiry the committee received evidence from interest groups and representative organisations discussing how particular Victorian communities view electronic voting, as well as their experiences with the current vVote system.

Culturally and linguistically diverse electors

As noted in Chapter Two, electors who do not speak English are able to access vVote and vote in one of 14 community languages programmed into vVote kiosks.

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291 Australia Post, *Submission No. 19*, p.5.

292 Australia Post, *Submission No. 19*, p.5.

293 Lockstep Consulting, *Submission No. 25*, p.p.2-5.

294 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.9.

The committee received a submission from the Ethnic Communities' Council of Victoria addressing electronic voting. One of the major points in the submission was that there is low awareness, based on the Council's research, of the availability of electronic voting and vVote amongst multicultural communities in Victoria. The Council noted VEC research, completed in 2012, which found that there is a "continuing broad lack of knowledge and awareness about enrolment, voting and the Australian electoral system among many culturally diverse communities in Victoria".[295] Further, in 2012, the VEC also found that the vast majority of research participants from multicultural communities had never heard of electronically assisted voting". Several participants in the VEC's research also "mistakenly assumed that electronic voting meant voting online at home, which is yet to be trialled in Victoria and will be considered for the 2018 election".[296]

Despite this, the Council suggested there is evidence that "multicultural communities are interested in receiving training and support to access government services digitally", particularly if the training is provided at preferred locations such as community centres or through 'train the trainer' models.[297]

Vision impaired electors

At the 2014 Victorian state election, vVote was available at six accessibility supercentres. While vVote was developed and tested by the VEC, it was not widely offered for familiarisation to potential users prior to the early voting period.

During the committee's inquiry into the 2014 Victorian state election, the committee received a submission from Vision Australia about the operation of the supercentres, and the overall appropriateness of vVote for vision impaired electors. While Vision Australia commended the VEC for offering vVote, the organisation said that NSW's iVote system was a far superior system to vVote for helping electors with vision impairment to cast a secret ballot unassisted. At the time, Vision Australia told the committee that the location of the supercentres was not optimal, and may have contributed to their poor patronage.[298]

During this inquiry the committee received a further submission from Vision Australia about the experience of vision impaired electors with vVote at the 2014 Victorian state election. The submission has two major focuses. The first discusses how the problems around familiarisation with vVote. Vision Australia noted:

> "Without robust familiarisation opportunities, gesture based input technology is not appropriate and is ineffective for voting in State elections. Vision Australia has provided familiarisation sessions with other gesture based technologies, including the Commonwealth Bank's Albert Payment terminals. This experience has shown familiarisation is essential for users unfamiliar with gesture based inputs as they can

295 Ethnic Communities' Council of Victoria, *Submission No. 27*, p.2.

296 Ethnic Communities' Council of Victoria, *Submission No. 27*, p.2.

297 Ethnic Communities' Council of Victoria, *Submission No. 27*, p.p.2-4.

298 Parliament of Victoria, Electoral Matters Committee, "Inquiry into the 2014 Victorian state election and matters related thereto", Parliament of Victoria, Melbourne, May 2016, p.112.

> practice until they are confident to use the technology in the real setting. Without this, users are focusing on the technology rather than the function of the technology, whether that be making electronic payments or voting".[299]

The second focus was on NSW's iVote system. Vision Australia argued that iVote was a far superior alternative to vVote because it allowed electors to cast a ballot in secret without the assistance of their family members. It also was a convenience for vision impaired electors and their families in that vision impaired electors could vote from their own home, on a device they were familiar with. Vision Australia called on the Victorian Parliament to adopt iVote:

> "We submit there is a system that is already working – iVote – for which the service framework and implementation has been critical in ensuring its success. The Victorian Government can and must do better to improve accessible voting options in time for the next state election".[300]

Vision impaired electors and electronic voting participation

Another theme in the evidence was the use of electronic voting as a tool to facilitate electoral participation amongst vision impaired electors, and electors with disabilities generally.

Vision Australia argued that vVote was ineffective as an electoral platform due to the very low take up noted earlier in this chapter and in Chapter Two, relative to the total number of people in Victoria who have some form of vision impairment:

> "We also consider this model to be ineffective as only 200 voters who are blind or have low vision used EAV at the 2014 Victorian Election. We understand that those who did choose to make use of this voting option were mostly satisfied with the experience. However, there are an estimated 90,000 in Victoria who are blind or have low vision who could have made use of an accessible voting option, were both technology and service delivery improved. Confidence in technology is essential for greater uptake".[301]

Vision Australia proposed that placing restrictions on the criteria for electronic voting had a depressive effect on voter turnout because it prevents family members from voting together.

As noted in Chapter Three, while there was a 505 percent increase in iVote at the 2015 NSW state election compared to the 2011 NSW state election, 91 percent of iVotes were cast by electors outside NSW, and less than eight percent by electors with a disability. The committee discussed these participation figures with several inquiry participants. David Kerslake, Western Australian Electoral Commission, noted his concern about the potential for iVote's introduction at the 2017 Western Australian state election to have a low take up amongst electors with disabilities.

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299 Vision Australia, *Submission No. 17*, p.p.2-4.

300 Vision Australia, *Submission No. 17*, p.5.

301 Vision Australia, *Submission No. 17*, p.2.

> "**Mr KERSLAKE** — To be honest our biggest concern at the moment is that the take-up will not be huge. We are doing a lot of work with disability groups to encourage them and to get them to inform their members. We are doing a lot of work in that area. One of the biggest challenges — and I think New South Wales found this with people such as the blind and vision impaired — is that many of them will over the years have gone to a polling booth with their partner. Their partner at an election is still going to have to go to the polling booth, so many people will still go along with them because they have got into a habit. So that is the big challenge for us — to get the word out to people. From those who have used it, though, in New South Wales, the feedback is that to be able to vote in secret for the first time really impresses people. But our challenge will be to get the numbers up; I acknowledge that".[302]

In response to a question about the Western Australian Electoral Commission's outreach strategies, Mr Kerslake said that the Commission would appoint an outreach officer or project manager to make relevant community groups aware of the availability of iVote and how the system provided an option to cast a secret ballot.[303]

Senior electors

The committee also heard from National Seniors, offering a perspective on the views of electors over 65 on electronic voting and remote voting. While National Seniors generally supported the use of technology to automate election processes, the organisation felt that electronic voting for older Victorians might be better situated in polling places rather than a remote setting; National Seniors' submission noted, citing NSW Electoral Commission evaluation statistics, 25 percent of voters aged over 65 distrust the iVote process and nearly half are unlikely to use iVote in the future.[304]

Overseas electors

As discussed in Chapter Three, there are varying estimates on the number of eligible electors who may be overseas at any one point in time. The Australian Bureau of Statistics estimated that between 1999-2003, there were 346,000 Australian-born people living in other OECD countries: As noted in Chapter Three, considering that the AEC issued just under 75,000 overseas postal votes at the 2010 federal election, this suggests that approximately only one-sixth of eligible Australians living overseas at the time of a federal election are casting a vote.

