Elections in the 21st Century: from paper ballot to e-voting

The Independent Commission on Alternative Voting Methods

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Membership of the Independent Commission on Alternative Voting Methods

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The first Chair of the Commission, **Keith Hathaway**, resigned in June 2000 when he retired as Chair of the Association of Electoral Administrators and became involved in election monitoring and supervision missions overseas. Sadly, we lost to ill health our esteemed colleague, **George Smith**, Chair of the Association of Electoral Administrators. A third former Commissioner, **Joe Wadsworth**, of Electoral Reform Services, resigned to avoid any conflict of interests when that company entered into partnership with an online voting vendor. Peter Facey joined the Commission to replace Keith Hathaway and Steve Lake replaced George Smith.

The Commission has been extremely well served by its clerk, **Rebecca Williams**, who has been supported by research assistance from **Simon Collingwood** and **David Pepper**.

The Commission was established by the Electoral Reform Society, and is grateful to them for hosting our meetings.

The Electoral Reform Society is very grateful to the members of the Independent Commission for the time which they have so freely given and for their commitment to the development of good electoral practices in the UK. The Society, which has since 1884 been campaigning for the strengthening of democracy (although principally through reform of the voting system), believes that the Commission's report is a major contribution to the debate on the modernisation of the way we vote and that the report should guide the development of policy and practice in this area in the coming years.

Although the Independent Commission was established by the Electoral Reform Society and has been serviced and supported by it, the Society has not sought to influence the Commission's work. The views expressed in the Commission's report therefore do not necessarily represent the views of the Society and, similarly, neither the Commission as a body nor its members individually necessarily support all of the policies of the Society.

Contents

Terms of reference

The Commission shall look into new methods of voting and related matters and draw up recommendations that will ensure that both the security and secrecy of the ballot are maintained and to ensure continued public confidence in the electoral process.

1. By electronic voting we mean all forms of electronic or mechanical equipment for assisting in the counting of votes, e.g.

   a) the mechanical and/or electronic counting, or sorting and counting, of ballot papers;

   b) computer programs to assist returning officers with calculations and in the production of results sheets;

   c) equipment by which voters enter their votes on a console rather than using a ballot paper, and computer disks, or the equivalent, take the place of ballot boxes;

   d) systems in which registers are online and which allow voters to vote at any polling station;

   e) telephone voting;

   f) internet voting;

   g) universal postal voting.

2. The Commission should consider each form of electronic voting, looking at:

   a) the state of the art technology;

   b) its existing use, in the UK or internationally;

   c) the ease of voting and risks of votes being wrongly cast;

   d) the safeguards required against voter impersonation;

   e) transparency and the facility with which candidates and their agents can ensure that there has been no malpractice;

   f) whether there is any place/need for recounts with the different systems;

   g) the ease and speed of counting;

   h) risks and consequences of mechanical failure, power cuts, etc.;

   i) danger of tampering, e.g. by technical staff or hackers;

   j) possible biases which might be introduced by differential access to the voting system, e.g. by those with telephones or internet access;

   k) any implications for turnouts;

   l) advantages which might be offered for more complex forms of vote counting (e.g. STV);

   m) approximate costs of implementation (and savings over manual counting).

   n) data protection problems.

3 The Commission should produce:

   a) guidelines for the safeguards required to preserve the integrity of the election with each form of electronic voting;

   b) recommendations on how far and how fast the Government should move in introducing electronic voting.

Preface

Democracy and Participation

A democracy in which the public does not participate is in trouble. Falling turnout at elections is a worry for all of us, because we know that voting is the most basic act of democratic participation; people who do not vote tend not to participate in other civic activities. It is not the job of the Commission to tell people that they should vote. We respect those who choose to abstain. But we are concerned to promote public participation in democratic life. It is beyond the remit of this report or this Commission to consider matters other than alternative methods of casting and counting votes, but we are strongly in favour of attempts to reinvigorate public participation, whether through the teaching of democratic citizenship in schools, the work of the Electoral Commission or the Government's developing interest in e-democracy.

Our work began before the 2001 election, in the shadow of the 71.3% voter turnout in 1997 – the worst since 1935. In 2001 voter turnout fell by a staggering 12 percent, leaving us in no doubt that the democratic process in the UK is indeed in trouble. Three out of four 18-24 year-olds did not cast a vote in 2001. Historically, voting is associated with higher levels of affluence and education; so, it is particularly disturbing to observe that, as the population as a whole has become progressively more affluent and educated in recent years, voting levels have declined. It would be simplistic and naive to imagine that new methods of voting could redress this drift, unless they were part of a much broader revitalisation of democratic life. So, any recommendations made here must be considered in the context of an agenda for making democracy more accessible and meaningful to citizens. This report is therefore offered as a contribution to a wider commitment to nourish and energise democratic life in Britain.

Do Methods Matter?

Superficially, it would not seem to be the case that the public cares very much about *how* they cast their votes. If voting in elections were abolished or limited tomorrow there would be a huge public outcry, but we doubt very much whether many people are much bothered by how votes are cast or counted. On the other hand, the public, in a number of recent opinion polls and surveys, have stated that current voting methods are inconvenient. People are becoming used to conducting their transactions in flexible ways – by post, phone, in the street or supermarket, and increasingly at home via email and the web – and the burden of walking to a polling station to cast a vote could seem anachronistic. We cannot be sure that all those who cite inconvenience as their reason for non-voting are telling the whole truth; maybe it is easier to blame voting procedures than to admit to inertia or apathy. Critics of the convenience argument say that there is a civic obligation to vote and that those who cannot even be bothered to walk to a nearby polling station are simply irresponsible. Such a view fails to recognise the logistical complications of modern lifestyles.

Whatever the arguments for and against making it easier for people to vote, we are convinced that culture is more important than convenience and that politics is a greater motive for voting than procedures. In short, people vote when they feel that there is something worth voting about and that their votes count. It is up to the parties and candidates, in their campaigning, to provide such incentives; where they do, people will vote, even if

it is not very convenient; where they fail to do this, people will not vote, even if the easiest voting technologies are available to them. Voting is a political act, not merely a procedural one. That does not mean that voting methods need not be considered; as long as a single person who is motivated to participate in an election is prevented from doing so because the method on offer is inconvenient there is a need to address the questions raised in this report.

Assessing Risk

We live in a world of risks. Just as personal health, air and road transport or commercial transactions are prone to risks and newly-perceived dangers, so is democracy. But, unlike most other risks that face us, democracy is a truly collective good: we all need it to work well. The public can only be expected to have confidence in the electoral system if it is based upon transparently fair and robust procedures and working methods. One could argue that public confidence in our current voting methods is not well founded; certainly, the current system is more open to fraud than many believe. Voters in the 2000 US presidential election discovered much about their electoral procedures which undermined their previous confidence. One thing is certain: public confidence in democratic elections takes decades to develop and far less time to destroy.

Dealing with risk is not a matter of eliminating all uncertainties, but of setting clear limits upon the scope for accidents, attacks and errors. In thinking about voting methods, we need to decide how much risk is acceptable. For example, let us imagine that there is a method of voting that is likely to result in higher voter turnout than current methods, but at greater risk to the probity, accuracy or security of the electoral process. Should it be accepted or rejected? The answer does not lie in an absolutist rejection of risk, but a clear policy about where on the spectrum of risks one decides to draw a line. The Commission has spent much time over the past eighteen months trying to draw such lines.

The Commission: Purpose and Principles

The Independent Commission on Alternative Voting Methods was established to examine, analyse and offer recommendations about a range of possible methods for casting and counting votes in UK elections. We have been motivated throughout by a keen awareness of the need for democratic practices to evolve and improve, but also a commitment to resisting changes which would fail to win public confidence or meet the highest democratic standards. The probity, accuracy and security of electoral arrangements are integral to the vitality and credibility of democracy. Everything in the following pages is intended to reflect that principle.

As its name suggests, the Commission is a totally independent body, with no ties to external institutions or organisations. In the course of our deliberations, we have had discussions with Government, and have been invited to submit our findings to them; however rather than seeking to set out a policy for Government, we have produced a set of principles and recommendations upon which we would wish to see such policy based. We have been pleased to take evidence from vendors of election machinery and software; however we have treated this critically and have no ties to such corporate interests. In all of our investigations over the past year and a half, and in the writing of this report, the Commission has acted in an independent and principled way and should be judged in these terms.

I have been privileged to chair this Commission and learn an enormous amount from my fellow Commissioners, as well as those who gave evidence to us.

In examining alternative voting methods, we have constantly kept in mind that any increase, or perceived opportunity for increase, in electoral fraud or malpractice would damage the integrity of the electoral process, the trust of the public and the legitimacy of our elected representatives. We set out ten key criteria which we applied to all methods of voting that we considered:

Security – protection against voter impersonation or tampering

Secrecy – protection against undue influence or traceability of votes other than by court order

Ease of voting and risk of mistakes – voting should be convenient, but also foolproof

Transparency – opportunities for scrutiny throughout the process

Speed and efficiency of counting – having been cast, the counting of votes should not be delayed or made less trustworthy

Accuracy of results – voters deserve an accurate count

Effects on turnout – the maximum number of eligible voters should be encouraged to cast their votes, but not at the expense of differential access

Cost – the process must be affordable and adequately funded

The Commission welcomes the fact that the Government has set in motion the process of examining and piloting alternative voting methods. It is important that these are independently evaluated and we would suggest that the criteria outlined in this report would be appropriate for such studies. Using evidence from places where alternative methods have already been used, this report makes recommendations about the speed and degree to which the Commission believes the Government should be moving forward with various new forms of voting. These recommendations are accompanied by guidelines for the safeguards that the Commission believes need to be in place to preserve the democratic integrity of the electoral process.

Dr Stephen Coleman

Executive Summary

The Independent Commission on Alternative Voting Methods welcomes the current climate of investigation into renewing the electoral and broader democratic processes of the United Kingdom. One part of this agenda is the piloting and possible further extension of new voting methods, and as part of an attempt to address disengagement from the political process we view these as positive developments. However, any change can bring with it suspicion and uncertainty, and it is vital that changes to our electoral process do not render that process more vulnerable, and do not undermine voters' confidence in the system.

It is not only the mechanics of the systems themselves, but also the way in which they are implemented which affects the confidence of voters, and the efficiency and effectiveness of the whole process. Recent elections in the United Kingdom have been characterised by the introduction of last minute legislation, insufficient funding and insufficient time for preparation and the testing and validation of equipment. Nothing will cause a greater loss of confidence than for systems to be introduced without this work being properly carried out.

Elections in the 21st Century: from ballot paper to e-voting examines five alternative voting methods. These are listed below along with a summary of our conclusions and recommendations. The full conclusions and recommendations on each method are at the end of each chapter.

(Universal) Postal Voting

The increased use of postal voting, whether on demand or universal, offers increased convenience to the voter and therefore has the potential to increase turnout at a manageable cost. Access is equal to all.

Problems arise however, with regard to the identity of the individual casting the vote and the secrecy in which the vote is cast. Postal voting does not make voting any more user-friendly or vote-counting any more efficient or accurate.

The Commission recommends:

- that further pilots take place in local elections, European Parliamentary elections and Parliamentary by-elections, across a whole authority, electoral region or constituency respectively, and also in parish and community council elections
- that voters be required to provide their dates of birth (both at registration and in completing the postal vote) in order to avoid personation; otherwise, that Declarations of Identity be retained
- the introduction of a marked register for postal votes, so as to maintain a record of postal voters whose votes were returned and allow checks to be made on whether a vote has been cast in the name of, for example, a recently deceased elector
- that postal voters who have not received their papers and do not have time to be issued with replacements, be allowed to attend a polling station and cast a tendered ballot, so as not to be totally disenfranchised
- that postal voters be made fully aware of the timetable for issuing postal ballots
- that consideration be given to the arrangements for the delivery and return of postal votes

Electronic Counting

The main area in which electronic counting can be beneficial is in increasing the speed and accuracy of the count. However, it does so at considerable cost.

Since this kind of technology affects the counting of votes, rather than the voting itself, it will not have any effect on turnout or increase the user-friendliness of the voting process. Opportunities for scrutiny are somewhat reduced, though a paper audit trail is retained.

The Commission recommends:

- that if such technology is introduced, it should be at polling station level, rather than at a central count; this would allow the inadvertent spoiling of ballot papers to be avoided
- that recounts must be available and that the nature of the recount (electronic or manual) must be governed by fixed, publicised rules
- that rigorous and realistic testing of software and hardware be carried out in situ by the Returning Officer, with candidates and agents given the opportunity to be present

Electronic Machine Voting

As a polling-station based technology, electronic machine voting would not offer any benefits in terms of voter turnout, but equally would not raise any problems of differential access.

Electronic machine voting could make the voting experience more user-friendly by warning people before they cast a spoilt ballot, and by providing voting formats that allow voters with visual and hearing impairments to cast their votes unassisted. Increased speed and accuracy of counting would also be a benefit.

The introduction of this kind of technology would be extremely costly. Opportunities for scrutiny would be substantially reduced, and there would not be a paper audit trail in the traditional sense.

The Commission recommends:

- that further pilots take place at any level of public election (including Parliamentary by-elections), except at a General Election
- that the equipment used be specifically election-dedicated voting equipment
- that rigorous and realistic testing of software and hardware be carried out in situ by the Returning Officer, with candidates and agents given the opportunity to be present; test modes should not be allowed and the test votes should be entered by hand, not as pre-prepared data
- that voting data be recorded and stored in duplicate in case of damage to data
- that voting machines be programmed to allow voters to cast a blank ballot, but that voters be warned before doing so
- that voting machines log all events, by voters and administrators
- that the security of the machines and cartridges be as high as ballot paper security
- that percentage turnout by polling station be made available on request to candidates and their agents during election day
- that a detailed breakdown of voting by polling station be made available to candidates and their agents as soon as possible after the declaration of the result
- that the election data be made available to a court, in the case of a challenge to the result

Telephone voting

Telephone voting offers increased convenience to the voter and therefore has the potential to increase turnout at a manageable cost. Voters could be prevented from inadvertently spoiling their vote, and vote-counting could be much quicker and more accurate than at present.

Problems arise however, with regard to the identity of the individual casting the vote and the secrecy in which the vote is cast.

Opportunities for scrutiny would be substantially reduced, and there would not be a paper audit trail in the traditional sense.

The Commission recommends:

- that further pilots take place, but that these initially avoid combined elections and elections with more than three vacancies
- the introduction of Elector Cards in conjunction with PINs to avoid personation; otherwise to require voters to use their date of birth along with a PIN
- that the voter's identity be stripped from the vote and stored separately, and that no individual or individual agency should have the capacity to match the two sets of records; the two sets of records should only be matched if a court order requires such action to be taken
- that all telephone calls from within the United Kingdom be free of charge
- that PINs be randomly generated
- that buying or selling PINs be made an offence and that the penalties be widely publicised
- that the interactive voice system be as user-friendly as possible and offer the possibility of having the instructions and options repeated at any stage; voters must be given the opportunity to review their choices before confirming their vote
- that there be sufficient telephone lines that at no point do electors have difficulty getting through to the voting system
- that the system should log all aspects of the call
- that voters be allowed to cast a blank ballot, but that they be warned before doing so
- that voters who have not received their security information and do not have time to be issued with replacements, be allowed to attend a polling station and cast a tendered ballot, so as not to be totally disenfranchised
- that a detailed breakdown of voting by the smallest appropriate polling division (equivalent to a polling station) be made available to candidates and their agents as soon as possible after the declaration of the result
- that the election data be made available to a court, in the case of a challenge to the result

Online voting

Online voting offers increased convenience to the voter and therefore has the potential to increase turnout. Voters could be prevented from inadvertently spoiling their vote, and vote-counting could be much quicker and more accurate than at present.

Problems arise however, with regard to the identity of the individual casting the vote and the secrecy in which the vote is cast. Differential access to online technology would be a serious issue.

Opportunities for scrutiny would be substantially reduced, and opportunities of external attack would be significantly increased, particularly in view of the vulnerability of personal computers. There would not be a paper audit trail in the traditional sense.

The Commission recommends:

- that a Technology Taskforce be established prior to any pilots in order to evaluate and challenge the system
- that electors who already have a digital certificate and the necessary software be allowed to use them as a form of voter authentication
- that electors have the option of being issued with an Elector Card by their local authority to be used in conjunction with a PIN; otherwise that voters be required to use their date of birth in conjunction with a PIN

- that the voter's identity be stripped from the vote and stored separately, and that no individual or individual agency should have the capacity to match the two sets of records; the two sets of records should only be matched if a court order requires such action to be taken
- that PINs be randomly generated
- that buying or selling PINs be made an offence and that the penalties be widely publicised
- that there be sufficient servers with adequate capacity that at no point do electors have difficulty getting through to the voting system
- that voters be allowed to cast a blank ballot, but that they be warned before doing so
- that voters who have not received their security information and do not have time to be issued with replacements, be allowed to attend a polling station and cast a tendered ballot, so as not to be totally disenfranchised
- that a detailed breakdown of voting by the smallest appropriate polling division (equivalent to a polling station) be made available to candidates and their agents as soon as possible after the declaration of the result
- that the election data be made available to a court, in the case of a challenge to the result

Overall Recommendations

The Independent Commission on Alternative Voting Methods makes the following recommendations in addition to those referring to specific voting methods contained in the individual chapters that follow. These recommendations apply to the introduction of any new voting methods.

1. We recommend pilots in the use of Elector Cards in conjunction with postal, telephone or online voting.

2. We recommend pilots in electoral registration which provide for more secure methods of voting. Subject to approval from the Data Protection Commissioner, these would gather electors' dates of birth which could be used to enhance the security of all forms of remote voting.

3. Any pilots using new voting methods must be formally assessed by an independent body rather than by those involved in the conduct of the election. Specific criteria must be laid down for the assessment of such pilots.

4. In order to build confidence amongst voters, an information campaign must be a central part of the introduction of new voting methods.

5. With the exception of all-postal elections, we recommend that a multiplicity of voting methods be maintained for the foreseeable future.

6. The Electoral Commission should have responsibility for:

   a) the validation to the highest international standards of any hardware and software used in the electoral process

   b) putting standards in place for the testing and certification of software and hardware at all stages of the electoral process; returning officers should be party to testing at certain stages, and candidates and their agents should also have the option to be present

   c) oversight of the use and validation of any barcodes used in the electoral process

   d) the standardisation of contracts with companies providing equipment

7. Sufficient time must be allowed for any necessary legislative processes to fully take their course before implementation of the new voting methods begins.

8. It is not possible to run effective elections without adequate resources. Since costs will inevitably be incurred in the introduction of new voting methods, we urge the Government to dedicate sufficient funds to implementing any changes.

9. Sufficient time must be available for detailed planning, to include areas such as training and a detailed rehearsal for all staff; a back-up plan in case of power-failure; briefings for all key participants (e.g. candidates and their agents, media etc).

Introduction

Our electoral arrangements are being challenged. The procedures that govern the way in which we cast our votes have remained largely unchanged and largely unquestioned in this country for over a century. Now they are having to face up to increasing competition both from new methods that have emerged as a result of technological advances, such as electronic and online voting, but also from the possibility of extending existing methods which until now have only been used by a small minority of voters, such as postal voting. Consequently, our traditional polling station, paper and pencil method of voting is coming under unprecedented scrutiny. The combination of rapid technological development, concerns about public engagement in the electoral process and the fact that 'alternative' methods are now routine in many other countries, has served to open up the debate in the United Kingdom.

Though technological advances and the desire for progress exert pressures of their own, the most seductive reason for change in the current climate is probably the possibility of increasing turnout at elections, even more so in view of the 59.4% turnout in the General Election of June 2001. Other factors also play their part in the debate, such as the potential for reducing the number of invalid votes, improving the speed and accuracy of election counts, reducing the cost and generally streamlining the process. These factors, which may once have seemed peripheral, have taken on far greater importance in view of the U.S. Presidential election in November 2000 where a close result shone a bright light on these areas of electoral procedure, and in many cases revealed that they did not bear up to such scrutiny.

Current Electoral Arrangements

The electoral law which governs election procedures in the United Kingdom today originated in the nineteenth century, a period when corruption was rife and the votes of the small electorates could be freely bought and sold. The introduction of the Ballot Act in 1872 provided for the first time a secret ballot, greatly undermining the ability of candidates and their agents to buy votes. Several other Acts followed which affected the legal and administrative provisions for elections both at national and local level, including the 1883 Corrupt and Illegal Practices Act which laid down basic rules for the procedures to be followed at elections.

The procedures adopted at the end of the nineteenth century have survived, and they have been recognised for providing free and transparently fair elections. For General Elections, each parliamentary constituency has a returning officer who is responsible for ensuring that all the procedures and election rules are properly applied. For Local Elections, there is a returning officer for each local authority.

Registration: In order to vote, individuals must have their name on the Electoral Register. Each household gets a regular opportunity to fill in a form and list all those residing in that property who are of voting age or who are nearing that age. These forms when returned to the electoral registration officers within local authorities provide the basic information used to compile the local area register of electors. With the recent introduction of 'rolling registration', people are able to change their details, for example if they move house, on a monthly basis at any point during the year. In the period leading up to the election, registered voters are sent a polling card giving details of the date and nature of the election and the location of the appropriate polling station. Provisions exist under the present system for an elector either to vote in person at a polling

station, or (by prior arrangement) by post or by appointing a proxy to vote on their behalf.

Voting at a polling station: On arrival at the appropriate polling station, the voter states his/her name and address. The voter is not required to show any form of identification. When the entry on the Electoral Register has been found, the voter's name is crossed off. The voter's electoral number (from the Register) is then marked on the counterfoil of the ballot paper which is about to be issued. The ballot paper and the counterfoil are both already marked with an identical printed number. The ballot paper is marked with the official stamp. The voter is given the ballot paper which s/he takes to the polling booth in order to cast the vote in secret, by placing a mark, as required, on the ballot paper. Ballot papers, once marked, are deposited in ballot boxes which are in full public view and sealed against tampering prior to the commencement of the poll.

The Count: At the close of poll the ballot boxes are transported to the count location, which for local elections may be in the polling station. Then the boxes are opened and the votes counted by hand in full view of any candidates and agents who choose to be present. Rules are applied to ensure that the Returning Officer, in consultation with the candidates and their election agents, can deal with any ballot papers which are questionable, challenged or void. If the result is close, a recount may be held, at the discretion of the Returning Officer.

Challenges: If there is a formal challenge to the process through the courts, then it is possible to trace individual ballots (by finding the ballot paper which matches the counterfoil number with the particular voter's electoral number written on it), and verify whether or not fraud has taken place, and whether it would have made any difference to the outcome of the election.

Towards Reform

Reasons for Caution

Transparency, security and secrecy. The current electoral arrangements have many strengths, not least their transparency. Candidates and their agents are able to observe each stage of the process. The fact that votes are required by law to be traceable means that there is a deterrent to fraud and a way of identifying it where it has occurred[1]. In this way, both security and secrecy are relatively easy to maintain.

Equal access. The current system provides equal access to everybody on the electoral register, particularly now that polling stations are required to be more accessible to voters with physical disabilities and to provide facilities that will allow partially sighted voters to cast their vote unaided.

Recounts. Recounts, though time-consuming, are not problematic.

Reasons for Change

Turn-off and turnout. Despite the strengths of the current electoral arrangements, recent years have witnessed increasing civic disengagement from the electoral process. Turnout in UK elections at every level is falling. The past decade has witnessed some of the lowest voter turnouts in local elections since records began. The DETR's Green Paper, *Modernising Local Government: Local Democracy and Community Leadership* (1998) points out that 'turnout in local government elections in Great Britain is at the bottom of the European Union league table below almost all industrialised nations.' In the 2001 General Election turnout fell to 59.4%, the lowest level since 1918 (a year in which a significant percentage of the electorate was overseas on military service, and prior to any arrangements for absent voting). Only 23% of eligible voters turned out for the 1998 European election, a lower percentage of the UK population than those who voted in the phone ballot for the final episode of Channel 4's *Big Brother* game show. As Rallings and Thrasher have observed,

> "Since 1992 the slump in participation in elections of all kinds has been marked. The turnout at the local elections, which followed just four weeks after that year's general election was the lowest since 1945. Turnout at parliamentary by-elections over the 1992-97 parliament was on average some 24 percentage points below general election levels. Labour's … successful defence of Leeds Central at a 1999 by-election saw the lowest

1. Many other countries have a more preventative approach to fraud and require that voters show proof of identity before casting a vote. They specify that no link should be maintained between a voter and his/her vote. For a more detailed discussion of this issue see **Ballot Secrecy: Electoral Reform Society/Liberty Working Party Report**, Electoral Reform Society, 1997

peacetime turnout in an individual seat (19.6%). Coupled with plummeting figures for the 1999 European Parliament elections (24%) and the first recorded instance in 1998 of fewer than one in three electors across England voting at local elections (28.8%), concern has been expressed about a crisis of democracy in Britain."

There appears to be a prevalent mood of disenchantment with the political process, combined with widespread ignorance about how it works or whether it matters. The Government set up an Advisory Group on Education for Citizenship and the Teaching of Democracy, under the chairmanship of Bernard Crick, which has reflected upon the need for encouraging political literacy within the school curriculum (1998). But it will take more than lessons in school to revitalise the democratic process. Redressing the drift towards civic disengagement must involve consideration of a number of issues which are beyond the scope of this Commission's work. These include the failure of the parties to campaign on issues in ways that convey real policy differences to electors; the move away from organised party politics towards single-issue campaigning; and the rise of e-politics and new forms of political communication. In short, we are not suggesting that by improving voting methods, as one factor within the electoral landscape, overall turnout will necessarily increase.