The committee also learnt during the inquiry that 18,926 postal votes were rejected from the final count at the 2014 Victorian state election because they were received after the postal voting deadline, representing 5.69 percent of all postal votes issued.[305] At the 2010 Victorian state election, 17,138 electors or 5.75 percent of all postal votes were rejected because they were received after the postal voting deadline.[306]

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302 David Kerslake, Western Australian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.4.

303 David Kerslake, Western Australian Electoral Commissioner, *Transcript of Evidence*, 24 August 2016, p.5.

304 National Seniors, *Submission No. 31*, p.2.

305 NSW Electoral Commission, *Submission No. 24*, p.13.

306 NSW Electoral Commission, *Submission No. 24*, p.13.

During the inquiry the committee discussed overseas voting, and methods to potentially assist eligible Victorian electors overseas to cast a vote, with the Victorian Electoral Commission. At the August 2016 public hearings the VEC advised that up to 7 percent of Victoria's population can potentially be out of the country on a short-term basis in November. Glenda Fraser, Election Services Manager, told the committee:

> "In November there are about 7 per cent of those people overseas. I just did a rough calculation, and looking at it — we are only concentrating obviously on those who are on the roll — it looks like there are potentially about 108 600 people out of the country during November who are Victorians who are eligible voters. At the moment we are managing to capture an audience of about 9.2 per cent of those, which has sat pretty steady for the last three elections — around 10 000 people voting overseas at the 34 venues we establish at various high commissions et cetera and embassies".[307]

As noted in Chapter Two, the VEC also provides an email ballot delivery service for electors living overseas. As part of the service the VEC uses email to deliver ballot material "to electors in remote areas or overseas who would experience difficulty in accessing postal facilities".[308] Eligible electors can submit a postal vote application by email, and provide an email address for receipt of ballot material. The VEC "processed each application and then sent two emails to each elector who requested the email ballot material service; the first containing a secure file with all ballot material required to vote, and the second containing a password for the elector to access the ballot material file".[309]

A total of 2,603 emailed ballot packs were despatched during the 2014 Victorian state election compared to 1,212 at the 2010 Victorian state election.[310]

Different models for delivery and receipt of ballot material to electors overseas

During the inquiry the committee explored different potential options for delivering ballot material to electors overseas.

In February 2017 the committee met with the Tasmanian Electoral Commission and discussed their Express Vote service. Express Vote is a form of voting where the Tasmanian Electoral Commission receives applications for ballot material from eligible electors overseas; the Commission distributes ballot material via email, and electors are then able to return ballot material via email.

Express Vote was introduced at the 2010 Tasmanian House of Assembly elections. To apply for an express vote voters were "required to provide their full name, date of birth, current enrolled address and current location (either overseas

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307 Glenda Fraser, Election Services Manager, Victorian Electoral Commission, *Transcript of Evidence*, 24 August 2016, p.6.

308 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

309 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

310 Victorian Electoral Commission, "Report to Parliament on the 2014 Victorian state election", Victorian Electoral Commission, Melbourne, 2015, p.30.

or remote)".[311] Following some criticism of the security of the voter's personal information, the TEC amended this procedure for the following Legislative Council elections to only require, "as an interim measure, the elector's day and month of birth".[312]

For an area to be declared a remote area, the "Tasmanian Electoral Commissioner must be satisfied that electors in that area do not have a sufficient postal service. Voters may apply for an Express Vote until 6pm on the Friday before Election Day. In comparison, overseas voters for Tasmania state elections may only apply for a postal vote until the Tuesday before Election Day".[313]

a) Processing and printing Express Votes

Express vote applications are received as an email. As noted by the Tasmanian Electoral Commission:

> "The voter's details are checked against the roll to ensure they are entitled to vote, and the voter's name placed on the Express Vote register. The first issue of Express Votes is sent within 24 hours of the announcement of candidates. Each Express Vote is issued individually, so as to ensure that Tasmania's ballot paper rules – relating to Robson Rotation – were correctly followed. Subsequent Express Votes are usually issued by 4pm each day during the early voting period until the last day when the final Express Votes were issued by 6:30pm".[314]

According to the Tasmanian Electoral Commission, returned Express Votes are printed and the declaration form processed before separating the declaration form from the ballot paper. To verify a voter's identity, the signature on the declaration is compared to the signature on the enrolment form. Completed Express Votes returned by email or fax are to be received before the close of the poll. Completed Express Votes returned by post are to be completed and posted before the close of the poll but usually have 10 days following the poll to be received. The final step in the process is for the ballot paper images to be transcribed onto actual ballot papers (using the same rotation schedule) before being dispatched to the returning officer for including in their postal vote count.[315]

The committee notes that overall take up of Express Vote has been quite low. At the most recent periodic Legislative Council elections in Tasmania in May 2016, for the divisions of Apsley and Elwick, 164 Express Votes were issued, accounting for 0.4 percent of total turnout. In comparison, 4,386 early votes were issued.[316]

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311 Tasmanian Electoral Commission, *Annual Report 2009-2010*, Tasmanian Electoral Commission, Hobart, 2010, p.32.

312 Tasmanian Electoral Commission, *Annual Report 2009-2010*, Tasmanian Electoral Commission, Hobart, 2010, p.32.

313 Tasmanian Electoral Commission, *Annual Report 2009-2010*, Tasmanian Electoral Commission, Hobart, 2010, p.32.

314 Tasmanian Electoral Commission, *Annual Report 2009-2010*, Tasmanian Electoral Commission, Hobart, 2010, p.33.

315 Tasmanian Electoral Commission, *Annual Report 2009-2010*, Tasmanian Electoral Commission, Hobart, 2010, p.33.

316 Tasmanian Electoral Commission, *Annual Report 2015-2016*, Tasmanian Electoral Commission, Hobart, 2016, p.22.

The committee also considered the security arrangements for Express Vote. As noted in Chapter Three, the Tasmanian Electoral Commission does not provide a guarantee that the Express Vote service is completely secure. Electors essentially waive this right when they choose to vote via the Express Vote service. During the inquiry Professor Gore and Dr Teague discussed all-email balloting systems. While their comments were not specifically directed at the Tasmanian system, they noted:

> "Voting by email is a particularly insecure form of Internet voting. Although commonly (correctly) understood to present serious problems for privacy, email voting also presents a serious risk to integrity. Email accounts are hacked all the time, and email contents or attachments can be modified at the sender's end, the receiver's end, or in many cases in transit".[317]

b) Electronic delivery and return of ballots in the United States

According to VerifiedVoting.org, 31 states and the District of Columbia allow military and overseas voters to return ballots electronically.[318] Yet 22 of these states require that voting systems at home use paper ballots or provide voter-verifiable paper records. Many states also have a legislative provision requiring electors who cast their ballot with the assistance of the internet to waive their right to a secret ballot; 14 states have this requirement in statute, six in regulation.

The impetus for the electronic return of ballot material was to assist military personnel stationed overseas to vote. In 2009 the Military and Overseas Voter Empowerment Act (MOVE) was introduced, addressing some issues facing overseas electors. It requires that election officials provide ballots to military personnel 45 days before Election Day, and to provide ballot material via email. In addition, military personnel are also able to return their ballots free through the US Postal Service.

The committee notes that there is considerable criticism of the electronic return component. According to the Common Cause, a public interest research group researching democracy and elections in the United States:

> "The right to cast a secret ballot in a public election is a core value in the United States' system of self-governance. Secrecy and privacy in elections guard against coercion and are essential to integrity in the electoral process. Secrecy of the ballot is guaranteed in state constitutions and statutes nationwide. However, as states permit the marking and transmitting of marked ballots over the Internet, the right to a secret ballot is eroded and the integrity of our elections is put at risk".[319]

Common Cause argue that people using the internet to transmit their ballot and thus subject to a "second class" voting system:

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317 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.10.

318 Verified Voting Foundation, "Internet voting", Verified Voting Foundation, Carlsbad, CA. Retrieved 1 March 2017 from www.verifiedvoting.org/resources/internet-voting/.

319 Verified Voting Foundation, "Internet voting", Verified Voting Foundation, Carlsbad, CA. Retrieved 1 March 2017 from www.verifiedvoting.org/resources/internet-voting/.

> "Our concern lies with the transmission of marked ballots via the Internet. Internet voting will erode voter privacy and threaten election integrity...[For example] Alaska acknowledges that the system is insecure and may not work, warning voters that "[w]hen returning the ballot through the secure online delivery system, your [sic] are voluntarily waving [sic] your right to a secret ballot and are assuming the risk that a faulty transmission may occur." A similar warning on a physical polling place voting system would be considered unacceptable".[320]

Normative aspects of wide-scale electronic voting

As noted in Chapters Two and Three, two inquiry participants discussed the effect of electronic voting on Victoria's electoral traditions and rituals. Both urged the committee to proceed cautiously with the introduction of wide-scale electronic voting, given the capacity of the technology to negatively impact Victoria's traditional Election Day.

In his submission Professor Graeme Orr said that "by analogy, moving away from the traditional solemnity of answering questions at a polling station and marking and depositing a tangible, paper ballot, will have unpredictable consequences for when we come to understand the act of electing representatives".[321] He also suggested that given increasing levels of overseas travel and Victoria's compulsory voting and enrolment nexus, that electronic voting might only lead to a situation where parents end up voting for children who are travelling overseas, "or a husband for a wife, etc".[322]

Similarly, Christopher Glerum said that electronic voting affected democratic trust:

> "Trust and anonymity are both at stake. This system asks the general public to trust that the machine is coded correctly, trust that it is audited frequently and expertly and trust that human error does not occur. Paper-based voting, as it currently stands, has numerous checks and balances to ensure that human error on the part of one person cannot affect any part of the election. For the reasons listed above, electronic voting cannot provide these safeguards".[323]

5.2 Expanding kiosk voting

While the bulk of the evidence the committee received during this inquiry addressed the potential for Victoria to adopt a remote voting system, several inquiry participants also discussed Victoria expanding, or building on, the VEC's vVote 'closed' system as an alternative to the NSW's iVote model.

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320 Verified Voting Foundation, "Internet voting", Verified Voting Foundation, Carlsbad, CA. Retrieved 1 March 2017 from www.verifiedvoting.org/resources/internet-voting/.

321 Professor Graeme Orr, *Submission No. 5*, p.p.2-3.

322 Professor Graeme Orr, *Submission No. 5*, p.2.

323 Christopher Glerum, *Submission No. 2*, p.5.

5.2.1 Expanding vVote

Several inquiry participants suggested that the parliament should consider expanding vVote.