There are a number of variables that affect turnout at elections and these have a different impact in different constituencies and at different types of elections. These include: the marginality of the contest, the size and composition of the electorate, the number of parties contesting the election, partisanship of ward, the strength and nature of the party campaigns[2], the identification of an issue, mobility of the population, the media and strength of local identity. All these and more have an effect upon the number of people who turn out to vote at an election.

If it can be shown that a new method of voting – whether by post, online or via digital TV – would substantially increase the number of citizens choosing to cast a vote, that in itself would be a strong argument in favour of providing such an option.

A voter attitude survey conducted by MORI on behalf of the Electoral Commission[3] found that 21% of non-voters in the 2001 General Election said that they "couldn't get to the polling station because it was too inconvenient" with a further 16% saying that they "were away on election day", suggesting that voting arrangements could have a significant impact on voter turnout.

Invalid ballot papers. Though casting a vote is currently not an especially complicated matter, invalid ballot papers are far from uncommon (0.26% in the 2001 General Election[4] and 0.3% in 1997[5]). This means that the voter's intention was unclear, generally because they did not make a mark, they put a mark in the wrong place or in too many places, or the mark revealed the voter's identity. Methods of reducing the number of unintentionally spoilt ballot papers would be welcomed.

Speed of the count. Under the current arrangements, a number of factors contribute to the speed of the count. The level of voter turnout has an effect on the number of individual votes to be counted, and the number of people employed to do the counting is clearly also an important factor. In General Elections, the quickest counts take just under two hours and, barring recounts, most voters can expect to know the result in their constituency by the time they wake up the following morning. A hastening of the announcement of results could be advantageous.

Accuracy of the results. The accuracy of the results is open to a certain margin of human error, but the process is scrutinised by candidates and agents. It would be unusual for the margin of human error to be greater than the difference between the two leading candidates. If the difference is especially close, then a recount can be called. This was the case in sixteen constituencies in the 1997 General Election. Clearly, any way of reducing inaccuracy would be a positive step.

Other factors

Cost. It is estimated that the 1997 General Election cost £52 million of public money[6], a figure which covers Returning Officers' Expenses, but does not include electoral registration. This represents £1.19 per elector. Although the introduction of new

2 For further information on this point, please refer to **Attitudes to Voting and the Political Process**, a survey conducted by MORI on behalf of the Electoral Commission, 4th July 2001

3 Attitudes to Voting and the Political Process, 4 July 2001

4 Calculation based on figures provided by the University of Plymouth for the Electoral Commission, September 2001

5 Calculation based on figures from **Election Expenses**, The Stationery Office, February 1999.

6 The British General Election of 1997, David Butler and Dennis Kavanagh, Macmillan Press Ltd., 1997, p.223

technology would be likely to increase costs initially, it is likely that savings would be made in certain areas of expenditure. Over time, new methods could potentially become more cost-effective, and this is certainly a factor worth examining.

Alternative Electoral Options

The Representation of the People Act 2000 made provision for limited experimentation with our electoral procedures. This resulted in pilot projects being carried out by 32 local authorities in the local elections of 4th May 2000 and in all London boroughs in the elections for London Mayor and Assembly on the same day. These included postal votes on demand, universal postal ballots, electronic machine voting, electronic counting, early voting, extended polling hours, weekend voting and mobile polling stations[7].

Elections within private organisations, not bound by legislation in the same way as public elections (other than the organisation's own constitution), have used alternative methods of voting and counting for many years, with electronic counting, telephone voting and increasingly online voting being quite usual. This is also the case for many Trade Union elections, apart from the top level of elections which are usually required to be postal ballots[8].

Other countries have been experimenting with their electoral procedures for public elections for many years. The state of Tasmania in Australia has held council elections by universal postal vote since 1994; in Brazil, voters have been able to cast their votes electronically since 1996, and as is now well-known, a plethora of different electoral arrangements are in place across the United States, including the use of mechanical lever voting machines since 1892.

The options that the Commission has chosen to consider are those which are likely to have the greatest implications for the integrity of the ballot, rather than those which merely extend or alter the polling period. They are listed and also defined here so that the terms used by the Commission are clear from the outset and are distinguished from other kinds of electoral arrangements which are sometimes, confusingly, known by the same names.

Postal voting: this can either mean **postal voting on demand** as has recently been introduced in Great Britain; or it can mean **universal postal voting**, where there are no polling stations and everyone on the electoral register gets a postal vote delivered to them as a matter of course. The vote is to be returned to the appropriate place by a certain deadline on polling day. Votes are then counted in the traditional way.

Electronic counting: this refers solely to the counting process. The voter goes to the polling station as usual and makes a mark in the appropriate manner on the ballot paper. The completed ballot paper is placed in the ballot box. The ballot papers are then counted by a machine, rather than by hand.

Electronic Machine Voting: this is also polling-station based, but combines the voting and counting processes. It is sometimes known as Data Recording Electronic (DRE). It usually functions as a closed circuit within the polling-station, not linked to any external network (though this need not necessarily be the case); the voter votes by, for example, pressing buttons or touching a screen, and the vote is stored on an electronic memory device within the system. There are not usually any paper ballots. The counting is then a relatively speedy tallying of these electronic records.

Telephone Voting: this is remote voting from land-line touch-tone telephones as found in homes and offices, or from mobile phones. There are no paper ballots and there is no need for polling stations.

Online Voting: this can be in polling-stations or from remote locations such as computer terminals at home or at work, lottery machines, digital televisions, mobile phones or other devices that are connected to an existing external network. Again, there are no paper ballots. The counting process would also be incorporated, and would be an electronic tallying of electronic records.

The report contains a chapter on each of these options. Each chapter examines any existing use of the technology in public elections in the United Kingdom along with any more long-standing or large-scale experience overseas.

7 Piloting New Electoral Arrangements, a Local Government Association briefing for May 2000 elections, LGA Publications, April 2000

8 Here 'top level' refers to elections for the Principal Executive Committee, the General Secretary and the President (if elected).

Postal Voting

Traditionally in the United Kingdom, the use of the postal vote has been restricted to those who, in specific circumstances, are unable to cast their vote at the polling station. Recent changes to postal voting arrangements in Great Britain have, for the first time, allowed for postal votes on demand to any elector. However, postal voting in the United Kingdom, other than in specific pilot schemes, remains a complement to polling-station-based voting. The General Election of June 2001 will provide the material for our examination of postal-votes on demand, with the pilot schemes of May 2000 and overseas examples providing the basis of our discussion of universal postal-voting.

Background

In order to vote by post, electors must apply to have their name put on the Absent Voters List, along with those wishing to cast a vote by proxy, for a single election, a limited period or indefinitely. The first provisions for postal votes in the United Kingdom were made to enable those carrying out national service duties to vote in the General Election of 1945. The Representation of the People Act 1948 allowed for the creation of an Absent Voters List containing the names of those entitled to vote by proxy or by post. These included the names of service voters, and others who could not be expected to vote in person due to:

- the 'general nature' of their occupation (e.g. long-distance lorry-driver)
- duties in relation to the election
- blindness or other physical incapacity
- having to make a journey by sea or air to reach their polling station
- having changed address, beyond the boundaries of the borough, urban district or parish[1]

More recently, holiday-makers and those with short-term illnesses were also added to the list. The Representation of the People Act 2000 made postal votes available on demand for any registered elector in England, Scotland or Wales, even if they are currently resident overseas. Restrictions on eligibility remain for Parliamentary elections in Northern Ireland (see Appendix 1, p. 37).

With restrictions on eligibility in place, postal votes included in the count tended to account for 2 – 3% of all valid votes across the United Kingdom (2.4% in 1997), though the figure is usually higher in Northern Ireland (3.3% in 1997)[2]. In the 2001 General Election, when postal voting was made available to all electors the figure was closer to 5.3%[3].

Postal votes at UK General Elections

General Election	Postal ballots included in the count as a % age of valid votes
1974 (Feb)*	2.0%
1974 (Oct)*	2.9%
1979*	2.2%
1983*	2.0%
1987*	2.4%
1992*	2.1%
1997*	2.4%
2001**	+/- 5.3%

1 The British General Election of 1950, H.G.Nicholas, Macmillan & Co. Ltd, 1951

2 Election Expenses, The Stationery Office, February 1999

3 Calculation based on figures provided by the Electoral Commission in July 2001

4 For example, Strathclyde Water Referendum, March 1994; Council Tax Referendums in Croydon and Bristol, February 2001

* Statistics for 1974 – 1997 from: **Election Expenses**, The Stationery Office, February 1999

** Statistics for 2001 – a preliminary calculation based on figures from the Electoral Commission in July 2001

Postal voting is more commonly used in the United Kingdom for elections in the private sector, such as trade union or professional association ballots where voters are scattered across the country, but not in sufficient numbers to merit the establishment of polling stations. It has also been used for a number of referendums[4].

In other countries, attitudes to postal voting are mixed. In some countries, such as Italy and Belgium, there are no provisions for postal voting for voters residing within the country. Elsewhere, such as the Republic of Ireland and France it is restricted to voters in specifically defined circumstances whereas in countries such as Germany, Canada and New Zealand, postal voting is relatively unrestricted.

Current Postal Voting Arrangements[5] (excluding Parliamentary Elections in Northern Ireland – see Appendix 1, p. 37)

Eligibility: All registered electors in England, Scotland and Wales. The register effectively closes at the beginning of the month during which the election timetable begins.

Application procedure & timing: By filling in and signing a form available from various sources including the local authority Electoral Registration Office, government websites or circulated with other election material. Applications must be received by the Electoral Registration Office by 5pm on the sixth working day before the election.

Timing of mailing: The timing and arrangements for the mailing of ballot materials is at the discretion of the Returning Officer who is required to send out voting materials 'as soon as practicable' after the close of nominations. Postal ballots can be dispatched continuously from that moment onwards until shortly after the sixth day before polling day. These are sent by first-class post by the Post Office or a commercial delivery firm, or are hand-delivered by clerks. The organisation responsible for delivery acknowledges receipt of the number of envelopes and the date on which they were received for onward delivery.

Issuing ballot papers: Only the Returning Officer and his staff are permitted to be present when postal ballots are issued[6]. Every ballot paper must be stamped with the official mark, which is different from the official mark on non-postal ballot papers. The name and number of the voter, as they appear on the electoral register, is called out as each ballot paper is issued. The number is noted on the counterfoil of the ballot paper, and a mark is made against the name on the Absent Voter's List, to signify that a ballot paper has been issued. The requisite number of ballot boxes for receipt of postal voting material are provided and sealed in view of all present at the first issue of postal voting materials. An 'A' is written next to the voter's name on the polling station register, so that the voter is not able to cast a vote at the polling station on Election Day.

Other voting materials: As well as a ballot paper, the voter is sent a Declaration of Identity. This records the ballot paper number sent to the voter. It requires the signature of the voter and the signature and address of a witness known to the voter to testify that s/he is the rightful recipient of the ballot paper. The completed ballot paper is inserted into a small, inner envelope which also bears the ballot paper number. The small envelope and the Declaration of Identity are then inserted into a larger, covering envelope (see Appendix 3, p. 38-40).

Voting period: This depends on when the ballot materials were sent, but is usually between one and two weeks before Election Day. Voters are provided with a pre-paid envelope in which to return their vote (as long as it is in the UK) though votes may also be handed in at a polling station in the relevant constituency on Election Day, or to the Returning Officer. Votes must be received by close of poll on Election Day.

Provision for spoilt/undelivered ballots: If a voter spoils his/her ballot paper, s/he is entitled to request a replacement up until 5pm on the day before Election Day. The Returning Officer will issue a new ballot paper upon receipt from the voter of all relevant voting material (including declaration of identity and envelopes) from the initial issue. If, four days before Election Day (three days in Scotland), a voter has not received

5 Many of these provisions were introduced in the Representation of the People Act 2000 and the Representation of the People Regulations 2001. Prior to this legislation, the rules regarding postal votes in Great Britain more closely resembled those still currently in force in Northern Ireland (see Appendix 1, p. 37)

6 Prior to the legislation mentioned in the previous footnote, candidates and their agents were entitled to be present at the issue of postal ballot papers. This causes disquiet to some members of the Commission.

ballot materials, s/he may contact the local Electoral Registration Office to request replacement materials. If the request is received before 5pm on the day before Election Day, and the Returning Officer is satisfied as to the identity of the voter and has no reason to doubt that the voter did not receive the original materials, provisions will be made to replace the voting materials. A list is kept of all electors who have requested replacement voting materials.

Verification of votes: Ballot boxes containing postal voting materials may be opened before the close of poll, as long as one ballot box remains available for receipt of incoming materials. Candidates and their agents are entitled to be present. The ballot box is opened and the returned envelopes are checked. Any envelopes which contain no Declaration of Identity, or an incomplete Declaration, are "provisionally rejected" at this stage.

Counting of votes: When the inner envelopes are opened, the number on the envelope is checked against the number on the ballot paper. If any of these do not match, they are rejected.

Information from Parliamentary and Local Elections – 7th June, 2001

Parliamentary elections were held on the 7th June, 2001; these were combined with County Council elections in county areas and with unitary elections in a number of Unitary Authorities.

Elections were also held on the same day in many constituencies to fill casual vacancies in individual wards.

It is estimated that combined elections were held in about 35% of the 659 Parliamentary constituencies.

These were the first major elections held after the introduction of rolling registration, postal voting on demand, the shortening of the deadlines for postal and proxy vote applications and a number of other changes to the postal voting process. These changes were introduced by the Representation of the People Regulations, 2001.

The County and Unitary Elections were originally scheduled to be held on the 3rd May but were postponed to the 7th June because of the Foot and Mouth disease epidemic.

Issues around postal voting received significant publicity, particularly the possibility of fraud and also the extreme differences in the take-up of postal voting.

The effect of the Registration of Political Parties Act, 1998 meant that there were no nomination problems of substance. Candidates seeking to confuse the electorate with descriptions close to those of political parties or with similar names were fortunately absent so there was little for the media to focus on in that area. With the result of the Parliamentary election not looking in great doubt it may well be that the publicity about the possibility of postal voting fraud was one of the few election stories left for the media to follow up, and arguably the publicity was disproportionate to the problem.

The key issues which arose in the postal voting area were:-

1. Following the pilots (referred to in pages 22-24) a number of Electoral Registration Officers undertook campaigns to give much greater publicity to postal voting. A number of EROs wrote at least once to every elector inviting applications for postal voting. Well before the elections were announced several authorities already had their highest ever number of postal voters – Stevenage, Cardiff, Newcastle and Norwich all undertook major campaigns and in Stevenage 30% of the electorate registered to vote by post. The national publicity in the run up to elections on postal voting was also significant and effective and many ERO/ROs took advantage of the later deadlines to include information about the availability of postal voting on the poll cards. The overall effect of these measures was a significant increase in the number of postal voters.

   There were however very wide variances from constituency to constituency in the percentage of the electorate registered to vote by post, believed to range from less than 1% in some areas to over 30% in others[7].

7 Figures provided by the Electoral Commission, July 2001

2. The later deadline (moved from 5pm 11 working days before polling day to 5pm 6 working days before polling day) also resulted in increased numbers of postal voters. The 11 day deadline remained for alterations to existing postal / proxy voters.

3. Returning Officers were able to start issuing postal votes as soon as practicable after the 11 day deadline. Practices varied but most ROs issued votes on at least 3 occasions with in many cases the final issue not taking place until Friday 1st June.

4. The 2001 Regulations enabled Returning Officers to deliver postal votes through Royal Mail, by hand or using a commercial delivery service. In practice the vast majority of ROs continued to use Royal Mail. Whilst the period between the first issue and polling day gave sufficient time for postal votes to be delivered and returned, in the cases where postal votes were issued on Thursday 31st May or Friday 1st June the period for Royal Mail to deal with delivery and return was quite short. It is very difficult to gather accurate information as to how many ballot papers were "lost in the post" either on their way to the elector or on the return. Anecdotal information gives rise to concern about the potential numbers. The aftermath of an unofficial strike by Royal Mail workers may well have exacerbated the problems.

5. Each Electoral Registration Officer is required to prepare a list of postal voters. This is then used by the Returning Officer (usually the same person) to issue the postal votes. It is therefore known which electors are to receive a postal ballot paper. There is no provision for recording on the list of postal voters whether a ballot paper has been returned, meaning that there is no postal vote equivalent to the marked copy of the register. Whilst this has always been the case, the tremendous increase in postal vote numbers has focussed attention on the issue. A marked register serves the purpose of helping to detect fraud, and it seems anomalous that an equivalent should not exist for postal votes. It also means that there is no way of checking whether a postal vote was actually received by the RO, and makes it very difficult to conduct an audit of postal vote return.

6. Another amendment to the Regulations was the introduction of an arrangement for the postal voter to request a replacement ballot paper if the postal ballot had not been delivered. The replacement could be requested between 4 and 1 working days before polling day. The voter or the person applying on behalf of the voter has to complete a declaration. This arrangement undoubtedly benefited those voters whose ballot papers had genuinely not arrived. However because of the tighter deadlines and delays in deliveries the numbers of replacement ballot papers issued were significant in some cases. Final statistics remain to be evaluated but one constituency issued over 250 replacements.

7. Further amendments for these elections were:-

   - the ability of the voter to deliver the postal ballot paper to a polling station in the constituency. It has always been possible for the voter or a person on behalf of the voter to hand deliver the ballot paper to the ROs Office;

   - the RO could send a postal ballot outside the UK (previously this was not allowed) but the later deadlines made the time scale for this very tight;

8. At the opening of postal ballots another amendment was the arrangement for the RO to "connect" a ballot paper to a Declaration of Identity if these were delivered separately. Prior to this amendment, it was common where, for example, two elderly people lived at the same address and had postal votes, for the declarations and ballot papers to be mixed. Under the new regulations, this would no longer invalidate the ballot papers.

Information from Pilot Projects

As part of the local election pilot schemes, seven local authorities experimented with universal postal ballots on 4th May 2000. These were:

- Bolton Metropolitan Borough Council – 3 wards
- Doncaster Metropolitan Borough Council – 1 ward
- Gateshead Metropolitan Borough Council – 2 wards
- Norwich City Council – 2 wards
- Stevenage Borough Council – 2 wards
- Swindon Borough Council – 4 wards
- Wigan Metropolitan Borough Council – 3 wards

Four authorities (Amber Valley Borough Council, Eastleigh Borough Council, Gloucester City Council and Milton Keynes Council) experimented with postal votes on demand. Since we have already examined the General and Local Elections of June 2001 as a more recent and larger-scale example of postal votes on demand, we shall confine ourselves here to the universal postal voting pilots.

The pilot schemes were unusual in several respects. The Representation of the People Act 2000, which gave rise to the pilot schemes (see Appendix 2, p. 37), allowed the schemes to differ from normal provisions made under Representation of the People Acts in relation to when, where and how voting takes place. This allowed local authorities not only to hold amongst the first universal postal elections in the history of UK public elections[8], but also to experiment with postal voting procedures. This meant that in several significant respects there were variations in the approach taken by different authorities. The following description of the schemes will concentrate on those areas which depart from normal postal-voting procedures.

Also noteworthy was the fact that, despite the Representation of the People Act 2000 making provision for schemes to take place across a whole authority, the universal postal schemes only covered a handful of wards in each of the authorities. This meant that authorities were running two different sets of voting arrangements simultaneously. They were also doing so under considerable pressure of time due to the relatively late passage of the legislation.

Eligibility: In the wards concerned in the seven authorities, all voters on the electoral register were automatically sent postal voting materials. Doncaster and Gateshead in particular made concerted efforts to contact eligible voters who had changed address since the compilation of the Electoral Register so that ballot papers could be sent to them at their current address. Gateshead placed an advertisement in the Newcastle Journal to this end. Doncaster sent letters to all households asking them to inform the Council of any changes.

Public information: All of the local authorities involved went to considerable lengths to inform the electorate of the new voting arrangements and to explain how they would work. For most authorities, this involved sending information directly to each household, either once or twice during March and April, often instead of a polling card. Wigan concentrated its pre-election efforts on the local press, and only sent information directly to households with the ballot materials themselves. Some authorities, including Bolton and Gateshead, established a telephone helpline for the relevant wards.

Timing of mailing: Wigan began to forward voting materials for hand delivery from the week beginning 10th April (24 days before Election Day). Doncaster and Gateshead were next to dispatch their voting materials, by Royal Mail, on 20th April (14 days before Election Day). The others dispatched their materials over the following days up until Norwich's final dispatch, by hand, on 27th April (7 days before Election Day).

Issuing ballot papers: This appears in all cases to have been done in accordance with current practice, with the one difference being the vast increase in numbers. All authorities had to employ extra staff for extra hours in order to complete the issue.

Other voting materials: Six of the seven authorities included all voting materials required

8 With the exception of some Community Councils in Scotland, elected by universal postal ballot since 1997 (Community Councils within Stirling Council) and 1998 (Community Councils within Argyll & Bute Council).

under the current electoral provisions. Bolton, in its application to conduct a pilot scheme requested permission to dispense with Declarations of Identity. The request was rejected by the Home Office. However, the same request was granted to Gateshead which did indeed, for the first time in a recent public election in the UK, dispense with the Declaration and the double envelope system.

Voting period: As noted above, apart from some voters in Wigan, voters in the various authorities had between just under two weeks and just under one week to cast their postal ballot. Most authorities, with the exceptions of Bolton and Doncaster, also provided specific locations where votes could be delivered in person on Election Day. These locations were usually Council Offices and the facility was available either until 5pm or until close of poll at 9pm. Gateshead, where 11% of votes were returned by hand, also arranged for this facility to be available until 9pm at Whickham Public Library.

Provision for spoilt/undelivered ballot papers: It seems that this was not a major issue in any of the authorities. In Norwich, where six electors contacted the Elections Office because they had not received their voting materials, the Returning Officer arranged for hand-delivery of a set of papers. Each elector was required to sign a declaration to the effect that they had not already received voting materials, that they understood that to vote more than once in the same election would be an offence, and undertaking to return any voting materials subsequently received to the Elections Office. Although it did not arise, Gateshead had decided that it would only provide replacement papers to voters whose voting materials had been returned to the Returning Officer by the Post Office as being undeliverable.

Verification and counting of votes: Wigan was the first authority to start opening its voting materials, eleven days before Election Day. Other authorities began opening the materials from up to four days before Election Day. Candidates and agents either were present or had the opportunity to be. Counting appears to have proceeded according to normal procedures.

Media attention: Above and beyond their own press releases, the seven local authorities appear to have had good media coverage of the pilot schemes.

Information from Overseas

In the United Kingdom, experience of universal postal ballots in public elections has been confined to one-off pilots in a handful of wards within individual local authority areas. There are several instances elsewhere of such elections taking place across an entire state/territory or even an entire country either as a one-off referendum or election, or on a more regular basis. The following examples are far from exhaustive, but have been chosen because of their significance in terms of scale or regularity. They have also taken different approaches to significant aspects of the postal-voting process. Those aspects will provide the main focus of what follows.

The 1997 Australian Election for the Constitutional Convention

The issue of constitutional change in Australia had been gaining prominence for some time when the Liberal-National coalition government was elected in 1996 and pledged to hold a Constitutional Convention to discuss the issues relating to the possibility of Australia becoming a Republic. Those attending the Constitutional Convention, in February 1998, were to be 152 delegates of whom 76 would be elected and 76 appointed.

It was decided that the 76 elected delegates would be chosen by non-compulsory public election conducted by the Australian Electoral Commission (AEC) and that the number of delegates would broadly reflect the balance of representation of the States and Territories in the Federal Parliament. After considering several options, it was decided that the election would be a nationwide universal postal ballot. Election Day was on 9th December 1997.

It is worth noting that registration to vote is compulsory in Australia, and that it is a 'rolling' process. When the register closed on 7th

October 1997, it covered an electorate of 11.9 million. Voting in public elections in Australia is also compulsory and this particular election was an exception in that respect. Although the AEC had previously conducted local elections by universal postal ballot, this was to be the largest conducted in Australia.

Australia is made up of six States and two Territories. The AEC has its Central Office in Australian Capital Territory, a Head Office in the remaining Territory and each of the six States. It also has Divisional Offices in or near each of the 148 electoral divisions.

Eligibility: Everybody on the electoral register on 7th October 1997, two months before election day.

Public information: This was substantial and included advertising, public relations, a national telephone enquiry service and the internet. Advertisements were placed (multi-lingually) in the press and on the radio and television. Local, regional and national media were regularly briefed and featured interviews with AEC staff. The national telephone enquiry service operated on every weekend throughout the election period and was available in several languages. Particular groups were specifically targeted; these were mostly non-English-speaking or Aboriginal communities, or visually impaired electors.

Timing of mailing: The first consignments of voting materials were delivered to Australia Post offices on 28th October (42 days before close of poll) and the final ones were delivered to post offices on 11th November (28 days before close of poll). This process was largely automated, with the help of mailing houses for producing personally addressed envelopes. These were delivered by Australia Post except for areas (180 remote communities) without a regular postal service, where voting materials (19,000 voting packages) were delivered by hand. Delivery of these packages began earlier than the others because of the extra time needed both for delivery and return.

Issuing ballot papers: Candidates were not permitted to be present at the issue, or any other part of the conduct of the election, however, they were entitled to appoint scrutineers. In accordance with Australian electoral law, the ballot papers did not bear any mark that could be associated with an individual voter.