Professor Gore and Dr Teague proposed expanding vVote on the basis of verifiability and security. They noted that Victoria and Tasmania's kiosk voting systems provided strong evidence of verifiability to electors and for the voting system:

> "The VEC's vVote project is another way to provide verifiable evidence of the correct output, while voters vote by computer in a polling place. The crucial advantage vVote [has] over the "Tasmanian" system above is that there is no need to retain a paper trail at the polling place (or transport a paper trail back to a counting centre) because a full electronic proof is provided to everyone. Hence it is particularly well suited to early and absent attendance voting (e.g. in the London High Commission)".[324]

Professor Gore and Dr Teague proposed extending the eligibility for vVote to "everyone who wanted to use the system, rather than restricting it to just those voters who would require assistance voting on paper". They noted that "if the VEC decided not to rerun vVote in the next state election, they could easily modify the existing open-source software to produce a voter-verifiable paper record instead".[325]

Craig Burton also encouraged Victoria to expand vVote on the basis of the risks presented by remote voting. He said that "a promising way forward for computers in voting has been demonstrated successfully in Victoria with the verifiable system vVote. This system is now well known in e-voting research around the world. This needs further investment".[326]

The committee also notes that some submissions were critical of vVote. Dr Roland Wen and Associate Professor Richard Buckland argued that while vVote was a commendable attempt "at designing a system to address this shortcoming in verifiability, but it was unsuccessful".[327] They were particularly critical of certain aspects of vVote's security and scrutiny apparatus:

> "In the case of the vVote project, the vVote system has received minimal election scrutiny despite the significance of the project. With the exception of our submission to the Inquiry into the Conduct of the 2014 Victorian State Election there has been little commentary on the problems and the lessons that should be learned. Likewise the vVote project lacked technical scrutiny, and this resulted in serious problems and risks not being identified. Although during the project a number of us raised serious concerns over the failure to carry out engineering reviews...these concerns were never addressed. Instead independent audits were deemed unnecessary, and only a single engineering review was conducted, which lasted merely a week and was carried out when the development was almost completed".

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324 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.8.

325 Professor Rajeev Gore and Dr Vanessa Teague, *Submission No. 11*, p.8.

326 Craig Burton, *Submission No. 30*, p.1.

327 Dr Roland Wen and Associate Professor Richard Buckland, *Submission No. 23*, p.2.

In addition, the committee recognises that the VEC, the NSW Electoral Commission and the Western Australian Electoral Commission have suggested that rolling out kiosk-based voting systems to a non-restricted cohort at future State elections is costly, unlikely to stimulate turnout and may not assist electors with disabilities to cast a secret ballot.

Further, the committee notes that the NSW JSCEM also considered introducing electronic voting at polling places for the 2019 NSW state election. This suggestion was proposed by Antony Green and Dr Teague in their submissions to the 2015 NSW state election inquiry. Mark Radcliffe, iVote Manager at the NSW Electoral Commission, cautioned against introducing polling place electronic voting on the basis of cost and the administrative burden associated with rolling out kiosks to all NSW polling places. [328]

The NSW JSCEM concluded that the NSW Electoral Commission should consult with other jurisdictions about the cost and effectiveness of kiosk voting.

Committee's view – electronic voting at Victorian state elections

During the inquiry, and the inquiry into the 2014 Victorian state election, the committee learnt that Victoria's electoral processes are being shaped and challenged by a combination of social, technological and commercial factors. As the VEC told the inquiry, many Victorians now expect to vote early before Election Day. This has created an expectation that people can vote when they want, how they want (i.e., at a place close to their work or home) at a time and place that suits them. Further, several inquiry participants told the committee that people also expect to be able to interact with government processes digitally, using the internet and other online communication tools to complete transactions that have historically involved 'face-to-face' interactions. As a result of these factors, and declining levels of electoral participation at all Australian elections, the committee accepts that it is no longer feasible to provide election services concentrated on a single, traditional Election Day.

Further, the committee also noted that commercial pressures are having an impact on the way electoral commissions deliver services to electors who have special needs, such as vision impairment or other disability, or those who travel or are otherwise outside Victoria on Election Day. Changes to Australia Post's regular mail service have increased the baseline costs of administering postal voting services. Service changes to the regular mail timetable also mean that mail can take up to three business days to be delivered in some parts of rural and regional Victoria. In tandem, the committee was told that these factors have propelled interest in early voting and make the ongoing viability of postal voting tenuous. The committee notes that this statement means that service provision to nearly 300,000 Victoria electors, who voted by post at the 2014 Victorian state election, is at risk.

328 Parliament of NSW, Joint Standing Committee on Electoral Matters, "Administration of the 2015 NSW state election and related matters", Parliament of NSW, November 2016, p.12.

Against this background, the committee explored two possible scenarios for electronic voting at future Victorian state elections; to adopt NSW's iVote system, based on the recommendation of the VEC, the NSW Electoral Commission and the Western Australian Electoral Commission and other inquiry participants; or, reject remote voting and expand Victoria's current vVote kiosk-based voting system.

The committee notes that Victoria finds itself in a similar position to NSW in the mid-2000s. Victoria, like all Australian jurisdictions, is obliged by legislation and as a signatory to the UN Convention on the Rights of Persons with Disabilities to provide a secret and secure voting service for people who require assistance with voting, such as electors with vision impairment, and disabilities. However, as noted by several inquiry participants during the inquiry, including Vision Australia, the system currently used by Victoria – vVote – has over the course of three Victorian state elections combined facilitated fewer than 2,000 binding votes. This low take up is a major problem for the committee; it suggests that Victoria is not providing a service that appeals to electors with disabilities, meaning that the cost-per-vote for administering vVote is completely disproportionate to the level of electoral participation it facilitates. While the committee accepts that vVote provides a level of security and verification to electors who cast a vote using the system – and that the VEC should be commended for the leading role it took in the development of polling-place verified voting systems – this situation is far from ideal.

During the inquiry the committee heard from the VEC, the NSW Electoral Commission and the Western Australian Electoral Commission about Australia's path toward electronic voting. All three electoral commissions provided the following advice; while kiosk-based electronic voting is theoretically safer, NSW's iVote system offers a tried and tested approach to remote voting which, while not perfect, has successfully harvested over 330,000 votes at the 2011 and 2015 NSW state elections combined. In addition, all three electoral commissions demonstrated that electronic voting requires a harmonised, national approach. iVote is successful in NSW but it makes little commercial or economic sense to implement a state-by-state based approach to remote voting. Developing a national, electronic voting capability is, for the committee, and indeed the NSW JSCEM and the Commonwealth JSCEM, a major priority for the future of Australia's electoral administration.

However, stimulating turnout comes with a cost. During the inquiry several inquiry participants told the committee that internet voting is an unsolved problem, and that there is no real way to guarantee that an elector's vote cast over an internet connection is secure and free from tampering. As shown in Chapters Two, Three and Four, verification of remote voting is also a major concern; the committee notes that iVote verification rates were low and that it was possible – although unlikely – that the verification service was unable to do what it was supposed to do; provide evidence of a cast-as-intended vote.