Other voting materials: Along with the ballot paper, voters received a blue ballot paper envelope and a reply-paid envelope. The ballot paper envelope had a tear-off flap attached to it, which could be removed without opening the envelope. The flap was pre-printed with the voter's name, address and unique barcode which represented the voter's electoral registration number. In addition, on this flap, was a declaration where the voters were required to enter their date of birth and to sign a statement to the effect that they were the person named on the envelope, that they were entitled to vote, and that they had not already voted in this election. The voting package also included a State and Territory-specific information booklet entitled 'Your Guide to the Constitutional Convention Election' which included information on how to vote and a list of candidates, their identification numbers and statements.

Voting period: Voters had between almost six weeks and almost four weeks to return their voting papers, by 6pm on 9th December. Ballot papers were returned by post to the Divisional Offices, though voters were also entitled to deliver their ballot papers by hand to any AEC office.

Provision for spoilt/undelivered ballot papers: Voters were able to request replacement voting packages if they had lost or spoilt their ballot paper, or if the package had not been received. The request had to come directly from the elector. These were sent by post until 6pm five days before close of poll, and were available to be collected in person from any AEC office until close of poll. Over 49,000 replacement packages were sent, mostly in response to requests via the national telephone helpline from voters who had not updated their address before the close of the electoral register.

Verification of votes: This was done at the Divisional Offices and the process began as soon as the envelopes started to arrive. The outer envelopes were opened and the blue ballot paper envelopes extracted. Each Divisional Office had a

CD-ROM with a list of its electors, their addresses and dates of birth, created at the close of the electoral register. These offices were also provided with a barcode reader and software which, upon scanning the barcode, could bring up the elector's details on the screen from the CD-ROM. The barcodes were scanned to ensure that the elector details on the envelope and the CD-ROM matched, to make sure that they were entitled to vote and also to ensure that the elector had not already voted. If there were any discrepancies between the voter's details (including the date of birth), or if more than one vote was received in the name of a particular voter, the Returning Officer – checking the date of birth and comparing the signature to that on the most recent application for electoral registration – decided which, if either/any, of the votes would be counted. Any envelopes which did not meet the verification requirements (for example, those without a signature) were rejected at this stage. The ballot paper envelopes were then stored, unopened until the count.

Counting: Counting was conducted at Divisional Offices and also at State and Territory Head Offices. Candidates' scrutineers were entitled to be present at the count, though the candidates themselves were not. The detachable flaps on the ballot paper envelopes were removed at this stage (without opening the envelopes) to maintain the secrecy of the ballot. The envelopes were then opened and the ballot papers extracted and a count done to make sure that the number of ballot papers matched the number of envelopes. The counting began once all of the ballot papers had been classified as being valid or invalid. Because the voting system being used was a transferable one, the counting process was necessarily somewhat lengthy, however some of the results were data-inputted and counted by a computerised system. Though the deadline for the result was 6th January 1998, the result was actually finalised within two weeks and official notification of the results, in a formal announcement by the Electoral Commissioner, was on 24th December 1997.

Universal Postal Voting in Oregon, USA

The State of Oregon has been experimenting with universal postal voting since 1981 when the State Legislature approved its use for local elections. By 1987, it was the method used by most of Oregon's 36 counties for their local and special elections and 1993 saw the first State-wide universal postal election.

1998 was an important year in the development of universal postal voting in Oregon. 41% of Oregon's electors were now registered as permanent absentee electors, meaning that they had opted for a postal vote for every election until further notice. At a polling-station-based Primary election in May, almost two-thirds of the votes cast were postal votes. In November, voters in Oregon passed a measure directing all public elections to be held by universal postal ballot.

Ten State-wide elections have taken place using universal postal voting. The most recent of these was the Presidential Election in November 2000 with an electorate of 1.9 million and the electoral arrangements used for this particular election will form the basis of the following discussion. It is important to note that decisions about many aspects of electoral arrangements are made not by the State, but at county level.

Eligibility: Applications for registration had to be received by (or postmarked no later than) 17th October, 21 days before election day. However, electors already registered in Oregon were permitted to update their details (including their address) after this date up until and including election day itself.

Public information: Information was sent to all electors both in advance of the ballot and in some counties with the voting materials themselves. This consisted of a voters' pamphlet from the Secretary of State which included information about the nature of the election and the location of 'drop-sites', about the candidates and issues to be voted on and statements from the political parties. This information was also available online on the Secretary of State's website. Some counties produced county-specific voters' pamphlets in addition. Telephone numbers for county elections offices were also provided.

Timing of mailing: Most voter packs were dispatched, via the United States Postal Service,

18 – 14 days prior to election day[9]. Voter packs for overseas electors were sent from 45 days before the election, and for electors in other US States from 29 days before the election.

Issuing ballot papers: Members of the public were permitted to observe all stages of the electoral process. There were no counterfoils for the ballot papers, and there is not permitted to be any method of matching an individual ballot paper with a voter.

Other voting materials: In addition to the ballot paper, electors received a secrecy envelope, an outer envelope in which to return the ballot paper and in some counties a localised election information booklet. The completed ballot paper had to be inserted into the secrecy envelope which in turn was to be inserted into the outer 'return' envelope. The outer envelope, apart from the return address, included the name, address and voter identification of the voter and required the voter's signature. In addition, the voters needed to affix a 33cent stamp for the return postage.

Voting Period: Voters had roughly two weeks during which to return their ballot papers, which had to be received by the deadline of 8pm on the 7th November.

Ballot papers could be returned either by post, or by hand to any county election office (one per county) or to any designated 'drop-sites' within the State. There were at least two drop-sites per county and they were required to be open on Election Day for a minimum of eight hours up until 8pm. Some drop-sites were available during the week preceding the election, and some were sited in 'drive-by' locations.

Voters who, for whatever reason, did not wish to cast their vote at home, had the right to cast their vote in a privacy booth. These were available throughout the period that ballot papers were being issued, at county election offices and at some of the drop-sites. These booths were also made available for electors who had changed their registration details too late to enable a ballot to be sent to them by post.

Voters were permitted to call their county election office to confirm that their completed ballot paper had been received.

Provision for spoilt/undelivered ballot papers: In the case of lost, damaged, spoilt or undelivered ballot papers, voters were able to request a replacement voter pack up until 5 days before close of poll from their county elections office. After that, replacement voter packs were available for collection from the county elections office. A record was kept of all voters to whom replacement voter packs were sent, in case of receipt of duplicate/multiple ballot papers.

Verification of votes: This process, which began within a week of the initial dispatch of voter packs, took place at the county election offices. Members of the public were permitted to be present. The process involved verifying the signature on every outer envelope by comparing it with either an electronic signature held on computer, or the signature on the most recent registration application. If there was no signature on the envelope, attempts were made to contact the voter and arrange for them to come to the county elections office to sign the package, or for a replacement voter pack to be sent, or for the package to be returned to them for signing. If the envelope was not signed before close of poll, the vote was not counted. In cases where the signature could not be verified an attempt was made to contact the voter and resolve the problem.

A record was kept of each voter who had returned a ballot paper, enabling administrators to check that they were registered to vote, and that they had not already voted in the election. The envelopes were then stored, unopened until the next stage.

Five days before close of poll, the outer envelopes were permitted to be opened. Once again, members of the public were entitled to be present, and election personnel were required to be from different political parties. The total number of returned envelopes was recorded before the outer envelopes were opened and the secrecy envelopes removed. The outer envelopes were retained in order to serve the purpose of a

9 In previous universal postal ballots in Oregon, voter packs were sent 21 – 18 days before election day. This was reduced in order to allow new voters to register up until 21 days before election day.

'poll book'. From this point onwards, the ballots were totally anonymous. If there was no secrecy envelope (only a ballot paper) or if the secrecy envelope was unsealed, but the outer return envelope was sealed, then the ballot paper was accepted. If the outer return envelope was unsealed and the secrecy envelope was also unsealed or absent, the ballot paper was rejected. The secrecy envelopes were then opened and the ballot papers extracted. Ballot papers were then inspected for irregularities and prepared for the counting process.

Counting: The actual process of counting began on Election Day itself, allowing a significant proportion of votes to be counted, or otherwise dealt with, before close of poll at 8pm, though no results were released until then. Different counties used different vote-counting methods and these fell into the categories of punch-card/data vote systems and optical scan systems.

Evaluation of Universal Postal Voting

Our discussion of the implications of universal postal voting will fall into the following categories:

- **Integrity** (secrecy and security)
- **Participation** (turnout and the quality of the process for the voter)
- **Efficiency** (cost and time)
- **Complementary processes** (public information and party campaigning)

Integrity

a) Secrecy

The right to a secret vote is one of the key factors in the conduct of a free and fair election. If this right can be guaranteed, then bribery and corruption in the form of vote-buying or undue influence cannot exist. The circumstances in which a voter casts his/her vote is crucial to the maintenance of this right. Evidently, in a polling-station-based election, it is relatively easy to guarantee that voters have total privacy in which to cast their vote. As soon as voters are permitted to cast a vote in a location other than a polling booth within a polling station, this element of the process becomes impossible to monitor and extremely difficult to control.

Under United Kingdom law, undue influence is punishable by up to five years in prison and an unlimited fine.

Other than publicising the potential penalties, it is extremely difficult to deal with the problem of secrecy. Although there were no allegations of undue influence during the UK pilot schemes, the Australian universal postal election or in any of the Oregon elections, it is a permanent risk, and on that basis, cannot be ignored. It is worth mentioning that in Oregon, 'privacy booths' were provided throughout the polling period at county election offices (where the ballot papers are issued) and in other accessible locations, for those who wished to make use of them for whatever reason.

b) Security

There are a number of issues regarding the security of the electoral process that are raised by postal voting. These can take place on a small, domestic level or on a large organised scale.

Since a detailed examination of the process of electoral registration is beyond the remit of this Commission, and since improvements to that process, in terms of rolling registration, have recently come into force, for the purposes of this discussion we shall merely state that an accurate and up-to-date register is an essential pre-requisite for a secure election, particularly when postal votes are involved.

Assuming that voting materials are delivered to the correct addresses, there still remains the problem of multiple votes being delivered to a single residence. On a small-scale this could mean individuals within a house having access to the ballot papers of several other people. On a larger scale, there is the situation of a large multiple residence such as an old people's home or a student hall of residence which may have open 'pigeon-holes' for post, accessible not only to all residents but also, potentially, to any visitors. In these situations, it is not difficult to imagine a single person (whether or not they are a registered elector) obtaining multiple ballot

papers and voting several times. This is the crime of 'personation' under UK law.

This problem is not limited to postal-voting since no formal personal identification is required in order to cast a vote in a polling-station beyond simply stating one's name and address. However, large-scale fraud would be difficult in this context due to the danger of being recognised as a multiple-voter by polling-station staff, or to needing to organise a large number of different people willing to vote fraudulently.

"…in reviewing the scheme, both politicians and ourselves the officers feel that we would need to look again at the security aspects of all-postal voting. While no system is immune from abuse…having to vote in person is a check against personation. The existence of marked registers…means that there is a check on who's voted – it's a matter of public record…and under postal voting I would acknowledge that you don't have these checks."

Jonathan Rew, Gateshead Metropolitan Borough Council

The Declaration of Identity has been the method used to deter such actions in the United Kingdom, both in ordinary elections and in the pilot schemes (see Appendix 3, p. 38-40). The Declaration requires the signature of a voter and a witness to the effect that the voter is indeed the person they claim to be. The exception to this rule was the pilot scheme in Gateshead which, with the permission of the Home Office, dispensed with Declarations of Identity and did not replace them with any other security measures. There were no allegations of fraud relating to any of the universal postal pilot schemes.

Declarations of Identity are problematic in a number of respects. Firstly, they work as a purely theoretical deterrent since they are not, and cannot be, checked in any way; Electoral Registration Offices do not have a record of electors' signatures. It would not be difficult for a motivated individual to find a single willing accomplice to act as a false witness, or even for an individual to fill in the form in two apparently different hands; in either case it is unlikely that suspicion would be aroused.

Secondly, there is evidence to suggest that the Declarations are not especially user-friendly, and can cause electors, inadvertently, to spoil their vote. Most of the authorities conducting universal postal pilot schemes had significant percentages of spoilt ballots, ranging from Bolton's 2.5% to Doncaster's 8.4%, the majority of which were due to incomplete Declarations of Identity. Gateshead, without Declarations, had 0.25% spoilt ballots. At the 2001 General Election, the rate of spoilt ballots amongst postal voters was 2.25%, whilst the average rate was 0.26%[10].

"The biggest public reaction was against the Declaration of Identity. People resented what they saw as the third party interference in the voting process. And also that by returning the voting paper, albeit in a separate envelope, with a Declaration of Identity, that there was a loss of secrecy in the ballot. There was a strong reaction to that."

Des Grogan, Bolton Metropolitan Borough Council

As shown in the case-studies from Australia and Oregon, there are alternatives to the kind of Declaration of Identity currently used in the United Kingdom. These involve a check on the voter's identity by comparing information held about the voter (collected at the time of registration) with information provided by the voter at the moment of casting a ballot. These alternatives mean that it is necessary to collect and store extra information relating to electors, such as a signature and/or a date of birth, during the process of electoral registration. Automated processes, whether by means of barcodes, or identification/serial numbers, for the storage and retrieval of this information can evidently streamline the process. This is a possibility that is already being considered in the United Kingdom in relation to elections in Northern Ireland[11]. This kind of solution would require the collection of additional information when the annual canvass takes place or on completion of the registration application and could significantly increase the

10 Calculation based on figures provided by the Electoral Commission, September 2001

11 Electoral Fraud (Northern Ireland) Bill, introduced in the House of Commons on 28th June 2001

cost of preparing the register. There is a possibility also that it could discourage registration.

Though voters would be required to provide supplementary information about themselves, they would no longer have to involve a third party, as a witness, in the process. It would also be information easily memorable for the voter, but unlikely to be known to many other people and would have the benefit of being checkable. Large-scale fraud could be virtually eliminated, and though small-scale fraud could conceivably take place (e.g. within a family who are familiar with each others' dates of birth and, possibly, signatures), the deterrent would be significantly greater than at present due to the facility to check the information.

These kinds of mechanisms would also have the benefit of allowing the creation of a record of those who have voted (an equivalent of the marked register produced for votes cast at polling-stations), and checks to be made on whether a vote has already been cast in the name of a particular voter.

These identity checks could take the form of a Declaration of Identity, involving a signature and/or a date of birth, to be completed by the voter (without a witness), and then enclosed, along with the ballot paper envelope, in the outer return envelope. This solution, however, would retain the high number of separate pieces of stationery sent to electors. It would also do little to reduce the complexity of the current process and the consequent potential for error leading to the invalidation of ballot papers.

Alternatively, as in Australia, the identity check details could be printed on a detachable flap on the ballot paper envelope. This would reduce the pieces of stationery and would remove some of the complexity. The rate of rejected ballots due to incomplete details on the detachable flap in the Australian Constitutional Convention election was 1.49%.

In Oregon the identity checking information was on the outer return envelope, reducing to an even greater extent the amount of stationery and the complexity of the process. Questions of security could arise however over outer envelopes bearing the identity of the voter.

Clearly, whichever method is used, for the sake of secrecy, the voter details must be separated from the ballot papers by the time of opening the ballot paper envelopes and extracting the ballot papers.

Participation

a) Turnout

As discussed in the Introduction to this report, electoral turnout is a complicated issue involving many different and largely immeasurable factors. The basis on which postal voting can claim to have a bearing on turnout, is convenience. Voters are not compelled to vote during specific hours, or even on a specific day. They can vote at a moment which is convenient to them, which does not clash with, for example, professional, domestic or religious commitments, and with any relevant materials (instructions about how to vote, or party campaigning material) to hand. Votes can be returned from the most convenient postbox.

Several of the local authorities conducted post-pilot surveys and these overwhelmingly showed positive responses to universal postal voting in terms of convenience (92% of respondents in Swindon found universal postal voting more convenient; 82.6% of respondents in Stevenage preferred to vote by post and 100% of respondents in Wigan found voting by post easy). A survey conducted in Oregon in 1996[12] found that 76.5% of voters preferred to vote by post, mainly due to increased convenience.

With the wards involved in the pilot schemes it is possible to make a direct comparison with the turnout in the concerned wards in the previous year's polling-station-based elections, as well as with the average turnout across the authority, though it is important to bear in mind that levels of public information and media attention are likely to have been higher than normal.

There was an increase in the percentage of votes cast in all 17 universal postal voting wards. The increases ranged from 6% in Bedwell (Stevenage) to 32% in Whickham North (Gateshead). The turnout figures for all wards appear in Appendix 4, p. 41.

12 **Final Report: Survey of Vote-by-Mail Senate Election**, Priscilla L. Southwell, Department of Political Science, University of Oregon, April 1996

"…7,300 people over the two wards voted, which was roughly 4,000 more than in 1999. So, it actually brought 4,000 people into the democratic process."

Jonathan Rew, Gateshead Metropolitan Borough Council

The Australian Constitutional Convention election had a turnout of 47%. It is not easy to make any meaningful comparisons as this was a one-off election on a very specific issue. It was also a voluntary ballot rather than a compulsory ballot as is the case for most public elections in Australia.

Oregon provides more scope for making comparisons. The turnout in the Presidential Election in November 2000 was 79.8% whereas the national average was 50.3%, though it should be noted that Oregon has a tradition of higher than average turnout in Presidential elections. The previous Presidential elections in 1996 were polling-station-based (though almost 39% of the electorate were registered as absentee voters); the turnout was 71.31%.

Since 1996, the average turnout of polling-station-based elections in Oregon has been 47.44% whereas the average for universal postal ballots has been 56.12% (see Appendix 5, p. 42).

It is interesting to note that a nationwide referendum in New Zealand in 1997[13], the first in the country to be conducted as a universal postal election, achieved a turnout of 80.3%. This represented the highest turnout ever recorded in the country for a stand-alone referendum.

b) Assistance to electors

When votes are cast in a location other than a polling station, voters are to some extent deprived of assistance from an impartial official.

On the other hand, material can be included with the voting materials which gives step by step instructions about how to cast a vote. It is also possible to make assistance available on a telephone helpline.

c) Community considerations

Many people value the experience of attending a polling station on election day because of the feeling it gives that they are participating in the exercise of democracy and are seen to be doing it. Many, particularly in rural areas, look forward to the social element that is part of the present election day activity. This emerged in several of the pilot scheme wards (3 calls to the helpline in Bolton complained about not being able to vote in a polling station; 7% of respondents to the post-election survey in Swindon and 16% of respondents in Stevenage would have preferred to have voted in person).

The only measures which address this issue to any extent, are the provision of dropping-off points for ballot papers in public places, such as public libraries or town halls, and the provision of privacy booths in suitable locations.

Efficiency

a) Cost

The evidence relating to the cost of running universal postal elections is mixed. Both Oregon and Australia show significant savings whilst the local authority pilot schemes were significantly more expensive than polling-station-based elections.

In Australia, the Electoral Commission reported substantial savings. The Constitutional Convention election cost AUS$ 4.28 per voter (or AUS$ 2.01 per elector) whereas the cost of the Federal Election in the previous year, 1996, with compulsory voting, was AUS$ 5.10 per voter/elector.

In Oregon, the polling-station-based 1998 Primary Election cost $5.10 per voter ($1.78 per elector) in contrast with the universal postal 2000 Primary Election which cost $3.03 per voter ($1.56 per elector).

All of the local authorities that piloted universal postal voting experienced net increases in cost, with per ward increases ranging from £3,400+ in Swindon and Wigan to £10,686 in Doncaster. Doncaster estimated that universal postal voting had meant an increase in cost per elector from £0.75 to £1.12.

13 Compulsory Retirement Savings Scheme Referendum, 5th – 26th September 1997

Authority	Overall net increase	Net increase per ward
Bolton	£12,674	£4,225
Doncaster	£10,686	£10,686
Gateshead	£11,000	£5,500
Norwich	£11,720	£5,860
Stevenage	£7,200	£3,600
Swindon	£13,728	£3,432
Wigan	£10,463	£3,488

Universal postal elections provide the opportunity for savings to be made because the following items of expenditure can be dispensed with:

- hiring buildings for polling stations
- employing polling station staff (Presiding Officers, Poll Clerks and Polling Station Inspectors)
- delivering and collecting polling booths and ballot boxes
- printing and delivering poll cards

However, there are also areas of greater expenditure:

- additional stationery printing
- staff time for issuing and opening ballot materials
- postage (outward and return)

The extent of **additional printing** can be limited by replacing a Declaration of Identity with details printed on one of the envelopes. There could also be economies of scale if universal postal voting were extended across areas greater than two or three wards.

The **issuing and opening of ballot materials** was done by hand in the local authority pilot schemes. In both Australia and Oregon a significant degree of mechanisation was introduced into the process, to make the process quicker and less demanding of staff time.

> *"If we're going to have to do it in the future, we'd have to look at mechanical insertion equipment"*
>
> **Des Grogan**, Bolton Metropolitan Borough Council

Although the outward **postage** is fixed and predictable in relation to the size of the electorate, the return postage will increase the higher the turnout. In Oregon significant savings were made by putting the burden of the return postage on the voter.

b) Time considerations

There are three key areas, in terms of timing, in which postal votes can differ considerably from votes cast at a polling-station.

- issuing voting materials
- length of polling period
- verification and counting

Issuing voting materials for an entire electoral area is a potentially time-consuming process. Mechanisation of the process of inserting material into envelopes would speed the process up considerably, and would make staff available for other tasks. There are machines which can fill envelopes with several items at a maximum speed of 30,000 envelopes per hour, and machines which open envelopes at a rate of about 10 – 12,000 per hour. After the pilot schemes, both Norwich and Stevenage pointed out that the requirement for each ballot paper to be stamped with the official mark at the time of issue also contributed to inefficiency in the process of issuing voting materials. Stevenage recommended the use of ballot papers with watermarks instead. Norwich also suggested that the requirement for each ballot paper to have a counterfoil be dropped.

The **length of the polling period** will be affected by a number of factors, including compatibility

with other elements of the electoral timetable and the length of time that is considered to be preferable for voters to cast their vote.

The most important part of the electoral timetable in relation to the timing of postal votes is the close of nominations. This is on the eleventh day before the Election and the statement of persons nominated is published as soon as possible after 5pm on that day. Postal votes cannot be sent prior to close of nominations; however, the process can begin as soon as practicable afterwards.

In the local authority pilot schemes, most voters had a period of 1 – 2 weeks in which to cast their votes. The Australian Constitutional Election allowed voters 4 – 6 weeks whilst in Oregon the polling period is about 2 weeks. The 1997 universal postal referendum in New Zealand[14], mentioned above, allowed a 3-week period for voting.

Voting patterns tend to show that the shorter the voting period, the sooner people cast their votes. In the New Zealand referendum, 45.7% of ballot papers had been returned by the end of the first week of voting. Similarly, in Gateshead, which had a two-week voting period, 55% of papers were returned within the first week. Australia with its significantly longer polling period, received only 11% of all ballots during the first week, though this had risen to a total of 48% by the end of the second week. Thereafter, the weekly rate dropped to 27%, 14% and 7% with a slight increase in the last few days[15].

A lengthy voting period could lead to a number of problems. For example, Doncaster, whose voting period, at two weeks, was not especially lengthy, received a comment from a candidate in one of the pilot wards who felt that the length of the polling period meant that some electors had begun to lose interest. Wigan's post-pilot survey of electors found that 31% of non-voters claimed not to have voted simply because they had forgotten. The authority felt that posting voting materials closer to Election Day would help to reduce such forgetfulness. Evidently, any extension in the voting period could exacerbate these problems and potentially have a negative effect on turnout.

A longer voting period could be problematic in terms of political party campaigning (see page 34). In addition, any move away from the snap-shot that is provided by voting on a single election day, allows the possibility of significant developments occurring during the voting period, meaning that later voters could be influenced by different factors from the earlier voters. The longer the voting period, the greater the potential for this kind of discrepancy.

On the other hand, a voting period should not be so short as to reduce the possibility for increased convenience that is offered to the elector. There also needs to be adequate time to provide any assistance that voters might need and to replace spoilt or undelivered ballot papers.

Verification of votes can be more-or-less completed before election day, and this was done in almost all cases examined above. However, the issue of when to open the inner envelope is a more difficult one. On the one hand, time could be gained by beginning to open the envelopes early on during Election Day, and preparing them for the count, so that the count could proceed relatively quickly on close of poll. However, in the case of a universal postal election, with candidates and their agents entitled to be present, it would be possible for them to gain a fairly accurate picture of the final result before the close of poll, simply by viewing the opening of the envelopes. This was an issue raised by a candidate in one of the pilot wards in Gateshead which began opening envelopes at 1pm on Election Day. On the other hand, waiting until close of poll before opening the inner envelopes would considerably lengthen the counting process.

Complementary processes

a) Public Information

Public information is an important part of any election. It can inform electors that an election is about to take place, of the nature of the election and the candidates who are standing, of the voting arrangements that are in place and how to cast a ballot, as well as who to contact for assistance. With postal voting, when voters do not necessarily have access to information or assistance at the point of voting, it is even more important.

14 Compulsory Retirement Savings Scheme Referendum, 5th – 26th September 1997

15 Voting by Mail, International Institute for Democracy and Electoral Assistance, 1999

Public information can be through the media, or can be delivered directly to each elector either before the polling period or with the voting materials themselves. In Australia, efforts were concentrated on a high-profile national, regional and local media campaign leading up to the election. Detailed information was delivered to electors with the voting materials. In Oregon, information is delivered to electors prior to the polling period, including candidates' statements.

The local authorities differed slightly in their approaches. Wigan focussed primarily on the media and did not deliver information directly to electors except with the voting materials themselves. Its post-election survey revealed that only 49% of respondents could remember reading anything about the pilot scheme. Gateshead, on the other hand, delivered information directly to the electors on two occasions prior to the delivery of voting materials and found that 96% of respondents to its survey had been aware of the universal postal voting pilot scheme. It is also interesting to note that the Elections Office in Gateshead received only eight enquiries or complaints about the voting process.

Where telephone helplines were in place they appear to have been heavily used. In Australia, over 227,000 calls were received. Bolton received about 75 calls. In both cases, a large proportion of these enquiries related to electoral registration, and in Australia, requests for replacement voting materials. Over 10% of Bolton's telephone enquiries were from electors concerned that the inclusion of a Declaration of Identity would mean that their vote would not be secret.

b) Political Campaigning

The extension of the voting period from one specific "polling day" to a longer period inevitably has an effect on the way in which political parties conduct their campaigns. Whilst campaigning can continue throughout the polling period, parties will not know who has and who has not cast a vote or even whether there are areas of high or low turnout. This means that the most influential period in terms of reaching electors who have not already cast a vote, will be prior to the delivery of voting materials, effectively curtailing the campaigning period. For political parties, this means focusing campaigning efforts on the period between close of nominations and delivery of voting materials.

The other important factor for political parties to emerge from the pilot schemes was that, due to Home Office restrictions, no marked register was produced. Whereas, in a polling-station-based election, each elector who casts a vote has a mark placed next to their name on the electoral register, with the universal postal voting schemes, a mark was placed next to every name on the register because a ballot paper was issued to every elector. No record was made of those who had voted as votes were returned. This is a useful tool for political parties in planning future election campaigns, and potentially also for local authorities for the purpose of analysis. Because the marked register is open for public inspection, it can also help to identify fraud.

Conclusions and Recommendations

The cumulative effect of the alterations to the Representation of the People Acts and Regulations, the increase in the numbers of postal voters, and piloting of universal postal voting has been to focus attention on the postal voting process. This has happened amongst the electorate, the media, those concerned about the security of the process and those attempting to undermine it and use it to their own ends. Clearly voting other than in the polling station increases the potential for fraud, and the more postal votes in question, the greater the opportunities. Whilst a number of cases are being investigated, the issue of fraud issue needs to be kept under review and in perspective.

Of equal importance is the efficiency of the process of delivering and returning ballot papers. It is now impossible to know how many voters in the General Election of 2001 were disenfranchised due to their votes being held up in the post, but it is certainly an area in which improvements need to be made.

Evidence from overseas suggests that there are ways in which these and other aspects of postal voting could be improved and made more secure.

The Commission believes that the potential benefits in terms of increased convenience and participation coupled with the desire to find creative ways of limiting the potential risks certainly merit further structured experimentation.

Our recommendations, below, set out the basis on which we believe further experimentation should proceed.

Recommendations

1. Further piloting of universal postal voting is necessary, and the Commission recommends that universal postal voting be piloted in local elections, European Parliamentary elections, and Parliamentary by-elections across a whole authority, electoral region or constituency respectively, and also in Parish and Community Council elections. Evidence discussed in this chapter suggests that these elections would lose least and potentially gain most from using universal postal voting, particularly as regards potential increases in turnout. For the time being, turnout at General Elections remains high in comparison with public elections at any other level, and so we believe that postal-voting on demand remains appropriate and would not suggest a move to universal postal voting.

2. The current methods of adding security to the postal voting process are far from perfect. Declarations of Identity are at best a weak deterrent, they create considerable difficulties and expense for electoral administrators, and confuse electors to the extent that votes are unintentionally spoilt.

   Should the Government be minded to make changes to the way in which electoral registration functions (as has been proposed in the Electoral Fraud (Northern Ireland) Bill), then procedures involving dates of birth and possibly signatures could be used to streamline the security process from the point of view of the electors and the administrators, whilst actually increasing the security of the process. Instead of finding a witness, voters would simply provide their date of birth and/or signature, ideally on a tear-off strip attached to the ballot paper envelope. The strip would be removed after verification in order to maintain secrecy.

   If such changes are not envisaged, then the Commission sees no option but to retain the Declaration of Identity, providing as it does a limited deterrent. Thought should be given, however, to the simplification of the language and layout of the form, and increasing the prominence of warnings about the penalties of committing fraud.

3. The lack of a postal voting equivalent to the marked copy of the register is a major failing – the introduction of such a system should be looked at as a matter of urgency. This could be done in several ways:

   a) by printing the voter's (name and) electoral number on the reverse of the ballot paper envelope, and simply ticking off the name on the postal voters list. However, this option would make it more difficult to ensure the secrecy of the ballots requiring, as it would, those present to keep the envelope face upwards whilst the ballot paper was removed

   b) encoding the voter's name and/or electoral number in a barcode to be printed on the ballot paper envelope and then swiped during the verification process, thereby creating a marked register and ensuring secrecy

   c) printing the voter's name and number on a tear-off strip attached to the ballot paper envelope; the voter could be ticked off the postal voters' list and the removal of the strip after this process would preserve secrecy

   Such arrangements would give a list of postal voters whose votes were returned and prevent double voting where replacements had been issued. It would also allow checks to be made on whether a vote had been cast in the name of, for example, a recently deceased elector.

4. In the case of postal voting on demand, when an elector has applied for a postal vote, but the postal vote has not been delivered and there is not enough time to apply for a replacement, the voter should be entitled to attend a polling station in the relevant constituency and be issued with a tendered ballot paper after answering the statutory questions (suitably amended). In the case of a universal postal election, similar procedures should be in place at a location such as the Town Hall, or wherever the Returning Officer is based. At present a postal voter in these circumstances is totally disenfranchised.

5. The postal vote application form (in the case of postal voting on demand) should include detailed information as to the timetable for issuing postal votes (this is the same for all elections). This would help to ensure that electors going away during the election period were aware of the likely date of delivery of the postal vote in relation to their departure, and give them the opportunity to consider the option of a proxy vote if that were more appropriate. In a universal postal election, such information should be sent to electors at the earliest opportunity, possibly in lieu of a polling card.

6. The Commission is aware of concerns expressed by electoral administrators in relation to the performance of the Post Office in delivering postal votes. The Commission shares those concerns and believes that greater consideration should be paid to the arrangements for the delivery and return of postal votes and that procedures should be as formalised as possible.

Appendix 1 – Eligibility for postal votes for elections in Northern Ireland

a) Registered service voters

b) Those who cannot reasonably be expected

i. to go in person to the polling station allotted

ii. to vote unaided there

by reason of blindness or other physical incapacity

c) Those who cannot reasonably be expected to go in person to the polling station allotted by reason of the general nature of their occupation, service or employment or that of their spouse

d) Those who cannot go in person from their qualifying address to the polling station allotted without making a journey by air or sea

A person applying to vote by post must provide an address in the United Kingdom as the address to which his ballot paper is to be sent.

Source: Representation of the People Act 1985

Appendix 2 – Background to pilot schemes

After the 1997 General Election, the Secretary of State for Home Affairs, Jack Straw, directed that a review of electoral procedures should be conducted, and that it should take into account the decreasing participation in public elections.

In order to conduct this review, the Working Party on Electoral Procedures was established, under the Chairmanship of George Howarth MP, and met for the first time in January 1998. The Final Report was published in October 1999 and included a recommendation that the Home Secretary be permitted to amend electoral legislation to approve pilot schemes to test alternative voting arrangements at a local authority level.

Many of the Working Party's recommendations, including the recommendation on pilot schemes, were subsequently incorporated into the Representation of the People Bill. Predicting the safe passage of the Bill and in accordance with its provisions, the Home Secretary invited local authorities to make applications to conduct pilots schemes.

These applications were submitted by the 11th January 2000 and by 14th February the Returning Officers from each authority received a letter indicating whether or not the application had been successful, pending the Bill's passage through Parliament.

The Bill gained Royal Assent to become the Representation of the People Act in April 2000 and the local authorities whose applications had been successful were able to proceed with their arrangements for the local election on 4th May 2000.

Appendix 3 – Declaration of Identity + inner envelope

Front of form

DECLARATION OF IDENTITY REPRESENTATION OF THE PEOPLE ACTS

Ballot Paper No:

I hereby declare that I am the person to whom the ballot paper numbered as above was sent.

Voter's signature:

The voter, who is personally known to me, has signed this declaration in my presence.

Witness's signature

Name of witness (WRITE CLEARLY)

Address of witness (WRITE CLEARLY)

SEE INSTRUCTIONS ON THE BACK OF THIS FORM

Appendix 3 (continued)

Back of form

INSTRUCTIONS TO THE VOTER

1. You must sign this declaration of identity in the presence of a person known to you. That person should then sign this declaration as a witness, adding his or her name and address. Without this the declaration will be invalid.

2. Vote for one candidate only. Put no other mark on the ballot paper or your vote may not be counted.

3. Mark a cross (X) in the box on the right hand side of the ballot paper opposite the name of the candidate you are voting for. Do this secretly. If you cannot without assistance, the person assisting you must not disclose how you have voted.

4. Put the ballot paper in the small envelope marked "A" and seal it. Then put the envelope marked "A", together with the declaration of identity, in the larger envelope marked "B". Return it without delay. The ballot paper must be received by the returning officer not later than the close of the poll. Alternatively, it may be delivered to a polling station in this constituency on polling day.

5. If you receive more than one ballot paper, remember that it is illegal to vote more than once (otherwise than as proxy) at the same election.

6. At this election you cannot vote in person at a polling station, even if you receive an official poll card.

7. If you inadvertently spoil your ballot paper, you can apply to the returning officer for another one. With your application you must return, in your own envelope, the spoilt ballot paper, the declaration of identity and the envelopes marked "A" and "B". Remember that there is little time available if a fresh postal ballot paper is to be issued and counted.

Regulation 66(b)

Source: Draft Statutory Instrument, Representation of the People (England and Wales) Regulations 2001

Appendix 3 (continued)

Inner Envelope

General Election

Ballot Paper Envelope

No(s): _____

BALLOT PAPER(S) ONLY TO BE ENCLOSED IN THIS ENVELOPE

This envelope, together with the Declaration of Identity, must be placed in the envelope addressed to the Returning Officer.

A

_____ Ward/Electoral Division

Appendix 4 – Election Turnout Figures of Wards in 1999 and 2000

Authority	Ward	1999	2000	% change	Average turnout across authority (2000
Bolton	Bromley Cross	31.6%	45.8%	+14.2	26.8%
	Farnworth	15.1%	26.7%	+11.6	
	Smithills	29.1%	45.5%	+16.4	
Doncaster	Conisbrough	24.5%	40.1%	+15.6	26.2%
Gateshead	Bensham	19%	46.3%	+27.3	29.6%
	Whickham North	30%	62.2%	+32.2	
Norwich	Bowthorpe	18.3% 3	0.7%	+12.4	29.3%
	Catton Grove	21.1%	31.4%	+10.3	
Stevenage	Bedwell	32%	38%	+6	28.1%
	Old Town	33%	49.2%	+16.2	
Swindon	Abbey Meads	N/A	33.4%	N/A	28.6%
	Moredon	19.6%	31.5%	+11.9	
	Parks	17.7%	27.3%	+9.6	
	Penhill	19.5%	30.9%	+11.4	
Wigan	Bedford Astley	18.4%	26.8%	+8.4	19.5%
	Whelley	19.3%	25.9%	+6.4	
	Winstanley	15.1%	25.7%	+10.6	

Sources:

Local Authority reports

Local Elections Handbook 2000, Colin Rallings and Michael Thrasher, Local Government Chronicle Elections Centre, 2000

Appendix 5 – Elections in Oregon since 1996

Date	Election	Voting method	Turnout
30th January, 1996	Special US Senate General	Universal postal	66.32%
12th March 1996	Presidential Preference Primary	Universal postal	57.62%
2nd April 1996	Special Congressional Primary	Polling-station	34.2%
21st May 1996	Biennial Primary	Polling-station	37.75%
5th November 1996	General	Polling-station	71.31%
20th May 1997	Special	Universal postal	42.11%
4th November 1997	Special	Universal postal	57.62%
19th May 1998	Primary	Polling-station	34.9%
3rd November 1998	General	Polling-station	59.02%
2nd November 1999	Special	Universal postal	38%
16th May 2000	Primary	Universal postal	51.29%
7th November 2000	General	Universal postal	79.8%

Source: Oregon Secretary of State, Elections Division

Electronic Counting

Unlike postal voting, there has been no long-standing use of electronic counting in public elections in the United Kingdom, though it has begun to be piloted. As is now well-known, mechanised counting of one form or another has been used for many years in the United States of America, and some parts of Norway have also used electronic counting for about 10 years. The experience of the voters in casting their votes is not generally *greatly* affected by electronic counting beyond relatively minor changes to the format of the ballot paper. Rather than having an effect on levels of participation therefore, electronic counting is intended to improve the speed and accuracy with which the result of the election is delivered.

Current vote counting arrangements in the United Kingdom
(rules for elections to the European Parliament differ from the following in several respects)

In General Elections, counting usually takes place in a suitable centralised location within each constituency. Local Election counts also tend to take place in centralised locations, though these can sometimes be split into two or three sites. In both cases, votes are counted as soon as practicable after close of poll, which usually means on the evening of polling day. Ballot boxes are taken from polling stations to the central count under the direction of the Returning Officer (often with the assistance of the police), or otherwise are put into secure storage until the beginning of the count.

Those entitled to attend the count include the Returning Officer, his/her staff, the candidates and their spouses, the election agents and specifically appointed counting agents. The Returning Officer is able to admit others to the count as long as s/he is satisfied that their presence will not in any way impede the progress of the count or compromise the secrecy of proceedings. All present at the count are made aware of the requirements of secrecy at the count and the penalties for infringing those requirements.

The first stage of the count is to open the ballot boxes and count and record the number of ballot papers in each. The next step is the verification of the ballot paper account as submitted by the presiding officer of each polling station; the Returning Officer draws up a statement as to the result. This allows the Returning Officer to check that all votes cast have reached the central count, and that no unused ballot papers have been illegally added to the votes cast.

The ballot box(es) containing the already processed valid postal ballot papers are also added to the count.

Before the ballot papers are counted in terms of the votes cast, ballot papers must be mixed with those from at least one other ballot box so that it is not possible to deduce the voting preferences of any particular polling district. Postal votes must be mixed with ballot papers from at least one polling-station ballot box, and one ballot box must be kept back in order to mix with the final ballot box to reach the central count.

Ballot papers are then sorted into piles of votes for each candidate, and are bundled into batches of between 10 and 100. Doubtful ballot papers are set aside for adjudication by the Returning Officer in the presence of the candidates and their agents. Counting agents sit and watch the counting process.

Procedures vary somewhat if there is more than one vacancy to be filled. Votes cast in a block for candidates of the same party can be sorted and counted together relatively easily. For votes cast across party lines, as is often the case in parish council elections with large numbers of candidates, more complicated procedures are required. This can involve counting clerks sitting in pairs, with one calling out the names of the candidates for whom votes have been cast, and the other making a stroke on a counting sheet in the appropriate place. Another solution involves sticking 15 – 20 ballot papers alongside each other on a large piece of card, overlapping so that only the voted part of the paper shows; a column on the far right hand side of the card enables tallying of votes cast for each candidate on all of the ballot papers.

During the counting process, ballot papers are kept face up, so as not to expose the serial number printed on the reverse which could give rise to an opportunity to identify the voter.

Ballot papers which are unquestionably invalid are those:

- which do not bear the official mark
- which bear a mark by which the voter could be identified (other than the serial number)
- on which the voter has not placed any mark
- on which the voter has cast votes for more candidates than s/he was entitled to do so

For other doubtful ballot papers, the criteria by which they are judged to be valid or invalid is whether the voter's intention is clear. Any ballot papers deemed to be invalid are marked 'rejected' by the Returning Officer. If any of the counting agents disagree with the Returning Officer's decision, the Returning Officer must also add 'rejection objected to' to the ballot paper. An account is drawn up of the invalid ballot papers and the reasons for which they were rejected.

When the counting is complete, the Returning Officer informs the candidates and their agents of the results. Candidates and their agents may request a recount, particularly if the result is close, and the Returning Officer will agree if s/he considers the request to be reasonable.

The final result is declared forthwith by the Returning Officer.

All ballot papers, counterfoils and other election materials are sealed up in packets and kept in secure conditions for a year and then destroyed.

Electronic Counting Systems

Punchcard systems

Punchcard systems have been used in the United States since the 1960s. The ballot paper is a piece of card, and instead of making a mark with a pen or pencil on the ballot paper, the voter is required to make a hole in the ballot paper to indicate a preference.

There are two different kinds of punchcard, both of which can have counterfoils: one is the 'votomatic' and the other is the 'datavote' card. The votomatic card is most widely used in the United States, because it allows voters to express preferences on many different issues at the same time, all on the same ballot card. A series of numbered boxes, arranged in columns, are printed on the card (without any words). The names of candidates or the 'referendum' issues are printed in a special, hinged booklet. Both the ballot card and the hinged booklet are inserted into a special frame. As the voter turns each page of the booklet, only the printed boxes in the column relevant to the election or referendum issue on that page are exposed. The places where holes may be punched are pre-scored, and voters use a stylus to punch holes in the relevant boxes to mark their preferences.

Datavote cards differ from the votomatic cards in that they have the candidates' names and referendum issues printed onto them, with a corresponding box in which to punch a hole to show a preference. The cards are not pre-scored, and special mechanical hole-punching devices are used, which cleanly remove the 'chad' (the little piece of card to be removed) from each hole.

The cards are then fed through a computerised card reader which detects the location of the holes punched and records the totals. The reader can be programmed to reject ballots papers with too many votes, without a vote, or those which are unreadable.

Counting can take place within the polling station, in which case the reader functions as the ballot box and can warn a voter if they have cast an invalid vote, giving the opportunity to recast a valid vote. The results would then be communicated to the central tallying location. Otherwise, the ballot papers can be transported to a centralised location for counting.

Optical scanning systems

There are a number of different types of optical scanning systems, for example Optical Mark Reading (OMR), also sometimes known as Marksense, Optical Character Recognition (OCR) and Intelligent Character Recognition (ICR). From the point of view of the voter, they alter the voting process less than punchcard systems. Candidate names or referendum issues are printed on the ballot paper and voting involves making a mark next to the appropriate name(s) or option(s) with a pen or pencil. The mark must be in a very specific area on the ballot paper, and may be a cross, or an area (for example, an oval or a rectangle) to be filled in to mark a preference, or an arrow to be completed, or with preferential voting, numbers in order of preference.

As with punchcards, the ballot papers are then fed through a computerised scanner which detects the location of the darkest marks in the specified areas on the paper by measuring the reflected light (OMR) or the location of different numbers on the paper (ICR) and records the totals. Once again, the scanners can be programmed to reject ballot papers which bear no mark, which bear too many marks or unreadable marks. This can be done within the polling station, in which case the scanner functions as the ballot box and can warn voters if they have cast an invalid vote and giving the opportunity to recast a valid vote. Otherwise, the votes are inserted into ballot boxes (usually without folding and sometimes with a secrecy folder) and transported to a centralised location for counting.

This kind of technology has been used in some municipalities in Norway since the early 1990s, and Bosnia and Herzegovina (1998 and 2000), Hong Kong (2000), some polling stations in Russia (1995 & 1996) and Venezuela (since 1999).

Data-input systems

Some vote counting systems use standard personal computers and require the data from the ballot papers to be entered either manually, or by means of a bar-code reader attachment. These systems do not greatly change the experience of the voter in that they are presented with a ballot paper with a list of candidates, beside which they make their mark, with a pen or pencil, to express their preference. The only difference with a bar-code system would be the presence of a bar-code next to the name of each candidate on the ballot paper. At the count, election staff swipe the bar-code next to the name of the candidate chosen by the voter, and the vote is tallied by the computer software.

In the case of a voting system which involves a complicated count, as is the case with some proportional systems, it is possible to count the ballots by hand but to enter the totals into a computer programme to calculate the final result.

Examples of countries which use computerised counting in this way are Australia, Bulgaria, Hungary, Lithuania, Russia, South Africa and Ukraine.

Information from Pilot Projects

As part of the local election pilot schemes, two local authorities experimented with electronic counting on 4th May 2000. These were Broxbourne Borough Council and Three Rivers District Council. Elections for the London Mayor and Assembly, held on the same day, also piloted the use of electronic counting.

Broxbourne (Data-input)

The electronic counting pilot in Broxbourne Borough Council took place in four of the twelve wards in which elections were taking place, with

one councillor to be elected in each ward. The four wards selected (namely Wormley/Turnford, Cheshunt Central, Cheshunt North and Hoddesdon North) were those with the largest electorates.

The system used was a data-input type system similar to that developed by Epping Forest District Council in 1990 and used in parish council and council shire authority elections there. A demonstration of the system was given prior to election day for candidates and their agents in the relevant wards.

Barcodes were printed onto the ballot papers, with a specific barcode for each candidate, printed to the left of his/her name. Voters marked their ballot papers in the usual way, by placing a cross in a box to the right of the name of the favoured candidate. Ballot papers were then folded and 'posted' into sealed ballot boxes in the traditional manner. There was no evidence to suggest that the addition of barcodes to the ballot paper had in any way confused the voters or caused any ballot papers to be spoilt.

Existing local authority equipment was used for the count, and consisted of one computer and one barcode reader per ward. Broxbourne Borough Council also designed the software that was used.

4,875 votes were cast across the four wards. Within each ward, ballot papers were initially sorted into piles according to the candidate for whom the vote had been cast. One member of staff per ward then used the barcode reader to 'swipe' the barcode next to the candidate's name selected by the voter. As each ballot paper was swiped, the name of the party for whom the vote had been cast appeared on a screen, visible to the counting staff, and other observers. The results were cumulatively stored in the computer's memory, and when all ballot papers had been swiped, they were aggregated. As is traditionally the case, candidates and their agents were entitled to be present in order to observe the counting process.

The count was completed in a similar time-frame to those wards using traditional counting methods, though staffing levels were lower (4 per pilot ward as opposed to 6 – 8 per 'traditional' ward). No complaints were received during or after the count from any of the candidates or their agents and no recounts were requested. Though no specific testing was carried out immediately prior to the count, Broxbourne Borough Council believes that both the hardware and the software proved reliable.

The principal increase in expenditure was the cost of printing barcodes on the ballot papers which raised printing costs by £1,300. Since the equipment used was existing local authority equipment, no additional expenses were incurred in this area. Staff time had been dedicated to the development of the software, but other than the time needed for minor modification in the future, this was a one-off expense. As mentioned, fewer staff were used in the pilot wards than in wards using traditional counting methods, thus creating some savings.

In its evaluation, Broxbourne Borough Council identified an increase in the number of barcode readers per ward, from one to two, and a consequential adjustment to the software, as a way of delivering the result more quickly as well as making extra savings, since it would not necessarily mean increasing staffing levels.

Three Rivers (Optical scanning)

The pilot scheme in Three Rivers District Council took place across all 16 wards in which elections took place, to elect 17 councillors (this included one by-election).

Electronic counting was conducted in these wards by means of two optical scanning machines (optical mark readers) and a personal computer, provided by the company Election Systems and Software (ES&S). The particular model of counting machine used[1] is able to process up to 350 ballot papers per minute.

Voters came to the polling station to cast their ballots in the usual manner. The ballot paper format was different from a traditional ballot paper in that it was slightly larger, and pre-printed with an official mark, rather than needing to be stamped upon issue. More noticeably, instead of a

1 Election Systems & Software's Model 550 Networkable Central/Regional Super High Speed Ballot Counter and Vote Tabulator

blank box beside the name of each candidate, there was a small box within a larger box with a cross running through both. Voters were required to mark their choice of candidate, with a pencil (this was crucial since the scanning machines were not able to detect ink) by drawing over the cross in the appropriate box. The ballot paper then had to be posted into the ballot box, preferably without being folded and preferably face-down to maintain privacy. Although the machines can cope with ballot papers that have been folded, processing of ballots that do not need unfolding, and which are perfectly flat is quicker and more efficient. Ballot papers were also encoded with information, readable by the counting machines, about the ward and, where appropriate, the polling station to which they belong, so that they can be counted appropriately even if separate batches of ballot papers are fed through simultaneously at the count.

The count for all wards took place at a single venue, with about 20,000 ballots papers to be counted. Prior to the commencement of the count, ES&S staff conducted a logic and accuracy test on the counting machines to show that they were counting correctly, and to prove that no votes were already stored in the machines before the count had begun. These tests took place in the presence of the Returning Officer who signed a declaration stating his satisfaction with the machinery and the software at the beginning of the count.

The machines count the total number of ballot papers (for verification), and the numbers of votes cast for individual candidates at the same time. The postal votes were the first to be fed through the machines. Upon arrival of ballot boxes from the polling stations, these ballot papers were fed through the counting machines. Folded ballot papers did not cause undue problems or delays, beyond having to unfold and smooth the papers before feeding them into the machines.

The initial figures given were the total number of ballot papers per polling station, which were compared with the Presiding Officers' ballot paper accounts which, for ease of reference, had been entered into the computer. In almost every ward, the figures tallied immediately and the Returning Officer was satisfied that the process and been more accurate than when conducted by hand.

Before the totals for each candidate could be calculated, a number of issues had to be dealt with. These involved ballot papers that had been rejected as unreadable by the machines because:

- they had been completed in pen rather than pencil (many though not all of these were postal votes)
- voters had changed their minds or placed their cross in the wrong place
- they were spoilt (i.e. had too many votes, or none at all)

The Returning Officer was required to adjudicate on all of these ballot papers, in the presence of the candidates and their agents. Due to the number of papers rejected by the machines this was a lengthy process. After adjudication, these ballot papers had to be fed back through the counting machines, either as valid votes for a particular candidate or as spoilt ballots, in order for the number of papers to tally.