Despite evidence from Australia Post demonstrating the high level of interconnectivity between government and digital, online services – and growing community expectations to use the internet to complete transactions with

government – the committee notes that this relationship is not foolproof. The 2016 Australian Census of House and Population demonstrated that a major, critical public event like the Census could be derailed by a relatively small technical fault; in the Census' case, some commentators note that the whole premise of the Census may have been compromised by the Census website crash, which forced people to complete the Census over a period of weeks, not on a single night. Further, the committee notes recent concerns about the privacy of personal data held by Centrelink and other federal government agencies. These examples offer a salutary lesson for the committee and Victoria; as Craig Burton noted, the internet cannot be exclusively relied upon for high-stakes public events like Victorian state elections.

The committee also remains concerned about aspects of electoral participation and remote voting. While iVote was very good at stimulating voter turnout at the 2015 NSW state election, most people who used the system were probably relatively affluent electors who were travelling or outside NSW. Electors for whom iVote was originally designed – the vision impaired – used the system in greater numbers than vVote, but the overall numbers were still relatively low. The committee notes that this situation supports the latent debate in the electronic voting literature – and evidence the committee gathered in Estonia – that early-stage remote voting systems tend to favour electors who have the means to vote. Further, the committee remains concerned that iVote – despite its security flaws – is marketed as an electoral system for electors with disabilities. There is an uncomfortable tension here, which was pointed out by several inquiry participants; by providing convenience to many electors, 'insecure' remote voting is argued to be a superior form of voting for vulnerable electors. This is a troubling finding. The committee acknowledges there is no easy answer.

On the basis of these arguments, and the weight of the evidence received from inquiry participants, the committee nonetheless supports in principle the VEC's recommendation to provide for a system of remote voting at Victorian state elections. This system should be available to electors who have vision impairment, another form of disability which means they need assistance to vote, electors who are more than 20km from a voting centre on Election Day and electors who are outside Victoria on Election Day.

RECOMMENDATION 1: The committee supports in principle the provision of a system of remote voting at Victorian state elections. The system should be available to a limited category of electors; those who are blind or have low vision, those with motor impairment, those with insufficient language or literacy skills, and eligible electors who are interstate and/or overseas.

RECOMMENDATION 2: The committee recommends the Victorian Electoral Commission work closely with the Australian Electoral Commission, state and territory electoral commissions to develop agreed principles of integrity and security for any electronic voting system, as part of a coordinated effort to develop a national electronic voting capability in Australia.

The committee's support for remote voting comes with a number of conditions. The committee notes Professor Gore and Dr Teague's evidence that remote voting is an unsolved problem. The committee has several concerns about any potential remote voting system.

Security

During the inquiry the committee learnt about potential security breaches of iVote at the 2015 NSW state election, including the FREAK 'man-in-the-middle' attack. Given the issues surrounding the 2016 Census, there is widespread concern in the community about internet transactions with government. While remote voting cannot provide the same, intrinsic level of security as a paper-based system – notwithstanding the fact that paper-based systems can fail, as seen at the 2013 federal election – any remote voting system in Victoria must be secured to the highest possible security standard so that Victorian electors using the system can have a high level of confidence that their vote is as safe as possible from vote tampering and fraud.

Political parties and electronic voting data

The committee notes that registered political parties currently have a right to receive information about electors who apply for postal votes from the VEC, so as to facilitate communication between political parties and constituents. Any expanded electronic voting system should mirror this functionality.

Collaboration and scrutineering

One of the common themes during this inquiry was that while electronic voting seems conceptually simple – Craig Burton and the VEC noted that common use of internet banking has contributed to this perception – any electronic voting system is underpinned by complex mathematical and technical protocols that only a small group of technical professionals are qualified to understand. The committee notes that internet banking allows the system administrator – i.e, the bank, to monitor transactions and manage fraud in a commercial capacity when this is detected. In contrast, internet voting requires that the electoral commission is unable to see how an elector has voted, requiring a 'secret' transaction. Moreover, there is an important balance to be met between administering these systems, ensuring the technical details are appropriately regulated and that scrutineers who wish to view aspects of the electronic voting process are able to understand, and interact, sufficiently with the process. In this context, the committee appreciates Ian Brightwell's suggestion to establish an internet governance board including political party representatives working alongside technical specialists. Partnerships like this offer a way to blend the skills of both technical specialists and party representatives and offer a superior scrutiny and oversight system for remote voting.

Independent reporting

One of the successful features of iVote in NSW is that the system has been subject to various independent, post-election audits (in 2011, by the Allen Consulting Group; in 2015, by PriceWaterhouseCoopers). These reports provide an independent record of iVote's key successes and areas for improvement; any potential remote voting system in Victoria should also be independently audited.

RECOMMENDATION 3: The committee recommends that any remote voting system should be underpinned by the most rigorous security standards available to the VEC. To ensure these standards are met, the committee recommends the Victorian Parliament establish an Electronic Voting Board to oversee technical and traditional scrutiny arrangements for remote voting. The Board should include members of academia with technical expertise in electronic voting, electronic voting specialists and representatives from registered Victorian political parties.

RECOMMENDATION 4: The committee recommends the Victorian Parliament amend the *Electoral Act 2002* (Vic) to provide that the details of electors registering to use any potential remote voting system are shared by the VEC with registered Victorian political parties.

5.3 Election technology at Victorian state elections

As noted in the Introduction this inquiry was not just about electronic voting. It also focused on the ways in which technology can be used to improve the administration and efficiency of Victorian state elections. To this end, as seen in Chapter Three, the committee reviewed evidence about how other Australian jurisdictions use technology to deliver electoral events. The committee focused on two initiatives in particular; electronic roll mark off and electronic ballot paper scanning.

5.3.1 Electronic roll mark off in Victoria

Currently, as noted in Chapter Two, the VEC deployed electronic roll mark off devices – in the form of tablets of personal digital assistants – at all early voting centres at the 2010 and 2014 Victorian state elections. Using the devices electoral officials could mark an elector's name off the roll electronically, with the device linked to the VEC's election management server.

During the inquiry the committee considered how the AEC manages electronic certified lists (ECLs) for federal elections.

At the 2013 federal election, the "AEC piloted the use of ECLs in selected locations to introduce efficiencies into the process to find and mark voters off the electoral roll".[329] The Parliament's Joint Standing Committee on Electoral Matters (JSCEM) considered the use of ECLs in its inquiry into the conduct of the 2013 election

329 Australian Electoral Commission, "Addition Performance Information", Australian Electoral Commission, Canberra, 2016. Retrieved 1 March 2017 from annualreport.aec.gov.au/2016/performance/additional.html.

(*Second interim report on the inquiry into the conduct of the 2013 federal election: An assessment of electronic voting options*). The JSCEM recommended that the "AEC deploy ECLs where possible to all early voting centres and all mobile voting teams at the next federal election".[330] The JSCEM also recommended that ECLs be progressively implemented with a view to eventual replacement of paper lists at all polling places.

Further, an AEC evaluation of ECL usage at the 2013 federal election pilot (and in line with the 2014 JSCEM recommendations) found "that allocating ECLs by polling type rather than specific areas or divisions offered the most benefit in particular, allocating ECLs to early voting centres and mobile teams".[331] As noted by the AEC:

> "At both the Canning Division by-election (September 2015) and North Sydney Division by-election (December 2015) all polling places, early voting centres, and mobile polling teams used ECLs to issue ordinary votes to electors. Training was provided to all polling officials using ECLs for the by-elections. Every polling place was also provided with a contingency supply of materials required to conduct polling in case of ECL failure. Ahead of the 2016 federal election, 1,544 ECLs were deployed (around double the number used in the 2013 election)".[332]

During the Commonwealth JSCEM's 2014 inquiry into electronic voting options the committee considered the costs associated with rolling out ECLs to all polling places. The AEC advised that a wholesale roll-out of ECLs at 2014-level specifications and hardware configurations would be prohibitively expensive, "with indicative costs of over $65 million for deployment to all 150 federal Divisions".[333] Based on these figures, the JSCEM concluded that this was an unsustainable initiative. However, it did encourage the AEC to prepare a detailed cost-benefit analysis and report on this as part of its annual report process.

Committee's view

As noted by the Commonwealth JSCEM, ECLs offer "significant benefits for the delivery of election support services through an improvement in the timeliness and accuracy of roll mark-off management, reduction in paper lists" and more timely election results. The committee supports the use of electronic roll mark off at future Victorian state elections as part of a broader commitment by the VEC and the Parliament to use technology where possible to improve electoral administration.

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330 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, July 2014, p.xvii.

331 Australian Electoral Commission, "Addition Performance Information", Australian Electoral Commission, Canberra, 2016. Retrieved 1 March 2017 from annualreport.aec.gov.au/2016/performance/additional.html.

332 Australian Electoral Commission, "Addition Performance Information", Australian Electoral Commission, Canberra, 2016. Retrieved 1 March 2017 from annualreport.aec.gov.au/2016/performance/additional.html.

333 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, July 2014, p.14.

Given that the VEC already uses electronic roll mark off facilities at Victorian state elections, the committee notes that there is potential for the VEC to conduct similar cost benefit analysis to the AEC, to determine whether it is financially feasible to roll out electronic roll mark off facilities to all Victorian polling places. This analysis should focus not just on the hardware costs, but on the reduced staffing costs associated with the time saved using a traditional paper roll.

Noting the Commonwealth JSCEM's findings, the committee also encourages the VEC to undertake this analysis with a view to assessing whether non-VEC hardware could be utilised for electronic roll mark off purposes, such as onsite computer hardware, including school computers.

RECOMMENDATION 5: The committee recommends that the VEC prepare a detailed cost-benefit analysis for rolling out electronic roll mark off facilities to all Victorian polling places, including early voting centres and Election Day voting centres, at the 2018 Victorian state election. This information should be included in the VEC's 2017/18 annual report.

5.3.2 Electronic ballot paper scanning

As noted in Chapter Three, several Australian jurisdictions use ballot paper scanning technology to capture votes for the purposes of vote counting and storage.

In the ACT, Elections ACT scanned ballot papers using intelligent character technology at the 2008, 2012 and 2016 ACT Legislative Assembly elections. The technology identified preferences shown on every formal paper ballot. Any preferences that could not be identified by the software or that did not meet business rules were verified by electoral officials. All informal ballots continued to be manually rechecked. As part of the process, scrutineers where permitted to observe all aspects of the scanning and to see interpretations placed on ballot papers.

In October 2016 members of the committee and committee secretariat viewed aspects of the scanning process for the 2016 ACT Legislative Assembly election.

For federal elections, the AEC also implemented a ballot paper scanning system for the 2016 federal election, as documented in Chapter Three. The initiative followed a recommendation by the Commonwealth JSCEM that the AEC introduce ballot paper scanning for the 2016 federal election. The system is currently being evaluated by the Commonwealth JSCEM as part of its inquiry into the 2016 federal election.

Several inquiry participants noted the potential for Victoria to adopt ballot paper scanning. Ian Brightwell recommended "the VEC should investigate the use of scanning or data entry of all ballots for the Legislative Assembly".[334] He noted "this will provide a data file of preferences for all paper ballots which can

334 Ian Brightwell, *Submission No. 18*, p.12.

be merged with electronic vote preference data. This approach avoids the need to print electronic votes as paper ballots to support a manual distribution of preferences".[335]

Committee's view

Based on the evidence it received from Elections ACT and Ian Brightwell, the committee notes there is potential for the VEC to implement electronic ballot paper scanning at the 2018 Victorian state election. The VEC should work closely with Elections ACT and the AEC to develop the appropriate solution for Victoria.

RECOMMENDATION 6: The committee recommends that the VEC further investigate electronic ballot paper scanning for the 2018 Victorian state election, and report back to the committee.