The counting process eventually took longer than anticipated, and longer than a manual count would have taken. However, it is important to note that in the ward which also had a by-election where voters were required to vote for two candidates, the Returning Officer felt that in comparison with a hand-count, the machines "…dealt extremely quickly and efficiently with (the) count."

A considerable number of the problems encountered, including misplaced and unadjudicated ballot papers, were due to insufficient or ill-judged logistical arrangements. Some of these arrangements, such as the decision not to proceed on a ward-by-ward basis, were taken in an attempt to speed up the process, but ended up causing confusion and mistakes. The Returning Officer's report[2] and ES&S's own evaluation[3] clearly identify improvements in these procedures, including the need for a rehearsal,

2 Alastair Robertson (Returning Officer), **Three Rivers Council Election, 4th May 2000: Pilot use of Automatic Counting Machines**, May 2000

3 Evidence given to the Commission by Angus Ward, Director of Sales Europe, ES&S, 18th July 2000

and we will confine our comments to issues raised specifically by the technology.

Confusion was reported amongst some voters as a result of the format of the ballot papers, particularly the fact that there appeared to be crosses in all of the boxes already. Clearly, this is a design problem, which the Returning Officer suggests could be easily rectified by using much fainter crosses, possibly using dotted lines.

The large number of ballot papers rejected by the machines due to being completed in pen rather than pencil caused considerable delay, particularly since these needed to be remarked (with black dots) before being fed back into the machine.

Similarly, where voters had changed their minds or put their crosses in the wrong place, the Returning Officer had to judge whether the intention was clear, and if so, either blot out the irrelevant mark (with white dots), or remark the ballot paper (with black dots) before feeding the ballot papers back into the machine.

Fifteen people were employed at the count, including ES&S employees who were operating the counting machines. It was felt by the Returning Officer and his staff that the number of election staff working alongside ES&S staff was insufficient, and that ideally there would need to be two or three per machine in order to monitor and assist with the process. Candidates were entitled to one counting agent per machine, however the number of ballot papers on which adjudication was necessary left them short-handed in terms of scrutinising the rest of the process.

The electorate involved in this pilot scheme was about 52,000. The total additional cost was £10,245 which included the increased printing costs of the ballot papers, and employing the services of ES&S. The optical scanning machines were provided free of charge on a trial basis. Savings were made by a reduction in staff at the count, from 50 to 15.

London (Optical scanning)

Elections took place on 4th May 2000, the same day as the local authority pilot schemes, to elect, for the first time a Mayor and Assembly for London. The electorate was about 5.1 million.

Two different voting systems were used, the Additional Member System (AMS) to elect Assembly members, and the Supplementary Vote (SV) to elect the Mayor. AMS means that every voter has two 'X' votes, one to elect a constituency Assembly member and the other to elect an 'additional' member on a London-wide basis. SV allowed voters a first and a second preference in electing the Mayor (also two 'X's). It was, then, a large-scale and relatively complex election, and for reasons of speed and accuracy it was decided to explore the use of technology. After a tendering process, it was decided that electronic counting in constituency centres best met the Government Office for London's criteria and it was decided that the structure and procedures surrounding the count should stick as closely as possible to the traditional methods, simply introducing machines to do the counting and tabulation. It was hoped that results would be delivered by breakfast-time the following morning, the 5th May.

Data & Research Services (DRS) was the company that won the contract. They provided 168 optical-scanning machines (optical mark readers) which can count votes, in any orientation, at a rate of up to 2 votes per second[4]. The machines use infra-red light to scan the papers and are therefore capable of reading pencil or pen, as long as the ink is not red. Tests were conducted by two independent consultants, one employed by DRS to ensure the reliability of the performance of the hardware and software, and the other by the Greater London Returning Officer (GLRO) to assess the rigour of the testing.

Training was conducted by the Association of Electoral Administrators and by DRS for election staff and officials in the months prior to the election. A large-scale rehearsal also took place in Hammersmith at the end of February using a notional turnout of 60% in the West Central constituency as its basis. As a result, 406,000 ballot papers containing up to 1.6 million votes were processed. 390,000 of these ballot papers had votes laser-printed onto them, and the remaining 16,000 were completed manually by election staff. Representatives of the London

4 The machines used were Data & Research Services' CD800 Optical Mark Readers

boroughs, the political parties, Government and the press were invited to attend. The test went smoothly, both technically and organisationally, and any issues raised were subsequently addressed before election day[5].

The machinery and the specific set-up to be used in each constituency was tested in a warehouse two days before the election. Tests of the set-up were also run in the constituency counting locations during election day.

The format of the ballot papers was largely dictated by the voting systems being used, with one ballot paper for the Assembly, and a separate one for the Mayor. Features that were a direct result of the counting system were:

- barcode serial numbers on each ballot paper, to prevent papers from being counted more than once; the barcodes were unique to each ballot paper (as with serial numbers on traditional ballot papers), but also included an identifier for the particular contest (i.e. Mayor or Assembly), and an identifier for the Borough; it was the first time that barcodes had been used on ballot papers in this way in a public election

- a faint cross in each box corresponding to the candidate or political party, to encourage voters to place their mark in the correct place to be scanned by the machines

In the usual manner, voters attended their local polling stations to cast their votes. Voters indicated their voting intention by marking an 'X' in the appropriate boxes beside the names of candidates or parties. Voters were asked to mark the ballot papers with the supplied pencils and also to put their ballot papers into the ballot box unfolded, with the blank side up in order to retain privacy.

On election night, counts were conducted by Constituency Returning Officers (CROs) in a central location within each of the 14 constituencies, with a Calculation and Declaration centre in Westminster under the control of the Greater London Returning Officer (GLRO). Both local authority election staff and DRS employees were present at each count.

The machines were programmed to accept and, as appropriate, count all ballots that had been correctly completed, which were blank, or had blank sections. They were programmed to reject all ballot papers where the voter's intention was, for whatever reason, unclear, so that the Constituency Returning Officer could adjudicate on their validity. (See Appendix 1, p. 61 for detailed breakdown of accepted/rejected ballot papers). Each constituency count had 11 – 14 scanners, 4 – 6 computer workstations and a server.

When ballot boxes arrived at the constituency counting centre, the ballot account sheets, as completed by the Presiding Officer in each individual polling station, were checked and the totals transcribed onto a scannable checksheet. Any folded or creased ballot papers were flattened and all ballot papers were stacked, along with the scannable checksheet, ready for insertion into the counting machine feeder trays. This was the end of the 'reception' process.

The next stage was 'registration'. The checksheet with the ballot account totals was scanned and the data entered into one of the computer workstations. The checksheet was then placed at the bottom of the pile of ballot papers.

The 'reading' stage of the process consisted of ballot papers and the relevant checksheet being placed on the feeder trays of the machines, and fed through for scanning. Ballot papers emerged from the machines sorted into two trays: 'Good' and 'Rejected'. The ballot papers in the 'good' tray were those which were correctly cast or blank; those in the 'rejected' tray were those which needed to be adjudicated upon because the intention of the voter was unclear. If the machine could not read a barcode on a particular paper, then the machine would stop in order for the unreadable paper to be removed and put into a folder marked 'Unidentified'. The raw data from this reading was gathered and sent to the server.

Next followed the 'verification' stage in which ballot papers in the unidentified folder were manually entered with a handheld barcode scanner, to ensure that they were genuine ballot papers. The total number of ballot papers read in each contest was then displayed and transcribed

5 **The First Election of the Mayor and Assembly for London: Report for the GLA**, Office of the Greater London Returning Officer, July 2000

onto the checksheet to compare with the ballot paper accounts. Rejected ballot papers then proceeded for adjudication.

The Constituency Returning Officer adjudicated on ballot papers which the machines had rejected. Once the status of each vote had been determined, the barcodes were manually scanned and the voter's intention entered directly into the computer.

Once all ballot papers from the constituency had been dealt with, the 'consolidation' process began. The Returning Officer printed four separate reports from the computer (the constituency Assembly results, the votes cast for additional Assembly members, the first and second choices cast for Mayor, and the distribution of second choice votes in relation to first choice votes). The Returning Officer showed the first three of these reports to the candidates and their agents, and on gaining their agreement that the count was accepted, confirmed the result.

Results were then transmitted electronically by modem over secure lines to the Greater London Returning Officer (GLRO), and a hard copy was also faxed. The constituency results were confirmed, and the other totals were entered into the computer for consolidation with those from other constituencies.

Once results had been received from all 14 constituencies, the computer finalised the consolidation of constituency results and made the necessary London-wide calculations for the Mayor and the additional Assembly members. The GLRO then informed the candidates for Mayor and their agents of the result and sought their acceptance. Once accepted by all parties, the result was publicly declared.

The same process took place for the London-wide 'additional member' candidates, and the results were duly declared.

A number of problems occurred during this process which, despite a turnout of just 33.7%, cumulatively caused the final result to be declared not at breakfast-time but closer to midday on Friday, 5th May. Some of these problems were of a logistical nature; these are set out in the GLRO's report.[6] Although these are clearly important factors, our examination will focus on the more technical issues raised specifically by the use of electronic counting.

The counting machines operated considerably more slowly than anticipated (50% slower in some areas) and considerably more slowly than at the rehearsal that had taken place in February.

One problem was the unexpectedly high number of ballot papers that were rejected by the machines for adjudication. These were not only ballot papers where the voter's intention was unclear, but also postal votes (15% of postal votes in Barnet & Camden had to be hand-scanned[7]), ballot papers with blemishes on them, ballot papers where the cross extended just beyond the confines of the box, and some ballot papers where the machine was unable to read the barcode. Although the scanners had been designed to read the barcodes on the ballot papers in any orientation, a late change in the software for the Mayoral election meant that the scanners were not able to read barcodes on ballot papers inserted in one particular orientation. These factors meant that the CROs spent significant amounts of time dealing with individual ballot papers, which then had to be entered manually, all contributing to a slowing down of the process.

Another problem was double-feeding of ballot papers, where ballot papers were sticking together and passing through simultaneously; this happened far more frequently than had been anticipated. The machines were equipped to detect this, however each time it happened, the machine stopped, the papers had to be retrieved and the machine restarted, therefore slowing down the process. Ballot papers which had not been cleanly detached from their counterfoils also caused the machines to stop. The CRO for Bexley and Bromley estimates that the scanners stopped between 10 – 15 times for each polling station batch[8].

In several constituencies, many of the counting machines ceased to function during the count (all but two of the twelve machines in the Enfield and Haringey constituency). This turned out to be due

6 The First Election of the Mayor and Assembly for London: Report for the GLA, Office of the Greater London Returning Officer, July 2000

7 Evidence given by Max Caller, CRO for Barnet & Camden Constituency, to GLA Elections Investigative Committee, July 2001

8 Evidence given by Walter Million, CRO for Bexley & Bromley Constituency to GLA Elections Investigative Committee, September 2001

to fluff from the baize table-cloths interfering with the machines' double ballot detectors. Although the same baize table-cloths were used at the rehearsal, people had, on that occasion, been on hand to regularly clean the detectors. It was also suspected that static resulting from the use of plastic ballot boxes where voters had to post their ballot papers down a plastic chute, had exacerbated the problem both of ballot papers sticking to each other and of fluff sticking to the ballot papers. These ballot boxes had not been ready for use during the rehearsal. Another possibility was that the tinting process that made the Assembly ballot papers and the Mayoral ballot papers different colours interfered with their passage through the scanners[9].

Mistaken attempts to feed ballot papers which had already been counted into the machines delayed proceedings whilst machines had to be stopped in order to remove the ballot papers. The machines did, however, recognise the papers as having already been read. Other CROs have reported serious discrepancies between ballot paper accounts and the number of papers verified by the machines. In some cases, ballot papers were rescanned and provided a different total.

There were also anecdotal reports of data input/software problems which were eventually resolved by bypassing the official software – removing the data relating to a set of already scanned-in ballot papers and starting again – thereby arousing serious security concerns.

The budget for the election, excluding the information campaign, was £12.5 million. This covered the fees and expenses of the Returning Officers, the cost of polling stations, count venues and staff, as well as the electronic counting contract, which included the cost of printing ballot papers and providing ballot boxes and counting equipment.

Information from Overseas

Florida (Punchcards)

Presidential and Legislative elections took place across the United States of America on 7th November 2000. As has been well-documented, the result of the Presidential election was extremely close, and due to a combination of many factors, the process of deciding who had won the Presidency was slow and painful. Although a result was expected the following day, the contest was not resolved until mid-December, after protracted and contentious legal proceedings.

The closeness of the result served to highlight problems with many aspects of electoral administration in the US, institutionally, technically and logistically. Our focus will be on the technical lessons that emerged from the election in relation to the use of punchcards, and our discussion will restrict itself to issues of relevance to elections in the United Kingdom.

The State of Florida has 8.4 million registered voters across 67 counties. Decisions about how to conduct elections are taken at county level, though all equipment must be certified by the State-level Division of Elections. Certification includes voluntary standards of accuracy levels, as well as testing procedures. Four different methods of voting or vote-counting were used[10], including punchcards in 24 of Florida's more populous counties.

Of the 24 counties using punchcards, 15 used Votomatic systems and 9 used Datavote, and 7 different models of punchcard readers were used. In all cases, ballot papers were transported to a central location for counting. Across the United States, Votomatic systems are far more popular than Datavote systems (17.5% of counties used Votomatic systems with only 1.7% using Datavote). This is due to the fact that a single Votomatic card allows voting locations for a large number of elections and issues, whilst Datavote would require the use of several cards. In many areas, voters were asked to vote in twenty different elections and on twenty referendum-type issues.

Since electoral arrangements and equipment varied from county to county, we will not provide a detailed description of the conduct of the election, but will examine the main issues that arose across the 24 counties.

Although the concept of data processing cards had existed for many years, it was not applied to

9 Evidence given by Simon Day, Commercial Director, DRS, to GLA Elections Investigative Committee, July 2001

10 Punchcards in 24 counties; Optical scanning in 41 counties; Mechanical lever machines in 1 county and paper ballots with manual counting in 1 county.

the electoral process until 1964 when it was used in elections in 5 counties across the United States[11]. Its use spread rapidly, to the extent that ten years later it was being used by 10% of the US electorate, and in the November 2000 elections, it was used by about a third of the electorate. One of the reasons for the rapid spread of this technology was that the cards were in a standard format which was readable by equipment automatically provided with business computers at the time, making it a cost-effective option.[12] In most cases in Florida, punchcard equipment was bought in the 1980s to replace mechanical lever machines (see chapter on Electronic Machine Voting).

The turnout in Florida was 68.1% and the initial result was a lead to George Bush of 327 votes out of 5.9 million votes cast (a difference between the two leading candidates of less than 0.01% of votes cast). The number of ballot papers which were not counted due to voters casting a vote for more than one candidate (an 'overvote'), for no candidate at all (an 'undervote') or for other reasons that made the ballots uninterpretable, was just under 180,000, or 2.93% of the votes cast – 550 times more than the difference between the two leading candidates.

Such high percentages of overvotes and undervotes are worrying. Although some voters would take the trouble of going to the voting station and deliberately spoiling their ballot paper, or voting for other offices but not for President, it seems unlikely that as many as 3% would do so. It has been estimated that of the 2% of uncounted ballot papers across the United States, that only 0.5% made a deliberate choice not to vote for President, and that the remaining 1.5% (1.5 – 2 million voters) believed that they had cast a valid vote but had been inadvertently frustrated by the ballot paper layout, or by the voting or vote-counting equipment[13]. Statistics from across the United States reveal that counties using punchcard systems for the 2000 Presidential election had a higher average rate of uncounted ballot papers (2.5%) than the average for counties using any other form of voting or vote-counting equipment. In Florida the rate of uncounted ballot papers with punchcard systems was 3.93%, as opposed to the 2.93% State average. Three counties had uncounted ballot rates of over 9%[14].

A problem from which both Votomatic and Datavote systems suffer is that the ballot cards need to be inserted into a frame before a voter can cast a vote; this is exacerbated in the case of Votomatic systems, in that a booklet showing the choice of candidate is also inserted and also needs to be properly aligned. If the ballot paper is not inserted absolutely correctly, then the voter could end up punching holes in places other than those in which they intended, and thereby voting for another candidate, or not casting a valid vote at all. At least with a Datavote system it is much easier for a voter to see if they have made a mistake, as long as the ballot layout is clear, because the names of the candidates are printed on the ballot paper. This could account for some of the uncounted ballot papers.

Even without the claims of technical and administrative irregularities, the results in Florida were close enough to make recounting a likelihood. Florida Statutes require that a recount take place if the winner's margin is 0.5% or less, unless the losing party specifically requests otherwise in writing. In the case of unclear ballots, voting officials are required to attempt to judge the voter's intention. However there are no State-wide standards for interpreting voter intent in relation to the range of possibilities that can occur with punchcard systems.

Four counties came under scrutiny initially with requests from the Democrats for recounts. Of these four, three (Broward, Miami-Dade and Palm Beach) used Votomatic punchcard systems and had percentages of uncounted ballots of 2.6%, 4.6% and 7.0% respectively. The calls for recounts subsequently spread to other counties.

Legal wrangling continued for almost another five weeks over whether or not recounting should be permitted, and whether it should be conducted by machine or by hand. During this period, various recounts were begun, if not all completed, and they revealed further problems with the punchcard system, particularly the Votomatic versions.

Electronic recounts are fairly quick and easy. However, in this case, they drew attention to two major problems, both involving the infamous 'chads'. Votomatic punchcards are standard-sized

11 Fulton and De Kalb counties in Georgia; Lane county in Oregon; San Joaquin and Monterey counties in California

12 Roy G. Saltman, 'Voting Systems', The Bell, Vol. 1, No. 1, May 2000

13 Voting: What is and what could be? California Institute of Technology and Massachusetts Institute of Technology Voting Technology Project, July 2001

14 Duval county (Votomatic), 9.23%; Glades county (Datavote), 9.59% and Jefferson county (Datavote), 9.19%

pieces of card on which are printed a series of boxes and numbers. Each box represents a potential voting location and is pre-scored to assist the voter in punching a standard sized and shaped hole. The pre-scored areas are the chads.

However, for some time now, voices have been raised against the use of pre-scored punchcards[15], on the basis that they actually make it more difficult for the voter's intention to be correctly registered and can impede the punching of a clean hole, resulting in dimpled chads, hanging chads, trapdoor chads etc. High-profile problems with punchcard systems in the election of 1968 caused IBM to withdraw from the market. Wisconsin and Massachusetts abandoned punchcard technology and banned the use of pre-scored punchcards after problems in 1993 and 1996 respectively.

Firstly, there is a danger that improperly punched ballot papers are incorrectly read by the electronic counting machine. For example, a hanging chad which is loose, but still attached to the ballot paper can be squeezed back over the hole whilst being stacked to go through the counting machine, and therefore be read as a blank ballot, an undervote.

Secondly, when ballot papers are fed through the machines, particularly if this is done several times, it may be that some chads get knocked out of the ballot papers, thereby creating an overvote.

In either case, votes get spoilt or mistakenly recorded as being spoilt, and for this reason, the results in Florida were different each time the ballots were run through the counting machines.

Datavote cards are not pre-scored and therefore do not tend to suffer from these problems.

In terms of manual recounting, Votomatic ballot papers are extremely difficult to count because the holes are so small, there are so many different voting locations on each ballot paper, and no pre-printed names of candidates. There is a significant margin of interpretation as to what constitutes a valid ballot and what the voter's intention might have been. The same problems apply to hand-counting as to electronic counting in terms of knocking chads out accidentally with excessive handling. Once again, these are problems relating to the layout and the pre-scoring of the Votomatic ballots and do not apply to the Datavote ballots.

Over-ruling a decision made by the Florida Supreme Court, the US Supreme Court ruled on 12th December that there were to be no more recounts of any kind. This meant that George Bush won the electoral votes of Florida and thereby won the Electoral College vote for the Presidency of the United States.

Oslo (Optical scanning)

Public elections take place every two years in Norway with local elections alternating with national ones. Election day is a Monday. Each municipality decides which mechanisms it will use to count its votes, though most count manually. Data-input type systems using existing software do not need approval, however, optical scanning systems require approval from The Ministry of Local Government and Regional Development.

The Municipality of Oslo has used optical-scanning since about 1980, both in local and national elections. The machines are provided by Research Election and Expert Services (R-2E) and Ephorma, based in Norway along with Data & Research Services (DRS)[16] based in the United Kingdom. Optical-scanning has been used on a trial basis in other Norwegian cities such as Trondheim and Kristiansand, but never regularly as in Oslo.

Norway uses a party list system, where each political party provides a list of candidates in a specific order. The voting experience in areas using electronic counting is exactly the same as in areas where votes are counted manually. The voter attends the polling station and registers in the usual way. Voters are given a range of ballot papers, each of which represents one party list; the voter chooses the ballot paper of the party for whom s/he wishes to cast a vote and, without making any marks on the ballot paper, places it in an envelope and puts it into the ballot box. This means that a voter has cast a vote for a particular party, and that s/he has accepted the order in which the candidates appear on that party's list.

15 Accuracy, Integrity and Security in Computerized Vote-Tallying, Roy G. Saltman, Institute for Computer Sciences and Technology, National Bureau of Standards, August 1988

16 The company that provided the optical scanning machines for the elections for London Mayor and Assembly in May 2000. In this case, the machines used are the CD850 model.

However, voters also have the option of amending the ballot paper if they wish to vote for a party but do not agree with the order in which candidates appear on the list. Striking through the names of candidates has the effect of demoting those candidates within the party list. In local elections, voters have further options for amending the ballot paper, which are to put a cross beside the names of candidates in order to promote them on the list, or to write in the names of additional candidates selected from other party lists. Once any marks have been made, the ballot paper is inserted into an envelope and put in the ballot box.

At close of poll at 9pm on Monday evening, a preliminary manual count takes place in each polling station. These preliminary results, as well as the results of early voting[17], are given to the media. The ballot boxes are then sent from the polling stations to the Town Hall for a centralised count which begins as soon as ballot boxes arrive at about 11pm. The final ballot boxes usually arrive at the Town Hall just after midnight.

Ballot papers are fed through the scanners which scan both sides of the ballot paper at a potential speed of up to 9000 per machine per hour. Barcodes make each ballot paper specific to a particular election in a particular municipality, and also reveal the party to which that ballot paper belongs. Each barcode is unique, so that the machines can detect ballot papers that have already been scanned.

The scanners also detect any other marks such as crosses, deletions or 'write-ins'. Crosses and deletions are read and counted by the machines; 'write-ins' are detected and usually separated in order for the details to be transcribed by hand. Where newer Intelligent Mark Reading technology is in place, the scanner can usually interpret the handwriting. Results are stored on the scanners' hard disk and are then uploaded onto a server for aggregation.

The scanning process continues throughout the night and is usually finished by the following (Tuesday) morning. Although the overall result is fairly clear by this stage, final results are not declared until a 24-hour grace period for the late arrival of postal votes has elapsed. Final results are declared on Wednesday afternoon.

The machines are hired for each election. The electronic counting operation costs Oslo approximately 2 million Norwegian Krone (about £160,000).

The last national election was in 1997 and Oslo used 22 machines to count 300,000 votes (turnout of 79.2%). The use of Intelligent Character Recognition (ICR) for reading the 'write-in' section of the ballot papers will be extended for elections in 2003.

Australia (Data-inputting)

On Saturday, 3rd October 1998, Federal Elections were held across Australia to elect the House of Representatives and half of the Senate. It was the first election in which the Australian Electoral Commission (AEC) was entitled to use computers to assist with the counting of the Senate election[18].

In the election to the House of Representatives, one Representative was being elected from each of the 148 divisions in the country. The system used to elect the Representatives is the Alternative Vote, where voters number the candidates in order of preference and a candidate needs 50% of the vote to win.

In the Senate election, six Senators were being elected from each of the six States, and two from both of the Territories – 40 Senators in total. The electoral system used is also a preferential system. Voters have the option of voting 'above the line', which means that they cast a single preference ('1') for a group ticket, usually a political party (where the group/party fixes the subsequent order of preferences); or they can vote 'below the line' in which case they number all of the candidates in order of preference. Candidates need to win a certain proportion of the vote, known as a 'quota' to win.

Because Representatives are elected from single-member constituencies, it is possible to gain a fairly accurate picture of the final results on election night. However, since Senators are elected in multi-member constituencies, the

17 Early voting comprises about 25% of the total votes cast.

18 This was due to amendments made to the 'Commonwealth Electoral Act 1918' by the 'Electoral and Referendum Amendment Act 1998' which received Royal Assent on 17th July 1998

results from the entire State or Territory have to be received (including postal votes, the deadline for which is 13 days after Election Day) before the quota can be calculated and further calculations can be completed, meaning that only a general impression of the final results can be gained. 'Above the line' votes for groups are counted on election night, as are 'below the line' first preference votes for Independent candidates.

Under the circumstances, as the Joint Standing Committee on Electoral Matters has pointed out, "The delivery of federal election results is of necessity a complex and time-consuming process"[19].

Counting takes place in two stages, on election night to give an initial indication of the results and after election night to examine all votes and all preferences in detail, and to complete all necessary calculations.

In each State and Territory there is an Australian Electoral Officer (AEO) who is the returning officer for the Senate election in that jurisdiction. There is a Divisional Returning Officer (DRO) in each of the 148 divisions responsible for the election to the House of Representatives in his/her jurisdiction.