Committee Room
Parliament House
27 March 2017

335 Ian Brightwell, *Submission No. 18*, p.12.

Appendix 1
List of submissions

Submission no.	Name	Organisation
1	Dr Geoffrey Goode, President	Proportional Representation Society of Australia Vic Tas Inc
2	Christopher Glerum	
3	Stuart Boyd	
4	Tanjil Wright	
5	Professor Graeme Orr	School of Law, University of Queensland
6	Tom Rogers	Australian Electoral Commission
7	Andrew Hawkey, Electoral Commissioner	Tasmanian Electoral Commission
8	Anthony van der Craats	
9	Warwick Gately AM	Electoral Council of Australia and New Zealand
10	Walter van der Merwe, Electoral Commissioner	Electoral Commission Queensland
11	Dr Vanessa Teague	Computing and Information Systems, University of Melbourne
	Professor Rajeev Gore	Research School of Computer Science The Australian National University
12	Paul Miller, General Counsel	NSW Government Premier and Cabinet
13	Phillip Green, Electoral Commissioner	Elections ACT
14	David Kerslake, Electoral Commissioner	Western Australian Electoral Commission
15	RT Hon David Carter, Speaker, New Zealand House of Representatives	New Zealand House of Representatives Part A
		New Zealand Justice and Electoral Committee Report 2010 Part B
		New Zealand Justice and Electoral Committee Report 2011 Part C
		New Zealand Justice and Electoral Committee Report 2013 Part D
		New Zealand Justice and Electoral Committee Report 2014 Part E
16	Tony Keenan, Chief Executive Officer	Launch Housing
17	Karen Taranto, Acting Advocacy Manager	Vision Australia
18	Ian Brightwell, Senior Consultant	
19	Tim Adamson, State Director, Victorian Government and Tasmania	Australia Post
20	Dr Chris Culnane, Research Fellow	

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Submission no.	Name	Organisation
21	Warwick Gately AM, Electoral Commissioner	Victorian Electoral Commission Part A Victorian Electoral Commission Part B
22	Sam Campbell, Director	Scytl Australia Pty Ltd
23	Dr Roland Wen and Associate Professor Richard Buckland	School of Computer Science and Engineering, The University of New South Wales
24	Linda Franklin, Acting Electoral Commissioner	New South Wales Electoral Commission
25	Stephen Wilson	Lockstep Group Part A Lockstep Group Part B
26	Noah Carroll	Victorian Labor
27	Robert Gruhn	Ethnic Communities Council of Victoria
28	Tamara Wright	
29	Ralph McKay	BigPulse.com
30	Craig Burton	
31	Sarah Saunders Chief Advocate	National Seniors
32	Not available	
33	Not available	
34	Victor Rajewski	

Appendix 2
Public Hearings

Monday 22 August 2016

Name	Position	Organisation
Mr Geoffrey Goode	President	Proportional Representation Society of Australia (Victoria - Tasmania) Inc
Dr Lee Naish	immediate past Vice-President	
Dr Vanessa Teague		Melbourne School of Engineering, University of Melbourne
Mr Christopher Glerum		
Mr Tony Keenan	Chief Executive Officer	Launch Housing
Mr Ian Brightwell	Senior Consultant	
Dr Roland Wen	School of Computer Science and Engineering	University of New South Wales
Mr Marcus Bleechmore	Acting Manager, Government Relations and Policy	Vision Australia
Mr Sam Campbell	Director	Scytl Australia Pty Ltd
Mr Craig Burton	Information Technology Consultant	

Wednesday 24 August 2016

Name	Position	Organisation
Mr Warwick Gately AM	Electoral Commissioner	Victorian Electoral Commission
Ms Liz Williams	Deputy Electoral Commissioner	
Ms Glenda Frazer	Election Services Manager	
Mr Simon Hancock	Information Technology Manager	
Mr Stephen Wilson	Managing Director	Lockstep Group Technologies
Mr Noah Carroll	Victorian Branch Secretary	Victorian Labor
Dr Irene Bouzo	Executive Director	Ethnic Communities' Council of Victoria
Mr Carl Gopalkrishnan	Senior Policy Officer	
Mr Robert Gruhn	Policy Officer	
Mr David Kerslake	Electoral Commissioner	Western Australian Electoral Commission
Dr Chris Culnane	Research Fellow	

Monday 24 October 2016

Name	Position	Organisation
Anthony van der Craats		
Ralph McKay	Founder	BigPulse.com

Monday 5 December 2016

Name	Position	Organisation
Andrew Walduck	Executive General Manager, Trusted eCommerce Solutions	Australia Post
Tim Adamson	State Director, Victorian State and Local Government	

Appendix 3
Domestic site visits

Date	Participant	Organisations
23 November 2015	Mr Ian Brightwell, Director, IT and CIO Provided a presentation on the 'Administration of iVote in NSW'.	New South Wales Electoral Commission
25 May 2016	Mark Radcliffe, iVote Manager iVote seminar, Victorian Parliamentary Library	New South Wales Electoral Commission
26 August 2016	Warwick Gately AM, Electoral Commissioner Viewing of Electronically Assisted Voting at the VEC used at the 2014 Victorian state election	Victorian Electoral Commission
15-16 October 2016	ACT Electoral Commission Meeting with the ACTEC to view electronic voting applications and related matters for the ACT general election	ACT Electoral Commission
18 November 2016	John Schmidt, Electoral Commissioner Linda Franklin, Executive Director, Transformation and Delivery Mark Radcliffe, iVote Manager The Committee received a comprehensive briefing from the NSW Electoral Commission relating to the inquiry into electronic voting, viewing the NSWEC iVote system and discussing their submission to the committee	New South Wales Electoral Commission
16-17 February 2017	Andrew Hawkey, Electoral Commissioner	Tasmanian Electoral Commission
	Dr Richard Herr, Honorary Research Associate	University of Tasmania
	Dr Glen Kefford, Researcher	Office of the School of Social Sciences, University of Tasmania
	Professor Richard Eccleston, Director, Institute for the Study of Social Change and Professor of Political Science, College of Arts and Law	University of Tasmania