The AEC used a national computerised system based in each of the Divisional Offices. The telecommunications network was provided for the AEC by Computer Sciences Corporation and underwent significant testing prior to the election. It is a system which provides an audit trail by producing reports for inspection by election staff and scrutineers at every stage. It had also been certified by the Australian National Audit Office.

The system linked each Divisional Office to a National Tally Room in Canberra which provided a central point for the progressive display of election results throughout the evening. About 700 representatives from the media, 100 political party activists, 30 overseas observers and 2,500 members of the public visited the National Tally Room during the evening. Results were also fed directly to a computer terminal for the Prime Minister in Sydney, to another for the leader of the opposition in Perth as well as to the major television networks and the Australian Associated Press. Within minutes of reaching the National Tally Room, the results were also displayed on the AEC's website.

The AEC had put in place various back-up plans in case of technical difficulties. The communications links were duplicated through alternative networks and exchanges, in case of network failure. There was also a duplicate power source in case of electricity problems. A system using telephones and faxes had also been put in place in case of problems with the computers. All of these systems were tested at a rehearsal two days before the election.

Political parties and others involved in the electoral process had been fully briefed by the AEC about the introduction of the computerised system during the year leading up to the election.

Voting was compulsory and the resultant turnout of 95% meant that 11.5 million voters cast a vote in two separate contests.

Counting began immediately on close of poll at 6pm on Election Day, within each polling station. Votes for the House of Representatives took precedence. The main tasks on election night were:

- to count the total numbers of first preferences cast for each candidate in the House of Representatives election
- to conduct a 'two-candidate preferred' count of the House of Representatives ballot papers, in order to provide an indication of the likely result in each Division on election night
- to count the first preferences in the Senate election

Candidates were able to appoint scrutineers who are entitled to be present at every stage of the count. Scrutineers are also provided with reports on the progress of the computerised counting.

Upon completion in the polling station of each of the three tasks listed above, the totals were communicated to the Divisional Office by telephone. The DRO entered the figures for each polling station in the Division into the Australian

19 **1998 Federal Election: Report of the inquiry into the 1998 Federal Election and Matters Related Thereto**, Joint Standing Committee on Electoral Matters, Parliament of Australia, June 2000

Electoral Commission's computerised Election Night System. The figures were then transmitted electronically to the National Tally Room in Canberra where they were displayed on computer terminals and a National Tally Board.

Election results were sent to the National Tally Room from 6.30pm until midnight and were progressively updated and displayed throughout this time. No difficulties were encountered on election night and with the information provided from the National Tally Room the television networks were able to predict the final result by 8pm.

Election day was a Saturday, and the second part of the count began on the following Monday in the Divisional Offices. Ordinary votes for the House of Representatives were recounted, including all of the preferences expressed, and final decisions made about spoilt ballots. Declaration votes (early votes, postal votes, absent votes[20] and provisional votes[21]) were checked and counted.

The Senate votes were counted using the computerised 'Senate Scrutiny System'. All ballots marked 'above the line' were dealt with manually in the Divisional Offices.

Ballot papers marked 'below the line' were forwarded to a centralised count in the capital city of the State or Territory where large numbers of computers were installed. The preferences for each candidate were entered into computers, which could differentiate between a valid and a spoilt ballot paper.

The 'above the line' totals from each Division were also entered into the computer and combined with the 'below the line' votes. The computer then calculated the quota, distributed all of the preferences and produced the results.

In the past, it has taken up to two months to reach a final result in larger States. In the previous Federal elections in 1996, it had taken six weeks. In 1998, with the computerised counting system, all results were finalised within three weeks.

The total cost of the election was A$94,925,371, or A$5.06 per elector[22], slightly less than the A$5.08 at the previous Federal Election in 1996.

Evaluation of Electronic Counting

The ballot paper

Punchcard and optical scanning systems both require ballot papers of very precise specifications. If they are to be correctly read by the scanners, the ballot papers need to be printed on paper within a specific weight-range, of specific dimensions, and with precisely aligned printing. Perforations, for example where the ballot paper is detached from its stub, also need to be precise and clean. Ballot papers need to be kept dry and flat at all stages of the process to avoid swelling or folding. If any of these requirements are not met, then problems are likely to ensue[23]. These are problems which do not affect data-inputting systems.

There are also questions around the layout of the ballot paper, as were well-illustrated by the 'butterfly' ballot controversy in the United States elections in 2000. However, the issue of ballot paper layout exists to some extent for every election whatever the method of counting, and with electronic counting of all kinds there would seem to be no reason to deviate too far from the model of ballot paper as traditionally used in the United Kingdom.

Ballot paper security is as important with a system of electronic counting as it is at present. The use of barcodes on ballot papers would require specific security measures as well as a standardised format for each type of election.

The voting experience

Each of the three methods of electronic counting examined in this chapter provides a slightly different voting experience.

Punchcards seem to be the most user-unfriendly, in that the ballot paper needs to be correctly inserted into a frame and then the voter uses a stylus to punch a hole in the desired spot. With Votomatic ballot papers, the voter is further dependent on the correct insertion of a booklet into the frame in order to reveal which voting location relates to which candidate. Furthermore, Votomatic systems as currently used in the United States do not seem to guarantee that the voter makes a clear hole in the card, even if they

20 Votes cast in a polling station other than the voter's own, but within his/her State or Territory

21 Votes cast in circumstances where an elector's name cannot be found on the roll or the name has already been marked off the roll

22 Excluding public funding. The figure including public funding is A$7.87

23 The 1998 elections in the Autonomous Region in Muslim Mindanao, The Philippines, encountered misaligned printing on the ballot papers, thereby preventing the optical scanners from reading the votes for a particular candidate. Ballot papers being transported from a polling station to the central count got wet and had to be ironed dry before being scanned.

have chosen the correct location in which to attempt to do so. Punchcard systems are not ideal for postal voters.

Optical scanning systems deviate less dramatically from the familiar method of marking a ballot paper, except that they require more precision in making a mark (whether by shading or marking a cross) than at present, which could potentially be problematic for elderly, disabled and partially sighted electors. The US-based National Organisation on Disability[24] has said of both punchcard and optical scanning:

"This system is not accessible to voters who are blind or visually impaired. It is also inaccessible to voters who have hand, upper body and/or upper arm strength and /or dexterity limitations."

Some optical-scanning systems also require the ballot paper to be completed in pencil – a factor relatively easy to control within the polling station, but less so for postal votes cast elsewhere. The requirement for voters not to fold their ballot papers is also potentially problematic, firstly because it can be difficult to enforce, even within the polling station, and secondly because with an unfolded ballot paper there is a small risk that the voted ballot paper will be exposed between the polling booth and the ballot box.

Data-input systems would not necessarily change the voting experience for the voter at all.

Centralised versus localised counting

In the United Kingdom, counting is conducted in a centralised location which may be a particular polling station, a town hall or suchlike. Ballot boxes are brought from polling stations in the surrounding area and are counted together. A Home Office report in 1994 specifically rejected proposals to change this arrangement[25]. Any change would have an impact on the current requirement for the contents of ballot boxes from more than one polling district to be mixed.

Punchcards and optical scanning both offer opportunities for counting to take place in a central location, as at present, or in each individual polling-station. Counting in each individual polling-station involves a scanner acting as a ballot box, so that when the vote has been cast, the voter inserts the ballot paper directly into the scanner. The advantage of this is that voters can immediately be alerted to a spoilt ballot paper and can be given the opportunity to rectify any mistakes or to cast a fresh ballot. It also saves time, particularly in rural areas, on ballot papers being transported to a centralised counting location. Results from each polling station are then communicated to a central location for tallying with other results in the area.

Polling-station based counting already happens in some areas of the United States, and is being looked upon increasingly favourably in the light of the number of uncounted votes in the 2000 election.

It would however, require the expense of a scanner in each polling station, and necessitate the presence in each polling station of an individual with sufficient expertise in the use and maintenance of the machine. It would also make the process of scrutinising the count more complicated and diffuse.

Scrutiny

By removing an open, visual element of the process, scanning ballot papers rather than counting them manually almost certainly reduces the extent of scrutiny during the count, in that observers cannot see decisions being made about each individual ballot paper. It also more or less eliminates the current election night culture, where candidates and their agents are able to gain a picture of how the votes have been cast by watching the piles of votes for each candidate mounting up during the course of the evening. The lack of visual evidence about the likely result of the election can also leave agents short of time to make decisions about recounts etc.

However, it does not prevent observers from being present, watching the counting operation or raising questions about procedure or the adjudication of questionable ballots. Data-input systems allow observers to scrutinise to a similar degree as at present.

Most forms of electronic counting are able to produce reports of the number of votes counted,

24 **Voting System Accessibility Comparison**, National Organisation on Disability, August 2001

25 **Report of the Working Group on Automated Vote Counting**, Home Office, February 1994

and the running totals at any stage during the process (though this is an option which has not as yet been taken advantage of in the United Kingdom in an attempt to keep procedures as similar as possible to the traditional system), and certainly detailed reports can be produced on completion of counting.

Also, the existence of paper ballots recording the voters' preferences provide a paper audit trail and a method of checking an electronic tally against a manual one.

Accuracy and recounts

Prolonged use of punchcard (especially Votomatic) systems in the United States has done very little to prove the reliability of scanning holes in pieces of card. Electronic recounts are relatively easy to carry out, however the evidence suggests that they are less than reliable. The fact that recounts produce different results each time is deeply worrying, and the fact that the voter's intention can get lost with the handling of ballot papers means that there is no longer a reliable audit trail. Though manual recounts with a Datavote system are not too difficult, Votomatic systems are eye-straining and error-prone.

Optical scanning systems seem to be considerably more reliable, particularly if the ballot paper has been marked in the appropriate way. One concern however is with ballot papers that have not been correctly marked. Most of these will be rejected by the machines for manual adjudication. However, with a system where a valid vote is one where a mark is made in a target area, there is a possibility that a voter who makes a mark in the target area to indicate *disapproval* of a candidate will have his/her vote recorded as a vote in favour of that candidate. Similarly, if a scanner is programmed to accept blank ballot papers (interpreting them simply as spoilt), there is a danger that a voter whose mark was placed outside the target area will have his/her vote ignored.

There is no chance of the voter's mark being changed by handling (as with punchcards), no matter how many recounts are conducted. However, there could, as with the cases described above, be a difference between the interpretation of some papers in an electronic count and in a manual recount. The physical existence of the paper ballots provides opportunities for relatively straight-forward electronic or manual recounting, if necessary.

Data-inputting, whilst open to some level of human error (swiping the wrong barcode, or entering the vote for the wrong candidate) is no more prone to this than hand counting and is equally as open to scrutiny. As with optical-scanning, voters' intentions remain intact and, should the need arise, could be entered into the computer a second time or counted manually.

There is evidence to suggest that in some cases, trust in vote-counting machinery is so high that there can be reluctance on the part of Returning Officers to hold a recount, even if the margin of victory is very narrow. This kind of counting does not even provide for a curtailed recounting procedure, such as a bundle-check in a manual count, which can at least highlight *major* discrepancies.

Speed

The main reason for the use of electronic counting equipment is to reduce the amount of time taken to deliver the result of an election. Factors affecting the speed of an electronic count are similar to those that determine the speed of a manual count, namely, the size of the electorate and the level of turnout, the complexity of the voting system, the number of places to be elected within a single area (i.e. single or multi-member wards or constituencies), the time taken to transport ballot papers to the counting centre, the speed and accuracy of the verification process, the number of counting staff/machines, the number of doubtful ballots needing adjudication.

Whilst scanners are no doubt quicker at counting than humans, as Colin Rallings and Michael Thrasher have pointed out, "Estimating savings in count time is not simply a matter of dividing the number of papers a machine can count per minute by the number of ballot papers expected or received."[26]

The areas in which electronic counting can bring the greatest time-savings are in elections for more than one place, or elections with more

26 **Elections – the 21st century model: an evaluation of May 2000 local electoral pilots**, Colin Rallings and Michael Thrasher, Local Government Association, 2000, p.36

complicated voting systems. Examples of these would be multi-member local authority wards, where the manual counting process is more cumbersome and therefore slower and more error-prone than a single-member election, and the London election where voters were casting up to four votes or preferences in two separate elections using two different voting systems.

Scanners tend to lose some of the time gained at the verification and counting stages because of the number of unreadable or rejected ballots which then need to be adjudicated manually or remarked and fed through the machines again. As discussed above, this can happen for a large variety of reasons.

Unforeseen technical problems can also be a factor in slowing down an electronic scanning count, as the experience in London has shown. This could potentially be the case for data-inputting too, though fewer moving parts make this less likely.

Data-inputting is not necessarily significantly quicker in terms of actually counting the numbers of votes cast, but can be greatly time and labour-saving if the election requires calculations to be made on the basis of the votes cast, as was the case in the Australian example above.

Cost

The cost of introducing a punchcard system would have to incorporate not only the scanning machines but also the holders and styluses for every polling station. There would also be an increase in cost in producing the ballot papers to the strict specifications.

Optical scanning would require spending on scanning machines and software and on specialised ballot papers.

Data-inputting, depending on the nature and scale of the operation can be relatively cheap in that existing hardware, in the form of computers, can be used. Software would need to be developed or purchased. Ballot papers can be as at present in terms of quality and format, though the addition of a barcode would raise costs somewhat.

The cost of involving a technology-providing company in the electoral process will necessarily increase the cost of the election initially, though over time the reduction in staff hours could help to offset the cost. If the equipment was to be purchased rather than hired, then storage, maintenance and upgrading would also contribute to costs.

In summary

Punchcards: There would be little use for the Votomatic punchcard, with all its associated problems, in the United Kingdom, as each voter seldom has to cast more than one or two, or very occasionally three or four, votes at any one time. Although the use of Datavote punchcards would be more appropriate in that candidates' names are written on the ballot paper, and in that it is less problematic in several respects, the difficulties of placing the ballot paper in a frame and punching a hole in the appropriate location does not encourage the Commission to recommend a move in this direction. Punchcard systems are unable to deal with preferential voting systems as used for local, Assembly and European elections in Northern Ireland.

Optical-scanning: Evidence shows that optical-scanning is capable of speeding up large-scale and complex counts, because it speeds up both the physical counting of marks on ballot papers as well as any subsequent calculations that are necessary to reach a result. As regards smaller, simpler elections, the benefits are not as persuasive, particularly in relation to the expense. Although scanning provides good auditability because of the existence of paper ballots, a concern remains regarding the interface between human-made marks, and automatic machine reading of those inevitably somewhat unpredictable marks; this is the case even with simple 'X' voting but all the more so for preferential voting.

Data-inputting: Data-inputting also seems to be most advantageous in a complex election, whether it is large or small-scale, though in a large-scale election it could be significantly slower than an effective optical-scanning operation. Data-inputting cannot greatly improve the speed at which the votes are counted, however it can help

to significantly reduce the time needed to make any calculations necessary to arrive at a final result. In a single-member first-past-the-post election, any time-gains achieved in comparison with a manual count would be likely to be marginal. Auditability is good as is the opportunity for scrutiny. Costs are relatively low and the problem of machine/human interface and interpretation does not occur even if the voting is preferential.

Conclusions and Recommendations

If the United Kingdom were to find itself in a position where elections or referendums were being conducted with increasing frequency, with greater numbers of choices, and with more complicated electoral systems, then the Commission believes that electronic counting could solve some problems.

However, based on our terms of reference, we conclude that there is insufficient evidence in favour of the use of electronic or mechanised vote-counting at the current time. We believe that other available solutions would be more appropriate and more effective. It is our considered view that electronic counting does not increase turnout or boost public confidence in the electoral process, nor will it make voting easier. Increases in efficiency can be achieved but at great financial cost.

Without significant changes to the electoral calendar, or to the technology available, we do not see great value in further pilots of electronic counting.

We recommend as follows:

1. If investment were to be made in this sort of technology, then the Commission recommends that an optical scanner in lieu of a ballot box in each polling station (instead of centralised counting) would present a way forward. This solution would at least have the merit of preventing the unintentional spoiling of ballot papers.

2. a) Recounts must be available. The possibility of manual recounting must not be ruled out.

   b) Guidelines must be in place regarding the circumstances in which requests for recounts may be granted and whether the recount would be electronic or manual.

   c) This information must be available to all concerned.

3. There must be rigorous and realistic testing of hardware and software in situ by the Returning Officer – with candidates and agents given the opportunity to be present.

Appendix 1 – Ballot papers accepted and rejected by counting machines at London Mayor and Assembly elections

Mayoral ballot papers

First Choice	Second Choice	Destination Stack	First Choice Classification	Second Choice Classification
Single mark	Single mark	Accept	Good vote	Good vote
Single mark	Multi-mark	Reject	Good vote	Multiple vote
Single mark	No mark	Accept	Good vote	Uncertain or blank
Multi-mark	Single mark	Reject	Multiple voting	No valid first choice
Multi-mark	Multi-mark	Reject	Multiple voting	No valid first choice
Multi-mark	No mark	Reject	Multiple voting	No valid first choice
No mark	Single mark	Accept	Uncertain or blank	No valid first choice
No mark	Multi-mark	Accept	Uncertain or blank	No valid first choice
No mark	No mark	Accept	Uncertain or blank	No valid first choice

London Assembly ballot papers

Constituency Vote	London vote	Destination Stack	Constituency Vote classification	London Vote classification
Single mark	Single mark	Accept	Good vote	Good vote
Single mark	Multi-mark	Reject	Good vote	Multiple vote
Single mark	No mark	Accept	Good vote	Uncertain or blank
Multi-mark	Single mark	Reject	Multiple vote	Good vote
Multi-mark	Multi-mark	Reject	Multiple vote	Multiple vote
Multi-mark	No mark	Reject	Multiple vote	Uncertain or blank
No mark	Single mark	Accept	Uncertain or blank	Good vote
No mark	Multi-mark	Reject	Uncertain or blank	Multiple vote
No mark	No mark	Accept	Uncertain or blank	Uncertain or blank

Source: Election of the Mayor of London and the London Assembly: Count Rehearsal at Hammersmith Town Hall, 22nd February 2000

Electronic Machine Voting

Electronic machine voting has had very limited use in public elections in the United Kingdom having been used only in three local authority pilot schemes to date. It has however been used in one form or another in countries such as the United States, The Netherlands and Brazil for many years. It is a polling-station based technology, and therefore does not aim to have any effect on levels of voter turnout. The most significant difference between this kind of technology and the current methods, or any of the methods discussed thus far, is that voters no longer cast their vote on a paper ballot, but rather directly onto a machine which stores the recorded vote and tallies the records.

Electronic Voting Machines

The roots of the current models of voting machines lie in the mechanical lever machines that have been used in the United States since 1892 (see Appendix 1, p. 72). These machines were seen as a way of reducing fraud by eliminating the possibility of ballot paper manipulation or ballot box stuffing. Though mechanical lever machines were used by 17.8% of voters in the US elections in 2000, their use is declining rapidly in favour of newer technology.

Electronic voting machines, also commonly known as Direct Recording Electronic machines (DREs) consist of physical apparatus and dedicated election software. Prior to election day, the software is installed on a central computer and data about the political parties, the candidates and the constituencies/wards and polling districts is entered. The relevant data is loaded on a module into each voting machine.

The machines are positioned within polling stations and usually unfold to form a self-contained, polling-booth type cubicle. The voter goes to the polling station and once his/her entitlement to vote has been established, s/he proceeds to a polling booth in the usual way.

The terminal is usually activated by inserting a card or a number. The choice of candidates is then displayed on the screen, usually in the format of a ballot paper. Voters select their favoured candidate(s) by touching the appropriate section of the screen, either by hand or with a special pen, or by pushing a button. Voters have the opportunity to make changes before confirming their vote.

The vote is electronically stored on a memory cartridge or a disk. At close of poll, the results can be retrieved by printing vote totals from the individual machines, or by removing the memory cartridges and sending them to a central location, or the machines can be equipped with modems which transmit the totals to a central counting location.

Some voting machines have audio facilities (using headphones), larger font or braille facilities for blind and partially-sighted voters.

Machines of this sort are used in most municipalities in The Netherlands, and in several cities in Germany.

Belgium started to experiment with electronic voting in the early 1990s, and in the local elections in 2000 it was available in every canton and was used by about 44% of voters. The system uses light-pens on a touch-screen personal computer, and records the vote on a magnetic card as well as on computer disk. The magnetic cards are deposited into a ballot box and can be used as a back-up.

The Republic of Ireland intends to pilot this kind of technology in several constituencies in the

2002 General Elections, and then, if successful, to extend it to the rest of the country for local and European elections in 2004.

Information from the Pilot Schemes

On 4th May 2000, three local authorities conducted pilot schemes using electronic machine voting. They were:

Authority	Number of wards	Electorate
Bury Metropolitan Borough Council	1	7000
Salford City Council	1	7324
Stratford-on-Avon District Council	18 (+10 parish elections)	61,000

All three authorities used touch-screen systems; these were provided for Bury and Salford by Trilogy Information Systems[1] and for Stratford-on-Avon by Nedap/Powervote[2].

In all cases staff were involved in a training process, and the voters were informed of the pilot scheme both directly and through local and/or national media coverage. In Bury and Salford a mock election was held during the month prior to the election, to give voters the opportunity to come and try the equipment. Similarly, Stratford organised a series of 30 – 40 'road show' type events for people to familiarise themselves with the equipment, and also made a machine available in the District Council headquarters for people to try out.

Detailed back-up strategies were put in place. In Bury and Salford, the machines themselves were provided with a source of back-up power for up to eight hours. In Stratford, car batteries were brought in to provide back-up provision. Spare machines were on hand in case of mechanical failure, and in Bury ballot papers and ballot boxes were available in case of complete system failure.

In Bury and Salford, the system was used in five and four polling stations respectively, each equipped with two voting machines. Technical staff provided by the company were present, alongside polling staff, throughout the day at each polling station. In Stratford, there were 80 polling stations with one machine each, and several mobile technical teams, able to reach any polling station within 20 minutes. Machines underwent a pre-opening readiness test to ensure correct operation, and election staff also produced a 'Zero Report' from each machine to verify that no votes were stored in the machine's memory. In Bury and Salford, this report was signed by the Presiding Officer and poll clerk and the machines were then activated at the opening of the poll by the insertion by the Presiding Officer of an administration card and a Personal Identification Number. The card was then removed.

In Bury and Salford, the electoral register was held on a laptop computer in addition to the paper register. Voters arrived at the polling station and stated their name and address and had their names marked off the paper register in the usual way. The polling staff inserted a smartcard into a validation device attached to the laptop computer and entered the voter's electoral number into the computer. Once validated, the card was given to the voter to take to the polling booth containing the voting machine. The card was then inserted into the machine thereby initiating the voting process. In this way, a link between the vote cast and the voter's registration number is created.

In Stratford, voters presented themselves in the usual manner and were then given a ticket. The number on the ticket was written next to the voter's name on the electoral register. The ticket was then presented to the Presiding Officer who activated the machine on behalf of the voter. The ticket numbers were sequential, and so a ticket of the wrong colour or at the wrong point in the sequence would alert the Presiding Officer to a voter not entitled to vote at that machine (for example in a double polling station). Since the machine numerically records the sequence in which votes are cast, the link between the voter and the vote cast is maintained by referring back to the marked register.

A ballot paper appeared on the screen (two ballot papers in wards in Stratford with a district

1 In association with Global Election Systems Inc, based in the USA. The model used was the AccuVote TS model

2 The model used was the Nedap/Powervote ESD-1 model

and a parish election) and the voter had to touch the name of the candidate(s) for whom s/he wished to cast a vote. By doing this, an 'X' appeared in the appropriate place on the ballot paper. A message appeared asking the voter to confirm the choices that s/he had made and giving the opportunity to make changes. When the voter confirmed his/her choice, the vote was accepted and could no longer be altered. The machines were programmed to make it impossible to vote for more than the requisite number of candidates, however a blank ballot could be cast upon confirmation from the voter.

In Bury and Salford, the system recorded the fact that a particular voter had cast a vote on an internal audit roll; the voting card was then removed by the voter and returned to the polling staff for re-validation and re-use by another voter.

At close of poll, the Presiding Officer accessed the machines (in Bury and Salford this was done by inserting the administration card and Personal Identification Number). The results were printed out from the machine and the audit roll showing the numbers of votes cast and the disk containing all the data was removed. In Bury, each machine was connected to a telephone line and the data was transmitted to a server at the central count, where results were displayed on a large screen; the audit roll and disk were delivered to the central count for verification. In Salford, results were downloaded from the machines to a disk, and were delivered to the central count along with the printed results and the Zero Report.

In Stratford, the presiding officer completed a ballot account form and printed out the result from the machine. The ballot modules were removed from the machines along with the printout and ballot account, and delivered to one of four collection points in the authority. From there, they were taken to the central count in Stratford-upon-Avon. At the central count, there were three computers with reading units. The ballot modules were inserted into the reading units and the ballot accounts verified. The votes cast in each ward were collated and then downloaded onto a disk so that the results could be displayed in the Council Chamber.

Both Bury and Salford experienced problems in getting the machines up and running in time for the opening of the poll; in several polling stations one or both of the machines were not ready for use until 40-50 minutes after the opening of polls. In two cases, paper ballots were issued to voters who were in a hurry. In another polling station, the delivery of the wrong machine meant that only one machine was in use up until 1.20pm, when the correct machine was delivered. These delays meant that in Bury not all pre-polling tests were carried out. There was some dissatisfaction with the ability of the technical staff to resolve problems when they arose and with the speed of the back-up response. Stratford did not suffer any technical problems.

Salford issued tendered ballots to several voters who had inadvertently skipped through the ballot paper screen by pressing the screen twice. They were unable to return to the necessary screen and therefore unable to cast a vote on the machine. Salford also suffered several mechanical breakdowns during the day, though no single polling station was ever without a functioning machine. It was thought that voters trying to retrieve the smartcard from the machine too quickly, or trying to insert the card into the wrong machine had been the cause of these problems.

In Bury, one polling station had difficulty in transmitting the results to the central counting centre, and a disk with the results had to be delivered in person. Bury had hoped to deliver the result within 30 minutes (10 minutes for the polling station totals and a further 20 minutes for postal votes and verification). It actually took 55 minutes to declare the result, but it was still the first of the sixteen wards in the authority to declare. Salford's result came within 35 minutes of close of poll, the first result to be declared in Greater Manchester.

In Stratford the results were declared in 2 hours. This was about an hour slower than had been hoped, though significantly quicker than usual. The main difficulty was the distance that needed to be covered in transporting the ballot modules to the counting centre, in some cases a 45-minute journey away. It was suggested that in future elections, four counting centres would be used (as

is usually the case), and the results transmitted to a central point for tallying.

Authority	Total cost of pilot/Cost per elector	Total cost of normal election /Cost per elector
Bury Metropolitan Borough Council	£21,410/£3.06	£3,000/£0.43
Salford City Council	£5,700 / £0.78[3]	£2,022 / £0.28
Stratford-on-Avon District Council	£45,000/ £1.96[4]	£45,000/ £1.96

Both Bury and Stratford felt that validating the smartcards took too long and created queues, and that a simplification of the ballot interface on the screen was necessary to aid voters in following the correct procedures.

Salford also suggested the use of three rather than two machines per polling station and having a supply of ballot papers in case of total system failure.

Information from Overseas

The Netherlands

For a period, The Netherlands experimented with the use of mechanical voting machines. Problems with the performance of this equipment led to the introduction of electronic voting machines in the 1980s and they have been in use ever since.

The Elections Act of 1989 made provision for the approval by the Minister of the Interior of systems of voting '…other than by means of ballot papers'[5], based on criteria such as the maintenance of secrecy and ease of use for voters. All equipment is tested against fixed regulations[6] by a non-governmental research organisation on behalf of the Ministry of the Interior. Even after initial approval, manufacturers of voting machines must submit their machines for re-inspection every four years.

With approval from the Ministry, the decision about whether or not to use voting machines is taken at municipal level. Around 90% of Dutch municipalities, and 85 – 90% of the Dutch electorate (about 12 million), now use electronic voting machines, using equipment provided by two companies, Nedap/Powervote[7] and Sdu Uitgevers. One machine is used per polling district, which covers roughly 1500 voters.

Elections in The Netherlands use an open party list system where the whole country, province or municipality is a single constituency depending on the type of election[8]. Voters cast a vote for a particular candidate within a party list.

Voters enter the polling station and register by showing their voter identity/polling cards. A member of staff controls access to the machine and enables it for each voter in turn. A ballot of the same format as a paper ballot is displayed on the screen. If there are several elections then, depending on the model of the machine, either all ballots are shown on the screen at the same time (but clearly separated), or they are displayed in a sequence and voters, prompted by messages, work their way through the series of screens.

The voter touches the name of a candidate within one of the party lists on the screen, or otherwise pushes a button to cast an abstention. Voters have the opportunity to correct their choices and when they are satisfied, they are required to push a red button to confirm that the choices made are those that they intended to make. No further changes can be made. Once the voter has confirmed the vote, a blocking mechanism is in place to prevent any further votes from being cast, until a member of the polling station staff enables the machine for the next voter.

Close of poll is at 8pm and at this stage, reports are printed from the voting machines in each polling station. These show the total number of votes cast, the number of votes cast per list, per candidate and the total number of abstentions. The information is then transcribed onto the polling station's official report and signed and dated by the Presiding Officer and other polling station staff. This information is sent, often by fax or e-mail to the central count in the electoral area.

The ballot module, which contains all the data about votes cast, is extracted from the machine and physically transported along with the polling station report to the central count for reading. When all ballot modules across the country have

3 Due to financial constraints at the planning stage, Trilogy Information Systems offered Salford a special rate in order to be able to go ahead with the pilot. The cost of the scheme as originally envisaged would have been around £18,000.

4 Stratford rented the machines for the election. Stratford estimates that purchasing the voting machines would increase the cost per elector to £3.87 for the first seven years of use.

5 Elections Act, 28th September 1989, Section J 33

6 Regulations for the conditions and approval of voting machines, The State Secretary for Internal Affairs, July 1997

7 The Nedap/Powervote machines use integrated election software provided by Groenendaal bv.

8 In National and Provincial elections, these large constituencies may be further divided into electoral districts, but only for the purpose of selecting a geographical range of candidates, and not for the purpose electing representatives

been read, and all the votes aggregated, the final results can be calculated.

The Netherlands News Agency (ANP) receives results directly from municipalities on election night and makes an unofficial calculation of the final result. These unofficial results are available about two hours after close of poll.

Official detailed results are available two days after close of poll, with the final result declared three days later. This timetable has remained unchanged despite the transition from paper ballots to electronic machine voting and is largely a matter of procedure and tradition. The technology means that final results *could* be declared much sooner.

Machines are purchased rather than hired, and the cost is borne by the municipalities. The initial cost of equipping 9000 polling stations with electronic voting machines was about £22.5 million. Before the introduction of electronic machine voting, elections cost about 2 guilders (£0.60) per elector whereas now they cost 0.80 guilders (£0.23). Nedap estimates that the initial outlay can be recouped within 4 or 5 uses of the machines.

To date, there have not been any challenges to election results in The Netherlands relating to the electronic voting machines or software.

In an attempt to gain greater flexibility than with dedicated election equipment, The Netherlands has been experimenting with the use of ordinary personal computers in the voting process. These have been used in several elections on a pilot basis in 7 municipalities since 1998, and piloting is due to expand to include up to 50 municipalities in elections between 2002 – 2004. Other countries have shied away from using ordinary personal computers because of the potential for increased software security risks.

The Netherlands is also developing a system of online voting for public elections which it is intending to put into practice on a pilot basis in the provincial elections of March 2003.

Brazil

Electronic voting has been used in Brazil since 1996[9]. After 21 years of military rule, democracy in Brazil was restored in 1985, but suffered from allegations of electoral fraud. The 'Tribunal Superior Eleitoral' which oversees elections in Brazil decided to introduce electronic voting as a way of attempting to reduce the problem. It was also hoped that it would make voting easier for illiterate voters (up to 20% of the population) and that it would speed up the counting process which was taking about 30 days.

Brazil has an electorate of around 109 million. Voting is allowed from the age of 16, and is compulsory for literate people aged between 18 – 70. The voting system is a two-round system, where a candidate needs 50% of the vote to win. If no candidate obtains 50% in the first round, the two candidates with the highest number of votes go to a second round of voting to decide the winner.

Technology was first introduced into the electoral process in Brazil on a limited scale in 1990, for the transmission of results in one state to the 'Tribunal Superior Eleitoral'. Voting however, was done by hand in the traditional manner. In 1994, this system was extended across the country.

The mayoral and county elections in 1996 gave Brazilian voters their first opportunity to cast votes electronically. 33 million voters (nearly a third of the electorate) did so from polling stations in 52 of Brazil's largest cities.

In local, state and national elections in October/November1998, over 60 million votes (57% of the electorate) were cast electronically on machines provided by Procomp Amazonia Indústria Electrônica with a security system designed by Modulo Security Solutions and Microsoft.

In the municipal elections of October 2000, electronic voting was extended across the entire country for the first time. The first round of the elections was held on 1st October. Once again, machines manufactured by Procomp[10] were used. The machines have a personal computer architecture but stripped down to essentials in order to reduce costs and to save energy consumption. Many of the 326,000 polling stations in which they were installed lacked reliable electricity supplies, so the machines were designed to run for 12 hours on a rechargeable battery.

9 Electoral legislation making provision for electronic voting was passed in October 1995

10 In the year prior to the elections, Procomp was bought by Diebold Inc, a US company, and became a subsidiary

The voting equipment consisted of a unit with a numerical keypad (which in addition to the ten number-keys had a green, an orange and a white key) and a display monitor. Attached to this unit was a separate keypad. The keypads were also marked in Braille, and the units had audio capabilities for blind and visually impaired voters. Voters had to enter their registration number into the attached keypad, thus checking their eligibility to vote and enabling the machine. Each candidate was assigned a specific number, and the voter typed the code number of their favoured candidate into the numeric keypad on the voting unit. This approach was chosen, because it was felt that numbers would be easier to deal with than letters for illiterate voters. When the number had been entered, a picture of the selected candidate appeared on the screen along with his/her name and political party. Using the coloured keys, the voter could then confirm the choice (green), change it (orange) or cast an abstention (white).

The votes were stored on the computer's hard disk, using encryption. At close of poll, the data was downloaded onto a diskette and also printed off. The data was then transmitted over a telephone line to a central location where votes were tallied.

Results from all of the major cities were complete by the following morning. Results from the Amazon region were slower, but all results were available by that evening (within 30 hours of close of poll).

Of Brazil's 26 states, 15 elections were conclusive on 1st October; the other 11 proceeded to a second round of voting on 29th of the same month. Results from all of these 'run-off' contests were available within 6 hours of close of poll.

Brazil is lending 152 of its voting machines to Paraguay for a pilot in 5 districts during its municipal elections in November 2001. The 'Tribunal Superior Eleitoral' is planning to use 420,000 voting terminals in its elections in 2002 and is currently commissioning an inspection of the software with a view to improving security mechanisms.

Evaluation

The Voting Experience

Electronic machine voting as discussed in this chapter remains a polling-station based solution, so is unlikely to have any significant effect on the number of people who go to cast a vote.

However, voting by means of touch-screen machines, can assist the voter in casting an effective and secret vote once they have reached the polling station. Touching a screen rather than using pencil and paper requires less manual dexterity and precision, which could make voting easier for voters with certain disabilities as well as older voters. Audio and braille facilities as well as adjustable font-sizes, can assist voters with visual impairments who have traditionally needed to seek assistance in the polling booth, to vote independently and in secret. The US-based 'National Organisation on Disability' has said of electronic voting machines "This system is accessible for the overwhelming majority of people with disabilities."[11]

Electronic voting machines can also bring people into the voting process because of the opportunity they provide for eliminating spoilt ballot papers. Machines can be programmed not to accept attempts to vote for more than the required number of parties or candidates and to provide a warning message for any voter who attempts to do so; equally they can be programmed not to accept ballots with fewer than the requisite number of votes, or to require that the voter confirms that this is really what they intend to do. In this way the problem of unintentionally spoilt votes could be almost entirely eliminated, and it would be a decision for the appropriate authorities whether to allow the deliberate casting of abstentions.

"I'd be very sorry to go back to the traditional method of ballot papers because the electorate took to it so well… The 40-50 age-group said "we're worried about the elderly, they're not going to like it", but they had no problems whatsoever."

Bernadette O'Hare, Stratford-on-Avon District Council

11 Voting System Accessibility **Comparison**, National Organisation on Disability, August 2001

This kind of technology can deal equally as well with any type of voting system, whether 'X' voting, preferential voting, single ballot paper or multiple ballot papers.

Counting

The counting process using an electronic system is undoubtedly far quicker than manual counting, and the larger and more complex the election the greater the time savings. Effectively, the result from each polling station can be known within minutes of close of poll and communicated to a central counting location, or otherwise can be known and aggregated with the results of other polling stations within minutes of being physically transported to a central counting location.

Human error can be almost completely eliminated from the counting process, as long as all results are communicated/transported to the central counting centre and all results are aggregated, as would be the case with ballot boxes and ballot papers.

Recounting with an electronic system is largely redundant if it is simply a re-tallying of the same electronic records that were tallied the first time around; the result of a recount will inevitably be the same as the original result. Clearly, this raises issues about the ability of candidates and their agents to challenge results.

Scrutiny and Security

Whilst the use of electronic machine voting goes a long way to eliminating human error in both the voting and the counting processes, there is no doubt that it introduces new problems in terms of potential software and hardware error which are more difficult to detect.

i. Software design

With any use of software in the electoral process, concerns arise about the security of that software. The problems could be errors in the software design or pieces of hidden code introduced maliciously. These could have an effect on the final result of an election.

This is a concern made all the stronger by the fact that with any direct-recording voting methods there is no paper record of the voter's intention. There is a fear that software problems, whatever their cause, would not be immediately evident or be easily traceable.

Although paper records are not perfect at capturing voters' intentions, there is a feeling that in the case of problems with or challenges to the system, the existence of a paper record of votes cast would provide the opportunity for recounting, without having to start from the beginning and hold the whole election again.

Various methods are available which attempt to address this problem, most of which use some form of 'redundant' recording of the data, i.e. a second record of each vote cast which can be referred to if necessary. Some systems do this internally by storing an electronic ballot image of each vote or by recording votes on a roll of paper inside the machine. Others do it externally by printing the vote cast on a receipt for the voter to check and deposit in a ballot box, or encoding the vote on a magnetic card to put in a ballot box.

All of these solutions using redundant recording are useful in case of corruption of one of the sources of data within the system, in that they provide a separate back-up version of all votes cast. However, they do very little to address the problem of software reliability, i.e. is the machine correctly recording the voters' intentions? As U.S. academic Rebecca Mercuri points out:

"Fully electronic systems do not provide any way that the voter can truly verify that the ballot cast corresponds to that being recorded, transmitted, or tabulated. Any programmer can write code that displays one thing on a screen, records something else, and prints yet another result."[12]

It is much easier to monitor the software of machines which are designed and used specifically for elections, rather than general purpose personal computer type technology. This is because the software can be kept much simpler, and because it is the only software installed on the machine.

12 Rebecca Mercuri's Statement on Electronic Voting, 2001 http://mainline.brynmawr.edu/~rmercuri/notable/RMStatement.html

Some experts believe that making the software code publicly accessible and therefore totally open to scrutiny would enhance security. However others believe that this would simply make the software more vulnerable to tampering. There is little disagreement on the fact that an officially designated third party needs to have access to the software code in order to check it thoroughly with a view to certifying it for use in public elections.

ii. Hardware design
Issues relating to power supply are amongst the most important in terms of hardware design considerations. The key areas are:

- the need for battery back-up in case of a momentary or more lengthy power cuts, so that voting can continue
- the need for votes to be recorded on a permanent medium that can not be affected by a power cut or power surge
- the need for certainty about whether the interruption of a voting transaction by a power cut meant that the vote had been recorded or not

A user-friendly interface is also absolutely crucial, both in terms of the layout of the ballot and the buttons or areas of the screen that need to be pressed in order to cast a vote.

In view of these software and hardware considerations and the fact that key areas of the administration of the election take place in the micro-circuitry of an electronic machine, the role of scrutiny in the election process needs to be somewhat different from the traditional role. If all key players in the election process are to be satisfied as to the security and integrity of the election, then rigorous testing of the equipment needs to be undertaken.

Cost

There is no doubt, that the introduction of electronic voting would be costly. An electronic voting machine currently costs about £2500. The alternative is to rent machines for individual elections. Stratford took this approach and it cost £312.50 per machine.

> *"We will certainly continue to look at touch-screen technology because we can use it for surveys, referenda – all the things we have to build into best-value plans and community plans. But it is expensive – we can't afford to buy these machines and simply have them hanging around for elections."*
>
> **Stan Monaghan**, Bury Metropolitan Borough Council

Clearly, there are also savings to be made. Principally these are ballot paper printing, hiring count venues and counting staff. In Stratford, these savings counterbalanced the cost of renting the machines so that the overall cost came within the usual budget. It should be noted however, that provision would still need to be made for the printing, delivery and counting of postal ballots.

If the machines are purchased rather than rented, then savings can be cumulative over a period of time, potentially to a point at which electronic elections become cheaper than traditional paper-and-manual-counting ones[13].

Conclusions and Recommendations

The introduction of electronic machine voting would be a fundamental change to the voting process – it opens up many possibilities but needs substantial resources to enable the process to be properly planned and implemented. If electronic voting turned out to be a transitional stage in the modernisation of the voting process, it would be a costly transition.

Although we do not believe that electronic machine voting would have a significant effect on levels of turnout, it would have the benefit of preventing inadvertently spoilt ballot papers, greatly hastening the delivery of results and potentially improving their accuracy.

Our principal concerns lie with the reduced level of transparency and diminished possibilities for scrutiny that an electronic voting system is able to provide.

13 Nedap/Powervote estimates that savings begin to be made after the 4th or 5th round of elections.

We recommend as follows:

1. Pilots of electronic machine voting are appropriate at all public elections (including Parliamentary by-elections) other than a General Election

2. For security reasons, the equipment used should be specifically election-dedicated voting equipment

3. Testing of hardware and software must:

   a) be rigorous and realistic, preferably conducted in situ; test modes should not be allowed, and test votes should be entered by hand, not as pre-prepared data

   b) include the Returning Officer – with candidates and agents also given the opportunity to be present

4. Voting data should be recorded and stored in duplicate, in case of damage to data

5. Voting machines should be programmed to allow voters to cast a blank ballot; however voters must be warned that this constitutes a spoilt ballot and be given the opportunity to cast a valid vote before confirming their action

6. The voting machines should log all events, by voters and administrators, in order to make tampering, or attempts at tampering, evident

7. The security of the machines and cartridges on election day and leading up to it must be as high as ballot paper security

8. During election day, the percentage turnout by polling station should be made available on request to candidates and their agents

9. A detailed breakdown of voting, by polling station, should be made available to candidates and their agents as soon as possible after the declaration of the result. This would require a change to current electoral law.

10. In the case of a challenge to the result of an election, all election data must be made available to a court.

Appendix 1 – Mechanical Lever Machines

These machines were first used in the United States in 1892 and were being used by almost half of the US electorate during the 1960s. They were seen as a way of reducing fraud by eliminating the possibility of ballot paper manipulation or ballot box stuffing. Their use is declining now, because they stopped being manufactured almost twenty years ago, and spare parts are very difficult to find. However, mechanical lever machines were used by 17.8% of voters in the US elections in 2000.

The voter activates the machine by pulling a handle which also closes the privacy curtain of the polling booth. The machine is equipped with an array of switches, each marked with the name of a candidate or a referendum issue. Voters flick the switches of their preferred choices and then pull down a lever to register their choices. There is an interlocking mechanism to prevent voters from casting more than the requisite number of votes.

Inside the machine is a set of interconnected cogs for each candidate and issue; the cogs function as counter wheels. There is a cog each to count the hundreds, tens and units of votes cast. As the lever is returned to its upright position, it turns the units counter one tenth of a rotation. Each time the units counter makes a complete rotation it turns the tens counter one tenth of a rotation. The tens counter does the same for the hundreds counter. At close of poll, election officials open the back of each machine and the positions of the counter wheels for each candidate reveal the votes cast.

Since this kind of equipment is close to becoming obsolete and since its disadvantages have been widely discussed and accepted in the United States[14], we have not examined it in this report.

14 For example, Roy G. Saltman, **Accuracy, Integrity and Security in Computerized Vote-Tallying**, Institute for Computer Sciences and Technology, National Bureau of Standards, 1988, 3.3.1-2

Telephone Voting

For a number of years now, telephones have been used as a medium for voting in private elections both in the United Kingdom[1] and overseas, generally as an alternative to voting by post. The increasing use since the 1980s of touch-tone technology which is quicker, more reliable and user-friendly than its 'pulse' predecessor has facilitated this development.

Telephone voting has not yet been used for a public election in this country. However it has been used to elect advisory committees for public consultation purposes in Walsall[2] and was used for the first time in a local referendum in Milton Keynes in February 1999[3] and has been used as an option in several other local referendums since then. The piloting of telephone voting in local elections is now being actively encouraged by the Department for Transport, Local Government and the Regions.

Voting by phone removes the need for voters to visit a polling station, and therefore, like postal voting, has the capacity to increase turnout by increasing convenience for the voter. Like electronic voting, it removes the need for a ballot paper and allows voters to cast an electronic ballot, thereby allowing for speedier and potentially more accurate counting. As with postal and electronic voting respectively, issues of secrecy and security arise.

Generally, voting by phone proceeds as follows:

1. Electors receive a package of information which includes a list of the candidates/options, a telephone number (usually a freephone number), a security number and some general instructions.

2. Having called the freephone number, the voter, prompted by a computer-synthesized voice enters his/her security number on the keypad of the telephone, and the system checks the voter's eligibility to vote. If the voter is eligible, the system allows him/her to proceed and cast a vote.

3. Prompted by the voice, the voter presses the appropriate numbers on the keypad to indicate his/her preferred option(s).

4. The voter is asked to confirm the choice and is given the opportunity to go back and correct any mistakes; once the voter has confirmed the choice the transaction is complete.

5. Votes are stored electronically and can be tallied very quickly upon close of poll.

Voting can be from a land-line or a mobile phone. For diagram of the voting process, please refer to page 81.

UK experience

Telephone voting has not yet been used for a public election in the United Kingdom. It has however been used to elect advisory committees for public consultation purposes in Walsall and more recently as a component in several local referendums. The first of these was a referendum to decide on the level of council tax in Milton Keynes Borough Council in February 1999[4], where telephone voting was an option alongside a postal vote. Since then, similar referendums have taken place in Bristol City Council and the London Borough of Croydon (February 2001), once again to advise on council tax and rent levels; these gave voters the option of voting by post, by telephone or over the internet. These three referenda were conducted by Electoral

1 For example the elections to the National Executive Committee of the Labour Party; in 2001 these were conducted by Election.com (formerly Unity Security Balloting) and gave voters the option of voting by post, by phone or over the internet.

2 Walsall Metropolitan Borough Council has established 'advisory committees' for some of its local communities. In November 1998, in collaboration with British Telecom, Walsall MBC held the committee elections in the Rushall area by telephone. The voting period was 2 weeks, and the service was available in six languages. BT generated 12-digit 'Secure Voter Identification Numbers' which Walsall MBC applied to the electoral register to enable electors to get access to the voting system. The turnout was 25.3%, slightly less than the local election turnout in the same area the previous year.

3 This was a referendum to determine the level of Council Tax. It was conducted by Electoral Reform Services, in conjunction with Milton Keynes Borough Council

4 This referendum won the LGC's Innovation of the Year Award 2000

Reform Services in conjunction with the respective councils.

London Borough of Croydon

In July 2000, the London Borough of Croydon decided that it would hold a referendum to give its 230,000 electors the opportunity to influence the level of council taxes for the year 20001/2. It was also decided that Croydon's 17,000 council tenants would be given the opportunity to vote on their rent levels. In both cases, residents were given three options[5], and were asked to express a first and a second preference[6].

These referendums took place in February 2001. Ballot packages were sent by post to residents and tenants at the end of January and in early February, thereby giving voters at least ten days in which to vote. Electors were given the option of returning their ballot paper by post, or by voting over the telephone or the internet. They did not have to register for any one of these options in advance. Instructions regarding each option were included in the ballot package. The instructions also noted that voters were entitled to vote only once, and that any attempts to vote more than once would be detected and would not be counted[7]. A helpline was established for the duration of the voting period.

A computer telephony system equipped with specialised software was used to provide callers with an automated, interactive session. The system configuration allowed for the use of over 1,000 lines. The telephone voting facility was available 24 hours a day until close of poll at 5pm on 14th February.

The instructions for telephone voting included the freephone number that the voter would have to dial, and a sentence drawing the elector's attention to the ballot number and security code at the top of the ballot paper. The security codes were generated internally by Electoral Reform Services, and were also printed onto the ballot papers internally.

Voters called the number and heard a welcome message and a description of the voting process. Prompted by the voice, voters entered their ballot number and security number using the telephone keypad, thus ensuring their eligibility to vote. Voters then entered their voting intention, again using the telephone keypad. The choices that they had indicated were read back to them and they were asked to confirm these choices, or to cancel them and start again. Any mistakes were automatically identified and explained to the voter, and an opportunity was given to return and re-enter the numbers. A closing message let the voter know that the transaction had been successfully completed.

The turnout in the Council Tax referendum was 35.1%. This was just slightly lower than the level of turnout in the previous local elections in May 1998, and was far higher than the response to any previous public consultation exercises carried out by Croydon. Of those who voted, 4.88% (3,865 voters) chose to do so by phone[8], and the highest percentage of telephone voters in any one ward was 6.28% in Broad Green.

In the Council Rent referendum, the turnout was 24%, with 3.36% (137 voters) opting to vote by phone[9].

Close of poll was 5pm on 14th February and the results of both referendums were declared at 11am on 16th February.

The cost of the entire process was £151,532, which included a breakdown of the results by ward.

Overseas experience

As in the UK, the use of telephone voting in public elections overseas has been limited. There have been small-scale pilots but very few large-scale public elections.

Canada is one of the few countries to have used telephone voting for public elections and referendums. Changes made to the Municipal Elections Act in the Province of Ontario in 1996 allowed municipalities for the first time to "…use an alternative voting method, such as voting by mail or by telephone, that does not require electors to attend at a voting place in order to vote."[10] Until then, only paper ballots had been permitted along with the use of some mechanised counting equipment, which was

5 In the Council Tax referendum, the options were increases of 2%, 3.5% or 5%; in the Rent referendum the options were increases of 0%, 1% or 2%.

6 It was intended that the second preferences would come into play only if no option gained a majority of first preferences.