Appendix 4
New Zealand site visits

Date	Participant	Organisations
29 February 2016	Kristina Temel, Manager, Electoral Policy Mandy Bohte, National Manager, Electoral Enrolment Centre, Division of NZ Post	Electoral Commission Electoral Enrolment Centre New Zealand
29 February 2016	Dr Mike Reid, Principal Policy Advisor, Local Government, New Zealand Anusha Guler, Manager Democratic Services, Wellington City Council Pallavi Chhibber, Senior Policy Analyst, Department of Internal Affairs Clare Sullivan, Local Government New Zealand, Principal Governance Advisor Democratic Services	Local Government New Zealand Wellington City Council
29 February 2016	Alanna McKay, First Secretary Political Emma Goodwin, Third Secretary Tony Wilson, Political Policy Analyst John Brown, Trade Commissioner	Australian High Commission
29 February 2016	Cameron Cotter, Deputy Party Secretary Stuart Mullin, Membership Development Manager	New Zealand National Party
1 March 2016	Rt Hon David Carter MP, Speaker, Legislative Assembly	Parliament of New Zealand
1 March 2016	Professor Andrew Geddis, Professor of Public Law	University of Otago
1 March 2016	Jacqui Dean, Chair Jono Naylor, Deputy Chair Denis O'Rourke, List Member, New Zealand First Jacinda Ardern, List Member, Labour Party Charlotte Dawber-Ashley, Parliamentary Officer, Office of the Clerk of the House of Representatives Esther Zorn de Reus, Clerk (Acting)	New Zealand Parliament's Justice and Electoral Committee
1 March 2016	Hon David Parker MP, List Member Trevor Mallard MP, Member for Hutt South	New Zealand Labour Party
2 March 2016	Suzanne Snively, Chair Janine McGruddy, Deputy Chair	Transparency International
2 March 2016	Professor Jack Vowles, Professor, School of History, Philosophy, Political Science and International Relations, Victoria University, Wellington	New Zealand Election Study

Appendix 5
International site visits

Date	Participants	Organisations
16 September 2016	Mr John Butler, Commissioner – Middle East, Africa and Turkey	Victorian Government Business Office, United Arab Emirates
19 September 2016	Mr Priit Vinkel, Chief of Staff, Estonian National Electoral Committee (on behalf of Mr Tarvi Maartens, Head of Estonian Electronic Voting Committee who was unable to attend the meeting at short notice)	Estonian Electronic Voting Committee
	Mr Kalle Laanet MP, Chairman of the Constitutional Committee of the Riigikogu Mr Priit Vinkel, Chief of Staff, Estonian National Electoral Committee Ms Erle Enneveer, Adviser, Head of Secretariat, Constitutional Committee of the Riigikogu	Constitutional Committee of the Riigikogu
21 September 2016	Ms Mette Marie Sundbøll Head of Electoral Division, Copenhagen Municipality Ms Christine Boeskov, Ministry of Economic Affairs and the Interior, Electoral Division Professor Kasper Møller Hansen, Centre for Voting and Parties, University of Copenhagen Mr Soren Stauning, Project manager for the digitisation of the procedure for statements of support for new parties aspiring to stand for general elections, Ministry of Social Affairs and the Interior	Copenhagen City Hall Copenhagen, Denmark
23 September 2016	Mr Tom Hawthorn, Head of Policy Mr Mark Williams Policy Manager Ms Suzanne King, Senior Communications Officer	UK Electoral Commission
	Dr Ruth Fox, Director and Head of Research Mr Joel Blackwell, Senior Researcher	Hansard Society
	Mr Robert Harper, Asia-Pacific Programme Manager Commonwealth Parliamentary Association UK Branch	UK Parliament

Date	Participants	Organisations
26 September 2016	Ms Anna J. Leider, General Registrar, Voter Registration and Elections City of Alexandria Mr Paul Stenbjorn, Director of Election Administration and Election Technology Certification and Security Virginia Department of Elections Mr Craig T. Fifer, Director of Communications Office of Communications and Public Information, City of Alexandria, Virginia	Alexandria City Board of Elections
	Ms Linda Lindberg Director of Elections and Registrar Office of Voter Registration Arlington County Mr Craig T. Fifer Director of Communications Office of Communications and Public Information City of Alexandria, Virginia	Arlington County Board of Elections
	Mr Cameron Sasnett, Director of the Officer of Elections and General Registrar Fairfax County	Fairfax County Board of Elections
	Mr Pablo Sierra-Carmona, Staff Assistant Office of Congressman Don Beyer	US Capitol
27 September 2016	Mr Brian D. Newby, Executive Director Mr Ryan Macias Certification, Program Specialist	Election Assistance Commission
	Ms Elizabeth Willis Congressional Liaison Office	Australian Embassy
29 September 2016	Mr Lawrence Norden Deputy Director, Democracy Program Mr Christopher Famighetti Researcher	Brennan Center for Justice
	Mr Scott Novakowski, Counsel Mr Damon L. Daniels Campaigns and Outreach Associate Ms Naila S. Awan, Counsel	Demos
30 September 2016	Mr Craig Jenness, Director Electoral Assistance Division Mr Mansour Sadeghi Electoral/Political Affairs Officer Electoral Assistance Division Mr Maarten Halff, Political and Electoral Affairs Officer Electoral Assistance Division Mr Niall McCann, Lead Electoral Advisor United Nations Development Programme (UNDP)	United Nations Electoral Assistance Division
	Mr Douglas A. Kellner Co-chair Mr Michael J. Ryan Executive Director Ms Dawn Sandow Deputy Executive Director Assembly Member Brian Kavanagh New York State Assembly Member of New York State Assembly Committee on Election Law	New York Board of Elections

Appendix 6
Electoral Matters Committee reports and discussion papers

Report no.	Title	Date
1	Inquiry into the conduct of the 2006 Victorian state election and matters related thereto	June 2008
2	Report on international investigations into political donations and disclosure and voter participation and informal voting	December 2008
3	Inquiry into political donations and disclosure	April 2009
4	Inquiry into voter participation and informal voting	July 2009
5	Inquiry into the provisions of the *Electoral Act 2002* (Vic) relating to misleading or deceptive political advertising	February 2010
6	Inquiry into the functions and administration of voting centres	June 2010
7	Inquiry into the 2010 Victorian state election and matters related thereto	May 2012
8	Inquiry into the future of Victoria's electoral administration – discussion paper	November 2012
9	International investigations into the future of Victoria's electoral administration	August 2013
10	Inquiry into the future of Victoria's electoral administration	March 2014
11	Inquiry into the impact of social media on Victorian elections and Victoria's electoral administration – discussion paper	August 2014
12	Inquiry into the conduct of the 2014 Victorian state election	May 2016