7 The use of ballot numbers made this checking facility possible.

8 91.72% (72,679 voters) chose to vote by post; 3.4% (2,693 voters) chose to vote over the internet.

9 95.73% (3,900 voters) voted by post; 0.91% (37 voters) voted over the internet.

10 Municipal Elections Act, 1996, c.32, Sched., s.42 (1) (b)

regulated by the Province of Ontario. Consequently, 1997 saw both a referendum in the (former) City of North York[11] and municipal elections in the Town of Gravenhurst, the Townships of Severn and Tiny conducted by telephone only.

The Town of Gravenhurst and the Townships of Severn and Tiny, Ontario, Canada

Following the change in Provincial Legislation mentioned above, the Gravenhurst Council passed a by-law in August 1997 to allow all electors to vote by telephone only in the municipal elections. The aim was to increase turnout by making voting more convenient for local residents, and particularly for seasonal residents (almost half of Gravenhurst's residents live elsewhere in November), and also to reduce costs and gain quicker results.

Bell Canada provided the equipment and services for the municipality, and the Townships of Severn and Tiny also joined the team in an effort maximise economies of scale and make the exercise more cost-effective.

Bell Canada generated a list of 5-digit Identification Numbers, which was handed over to the municipality. The municipality assigned one of these numbers to every elector on the electoral register. This list was kept by the municipality, and Bell Canada had no record of which number had been assigned to which elector.

Bell Canada then generated lists of 8-digit Voter Identification Numbers and matching 2-digit Confirmation Numbers, one of each of which was assigned to every elector. These numbers were kept by Bell Canada, and the municipality had no record of which numbers had been assigned to which electors. In this way, neither Bell Canada nor the municipality had the capability to match a vote to an individual voter, in accordance with Canadian electoral law.

The new Municipal Elections Act made it a statutory responsibility that the municipal clerk establish procedures for the use of new voting methods or equipment. The municipal clerk was also required to provide all candidates (and any members of the public who requested it) with a copy of the procedures at least 30 days before the day of the election, in order to increase transparency and provide opportunities for scrutiny.

A significant voter education programme was undertaken which included media work and visits to civic groups to explain the new technology and voting methods.

Voter information packages were sent out during the week of 20th October. These contained the elector's 8-digit Voter Identification Number and 2-digit Confirmation Number, the telephone numbers to call, instructions about how to vote, a list of candidates and information about how to contact the Helpline. There were different telephone numbers for electors with touch-tone telephones and those with dial telephones. Local calls were free of charge, but voters outside the municipality had to pay for the phone-call.

The municipality compiled a computerised electoral register, which allowed staff at the Help Centre to answer register-related queries, and also allowed for the compilation of a marked register, based on the list of Identification Numbers handed over to the municipality each day by Bell Canada. Scrutineers were entitled to view the latest copy of the marked register throughout the voting period, excluding election day itself.

A network of 'Revision Centres' was established, in order to make additions, deletions and corrections to the electoral register, and to provide replacement Voter Information Packages for voters who had not received them or who were experiencing difficulty in using the Identification numbers. Electors were required to produce proof of identity for all of these transactions. Scrutineers were entitled to be present at the Revision Centres. Only four election officials, with security codes, had access to the administration of the telephone voting system and control of the Identification Numbers.

The telephone lines opened on 30th October and stayed open 24 hours a day until 10th November. Voters could call from anywhere in the world at any time of day, using any kind of

11 This referendum took place in February – March 1997, and asked electors whether or not they were in favour of amalgamating with the City of Toronto.

phone. The majority of those who voted did so on election day.

The phone-call consisted of an interactive voice system. Voters were first asked to enter their Voter Identification Number and Confirmation Number, which the system then attempted to validate. If this information was invalid after two attempts, the interactive voice system explained the situation and asked the elector to contact his/her local municipal office for assistance.

The identification numbers encoded information about the voter's ward and so, once validated, the system automatically moved on to a list of the candidates in the appropriate ward and the numbers to press to vote for each candidate. The telephone system allowed voters to cast an abstention. Votes cast were repeated back to voters and they were asked to confirm the choices. Once voters had confirmed their choices, they were not able to enter the system again.

The results were delivered quickly, and the whole election remained within the allocated budget, which was the same as the budget for a paper ballot election. The staff found the election "the easiest (they) had ever administered."[12] The one disappointment was the failure to increase turnout – which, at 30.1%, remained the same – though this was partly accounted for by the fact that there was not a mayoral contest in 1997.

The referendum in the City of North York proceeded along similar lines. The City Clerk, Denis Kelly estimated that the cost ($350,000) was less than half the price of a normal election[13]. The telephone system gave voters the option of five different languages, and provided a 'Teletypewriter' line (equivalent to Minicom[14] in the UK) for hearing-impaired voters. It achieved a turnout of 40.5%, as compared with 31.1% at the previous municipal elections. The results were declared half an hour after close of poll.

In the elections of 2000, Gravenhurst used telephone voting once again, and was able to make savings on its 1997 budget, because most of the policies and procedures were already in place. The turnout (with a mayoral race) was also slightly higher, at 34%.

However, in 2000 18 rather than 3 municipalities used telephone voting systems, all using the same service provider. Possibly as a result of this increase in numbers, some problems were experienced in that some voters had difficulty getting through to the system, either having to stay on the line for a lengthy period, or having to try several times, indicating that there were not sufficient telephone lines. In 2000, Gravenhurst received its results within half an hour, though other municipalities had to wait up to two hours.

In 1999, Bell Canada quoted the following prices for telephone elections[15]:

Size of electorate	Price per voter
Less than 30,000	$8 – $15
30,000 – 49,000	$5 – $8
50,000 – 74,999	$3.50 – $5
75,000+	$2 – $3.50

Evaluation

The Voting Experience

Telephone voting has the potential to make participating in elections far more convenient for electors by removing the necessity to visit a particular voting site and by extending the voting period from a single day to several days or weeks. This is of particular interest in view of the Electoral Commission's survey after the 2001 General Election[16] showing that 37% of non-voters said that they had not voted because they couldn't get to the polling station because it was too inconvenient, or because they were away on election day. The lack of use of telephone voting in public elections means that there is little empirical data regarding its effect on levels of turnout, though the same survey found that 66% of non-voters claimed that they would have been more likely to have voted if they had had the opportunity to do so by phone or mobile phone.

12 'An alternative voting method: telephone voting' Cindy Anne Maher, Clerk, Town of Gravenhurst, p.7

13 'Phone in system lauded' , Bruce DeMara and Paul Moloney, The Toronto Star, 20th March 1997

14 A minicom is a machine that enables a hearing-impaired person to use the telephone. Both the person making the call and the person receiving the call need a minicom. The minicom has a small keyboard and a small screen. Each user takes it in turn to type in what they want to say. The messages are received down the telephone line and appear on both minicom screens.

15 'Televote: IVR solution' – a presentation by Bell Canada to the Annual General Meeting of the Association of Municipal Managers, Clerks and Treasurers of Ontario (AMCTO)

16 Attitudes to Voting and the Political Process, a survey conducted by MORI on behalf of the Electoral Commission, 4th July 2001

Access to telephones is generally good. Most households and workplaces have a telephone, and the level of mobile phone ownership is also high (71%)[17]. All mobile phones and phone booths use touch-tone technology, as do most home-users and nearly all workplaces. In any case, it is possible, as in Canada, to make provision, if necessary, for those with dial phones. However, concern remains about those without immediate access to a telephone at home or at work. Fully functioning public telephone booths are not necessarily easy to find, and it would be unacceptable to exclude from the electoral process, by reasons of access, those who may already to some extent be socially excluded.

Telephone voting can be set up to provide a multi-lingual service, and special Minicom and TextDirect lines can be provided for voters who are deaf or hard of hearing. It can be used for both 'X' voting and preferential voting. However, the more complex the election (the more elections taking place at the same time, and the greater the number of candidates), the less attractive the technology becomes. As with postal voting, telephone voting may be more difficult for those with low levels of literacy since the instructions are written and there is no immediate human support.

As with other forms of remote voting such as postal voting, and online voting, if an election were to be held entirely by telephone, without polling stations or a specific election day, political parties would have to adjust the timing of their campaigning activities, and some electors would undoubtedly regret the loss of the social aspect that election day can provide.

It is also possible that some electors would feel uneasy about using the interactive telephone system, and that they could find it confusing, though it should be noted that interactive phone systems are becoming increasingly prevalent and accepted. Attention would need to be paid to making the system as user-friendly as possible, and allowing the instructions and choices to be repeated at any stage. On the other hand, telephone voting can prevent people from inadvertently spoiling their vote by explaining mistakes and giving the voter the opportunity to try again.

Congested telephone lines could cause considerable frustration for people attempting to cast a vote, and could potentially deter them from doing so. The capacity of the system would need to be sufficient to deal with peak periods.

Secrecy and Security

With regard to the secrecy which a voter can expect whilst casting a vote, similar problems apply to telephone voting as to other forms of remote voting such as postal voting and online voting. No form of remote voting can assure the level of secrecy that can be guaranteed by casting a vote in a polling booth within a polling station. With telephone voting, it is not possible to know whether a voter has cast his/her vote in secret.

There are also issues that arise in relation to the security of remote methods of voting. Voters must have access to some form of documentation or information that allows them access to the voting process. With traditional voting methods, it is sufficient that voters present themselves at the correct polling station and provide their name and address. With a remote voting system, there must be some other 'key' to the process; with postal voting the key is the ballot paper and declaration of identity that is sent by post; with telephone voting it is a Personal Identification Number.

Firstly, these PINs are generated. Security surrounding the generation of these numbers needs to be as high as the security surrounding ballot papers and their serial numbers. The entire PIN needs to be generated randomly; a PIN based on an existing number relating to an elector, such as an electoral registration number, even if combined with extra randomly generated digits, runs the risk on enabling the code to be 'cracked'. The numbers must also be sufficiently lengthy to make it virtually impossible to enter the system with a random number. The use of a supplementary 'confirmation number' or ballot number makes such random entry considerably less likely.

Secondly, the PINs are applied to the electoral register, and allocated to electors. Security surrounding the allocation of these numbers

17 The e-MORI Technology Tracker, based on a nationally representative sample of adults, aged 15+ across Great Britain, September 2001

needs to be as high as the security surrounding ballot paper counterfoils which combine an electoral registration number with a ballot paper serial number.

However whilst levels of security surrounding traditional voting methods are largely a question of physical security (i.e. putting the sensitive materials in physically secure conditions), with an electronic system, it is a question of safe-guarding electronic information. This could be done either by using encryption, or, as in Canada, by making separate agencies responsible for different parts of the process. For example, the people who generate the PINs and count the votes could be quite separate from those who apply the PINs to the electoral register. This would create an 'information gap' which would make it impossible for either agency to find out who had cast which vote. However, it would allow for the possibility of the two agencies comparing their records to find an individual vote, if they were required to do so by a court order.

Thirdly, the PINs must be communicated to the electors. The most practical and cost-effective way of doing this at the moment is by post, which arouses the same security problems as the distribution of postal votes – how can one be sure that the correct person has received the PIN and thereby gained access to the voting system? The only way to protect against the use of PINs by unauthorised individuals is to require the PIN to be used in conjunction with an additional piece of information, such as a date of birth or, in countries where they are used, an identity card number. Without a secondary identifier, a voting system is no more secure than the way in which PINs (or postal votes) are communicated to the electors.

During the interactive phone-call, the system can be designed to create a record for every aspect of the call, if desired. Records almost certainly need to be created for:

- the fact that a call has been made with a particular PIN (before a vote has been cast)
- the option(s) selected (to be repeated back to the voter before s/he confirms)
- the confirmed vote

Other information that could be stored is:

- the date and time of the call
- each digit selected by the voter during the course of the call (whether or not these turn out to be confirmed)
- the phone number from which the call is made, if available

Under UK electoral law, where a link between a voter and a vote must be maintained, the confirmed vote and the voter's PIN would need to be stored as a single record.

Voters who have already registered a vote would need to be barred from entering the system a second time in order to avoid disruption to callers who have not yet cast a vote.

Any disruptions to postal or telephone services could be severely problematic for the smooth running of a telephone election.

As with electronic voting, where the recording and the counting of votes takes place within micro-circuitry, rather than in ballot boxes and counting halls, the opportunities for traditional methods of scrutiny are much reduced. There must be certainty about the fact that the system is recording each vote correctly, and tallying the votes correctly. However, opportunities for scrutiny could be created at different – probably earlier – stages of the electoral process, with the possibility of extended provision of information for scrutineers during the voting period. These could include involving candidates, agents and potentially members of the public in the testing of the equipment, and providing agents with total numbers of people who have voted at various stages during the polling period.

Unlike online voting, where the computer system is vulnerable to external hackers, it is not possible to use a telephone to sabotage the voting system. Though the telephone voting system is itself a computer, and therefore potentially vulnerable to external hacking, it is possible to ensure that it is

not visible to the internet, and that if it is on an internal network, that the system has adequate security in the form of firewalls. It would also be possible to use encryption so that any unauthorised access would not permit deletion, addition or modification of data.

Some people fear the possibility of surveillance. Since this would almost certainly have to be done on an official level, it is not clear that there is any technical way of ruling out such a situation with telephone voting.

Accuracy and Recounts

As with electronic machine voting, the counting of votes with a telephone system is an electronic tallying of electronic records. Whilst minimising the opportunities for fraud, it also minimises the possibility of human error, thus increasing accuracy. Recounts are not meaningful, as inevitably – as long as all the requisite data has been included – the same result will be produced.

Accuracy is dependent on the hardware and software being correct and fully functioning. Everybody involved in the election process needs to be confident that this is the case, and rigorous testing and certification procedures clearly need to be in place.

Speed and Cost

Results can be produced extremely quickly, along with detailed statistics, if desired.

As with an all-postal election, savings can be made on polling station sites and staff, ballot boxes and delivery of polling station stationery, though the requirement to post a PIN to every elector means that costs in this area are likely to be similar to an all-postal election. However, with telephone voting, further savings can be made on counting sites and staff.

Beyond a threshold of a few thousand voters, the use of a telephone voting system is likely to be no more costly than traditional methods of voting or an all-postal election.

Conclusions and Recommendations

The Commission believes that telephone voting has the potential to increase voter turnout (though there is not yet sufficient evidence of its use in public elections to be certain) at a manageable cost. It has the ability to prevent the inadvertent spoiling of ballots, and can make voting easier for people with certain disabilities. We believe that results could be delivered with greater speed and accuracy.

However, problems surrounding the secrecy in which the vote is cast and the diminished possibilities for scrutiny must be addressed. We are also aware of concerns regarding access to the technology.

We recommend as follows:

1. We recommend further pilots in telephone voting. However we recommend that these pilots initially avoid combined elections and elections with more than three vacancies.

2. Elector cards should be introduced in order to increase the security of telephone voting. Voters would be required to use a PIN in conjunction with their Elector card number, making personation far more difficult.

A second option would be to make changes to the way in which electoral registration functions (as has been proposed in the Electoral Fraud (Northern Ireland) Bill). Then voters would be required to use their PIN in conjunction with their date of birth in order to increase the security of the system. This would require the collection of additional information when the annual canvass takes place or on completion of the registration application.

If neither of the above were acceptable, the only way in which to increase security would be to send the ballot number and the PIN to the electors separately.

3. The voter's identity must be stripped from the vote and stored separately. No individual or individual agency should have the capability to match the two sets of records. The two sets of records must only be matched if a court order requires such action to be taken.

4. All telephone calls from within the United Kingdom must be free of charge.

5. PINs must be generated randomly, and not on the basis of electoral registration numbers or any other existing number that may be allocated to the elector.

6. Buying or selling PINs must be made an offence; the penalties should be widely publicised.

7. The interactive voice system must be as user-friendly as possible, particularly in terms of using 'plain English'. Voters must have the option of having instructions and options repeated at any stage. Voters must be given the opportunity to review their choices before confirming their vote.

8. It is essential that there be sufficient telephone lines that at no point do electors have difficulty getting through to the voting system.

9. The system should log all aspects of the call, so as to increase security.

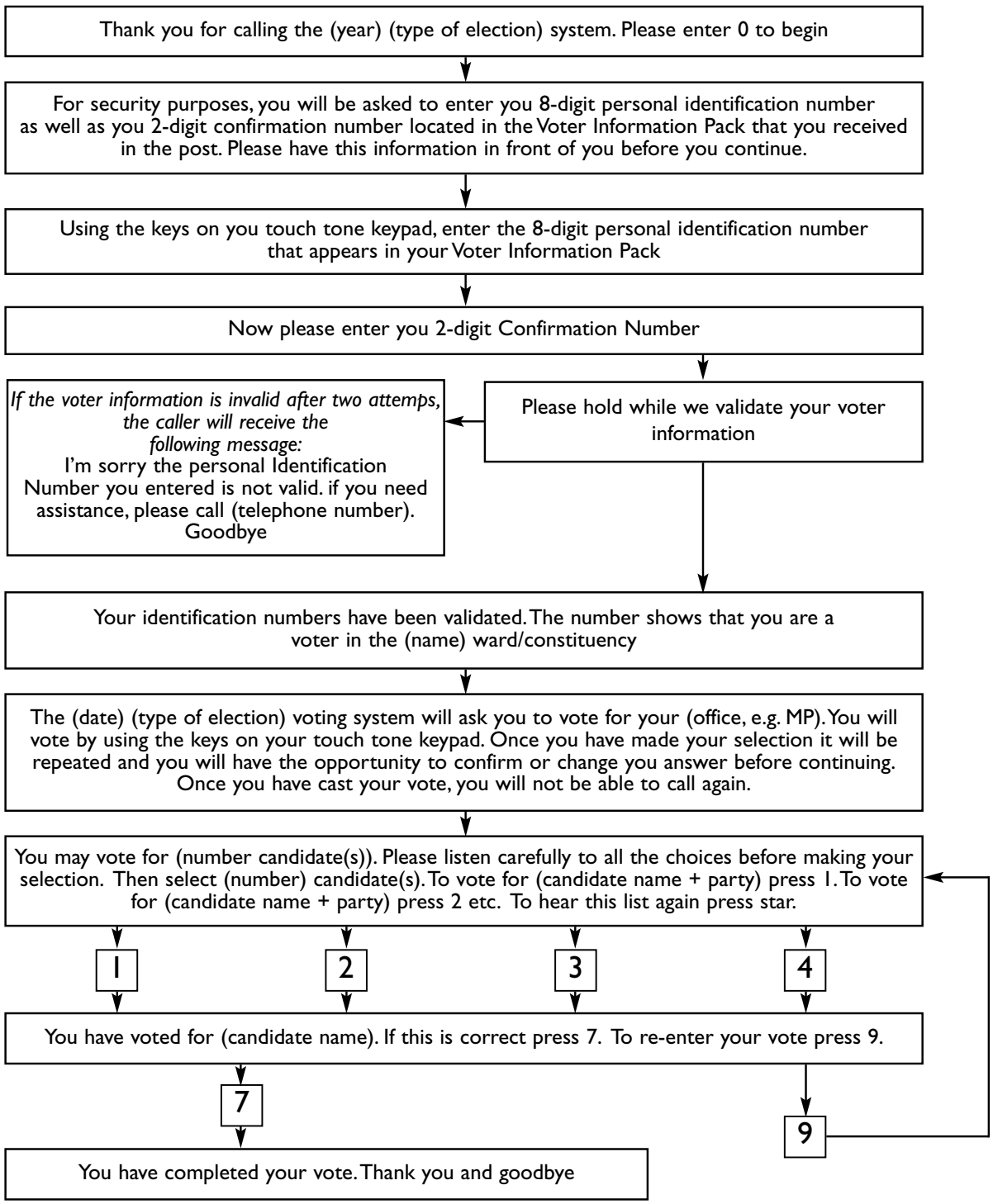
10. Voters should be allowed to cast a blank ballot; however, voters must be warned that this constitutes a spoilt ballot and be given the opportunity to cast a valid vote before confirming their action.

11. If the Voter Pack including the PIN number has not been delivered and there is not enough time to apply for a replacement, the voter should be entitled to attend a polling station in the relevant constituency and be issued with a tendered ballot paper after answering the statutory questions (suitably amended). This would avoid electors being unnecessarily disenfranchised.

12. A detailed breakdown of voting, by the smallest appropriate polling division (equivalent to a polling station), should be made available to candidates and their agents as soon as possible after the declaration of the results.

13. In the case of a challenge to the result of an election, all election data must be made available to a court.

Appendix 1 – Voting by phone: a template (based on Bell Canada's Televote Callflow Template)



Online Voting

Online systems are the newest form of technology to be applied to the electoral process, and have yet to be extensively used in public elections anywhere in the world.

There has been a surge in the usage of online technologies such as e-mail, the internet, interactive digital television and text-messaging in recent years. Increasingly, business and banking transactions are being conducted by these methods and governments have also grasped the trend. The UK government aims to put all government services online by 2005. Voting is being seen as one such 'government service'[1].

There have been a number of online voting trials around the world (though not as yet in public elections), and more are planned. In the UK, a small number of local government referendums have allowed votes to be cast via the internet, and the Department of Transport, Local Government and the Regions is actively pursuing the possibility of pilots using online methods for local elections.

Online voting allows voters to cast their ballots via existing infrastructures, such as the internet or cable networks, using equipment which need not be in a polling station such as a personal computer, a digital television or a mobile phone. There has been much discussion of the convenience of these methods of voting and their consequent potential for increasing turnout.

Online voting combines the convenience of postal voting with the accurate and instant count of an electronic system. Yet, it raises issues of voter access to the technology and unites the concerns about secrecy associated with remote voting with technological security issues. Security problems relating to e-businesses are regular news items and any online voting system would have to guarantee ballot integrity and convince the public of its reliability.

Whilst online voting can be based in a polling station or in some sort of public kiosk, most of the issues that are raised by using the technology in that way have been covered in the chapter on Electronic Machine Voting. We shall concentrate in this chapter on remote online voting.

An online voting system would consist of the following general stages:

- the voter is sent the requisite information and instructions to gain access to the voting site, including security numbers
- the voter enters the voting site by means of a computer, a digital television or a mobile phone and enters the required security information to prove his/her identity
- the voter is presented with a ballot in a similar format to a paper ballot
- the voter makes the required choice(s), confirms the choice and submits the vote
- the vote is received at the election site, and is stored electronically
- at close of poll all the records of votes cast are tabulated

UK Experience

Online voting in public elections has been very limited in the United Kingdom, as elsewhere. No use has been made in public elections as yet of voting via digital television, e-mail or by text messaging. However, local referendums held by

1 Speech delivered by Douglas Alexander MP at Wilton Park, October 2001

Bristol City Council and the London Boroughs of Croydon and Islington in 2000 and 2001 offered internet voting as one of several possible voting methods.

Bristol and Croydon

In February 2001, electors in Bristol and Croydon were given the chance to take part in local referendums. Both councils worked alongside Electoral Reform Services to run the ballots. Around 287,000 voters in Bristol and 230,000 voters in Croydon were asked to decide the level of Council Tax in 2001/2. In addition, 17,000 council tenants in Croydon were asked to set the level of their rent for 2001/2. In each case voters were given a range of tax/rent level options from which to choose.

Ballots were issued to voters early enough to give most voters 10 days in which to cast their votes, by post, by telephone or over the internet. A serial number and a unique security code were printed on each ballot. By using the number and the code voters could gain access to the internet voting page (and the telephone voting system). Instructions that directed voters to the election website were provided on the ballot paper.

The overall turnout in the Bristol and Croydon referendums was 40.2% and 35.1% respectively. Within that, the take-up of internet voting was 2.7% in the Bristol tax referendum and 3.4% in Croydon. In the Croydon rent referendum, take-up was lower, at 0.9%.

There is evidence to suggest a 'digital divide'. There was a significant difference in the take-up of internet voting for the tax (3.4%) and the rent (0.9%) ballots in Croydon. The rent ballot was only open to council tenants – less affluent electors who were less likely to have convenient internet access. Further evidence of this divide is provided by figures from the Bristol referendum. In the prosperous Bristol ward of Clifton East 5.69% of votes were cast via the Internet whereas in the less affluent Filwood ward that figure was only 1.12%. In Croydon, the pattern was repeated, with a more affluent ward achieving the highest internet turnout.

Islington

In May/June 2001 the London Borough of Islington held a referendum to determine its Council structure and to resolve a local education issue[2]. Once again, internet voting was offered in addition to postal and telephone voting. Voters were given five language options on the ballots and the polls were open for three weeks up to the 4th June.

The overall turnout was 22.3%, with 2.4% of those votes being cast over the internet. Although postal voting was once again by far the most popular option, the percentage of internet votes (2.4%) just exceeded the number of telephone votes (2.3%).

International Experience

The US provides some interesting examples of online voting, once again using the internet. These occur for the most part not in public elections as such but in candidate selection processes and primary elections.

Apart from the examples given below, other states have also experimented with internet voting. Washington primary voters in one county cast ballots in a mock presidential primary in February 2000. Prior to that, in November 1999, two Iowa counties held similar non-binding trials. In January 2000, Republicans in Alaska held a 'straw poll'. The US Reform Party presidential candidate election was also partly held over the Internet.

Federal Voting Assistance Program

In the United States a specific law governs voting in public elections for citizens living overseas (The Uniformed and Overseas Citizens Absentee Voting Act). This Act is administered on behalf of the Department of Defense by the Federal Voting Assistance Program (FVAP).

In response to research that it had carried out showing that the difficulties involved in casting postal ballots from overseas were a significant disincentive to voting, the Federal Voting Assistance Program conducted a trial during the US General Election in November 2000, that enabled overseas citizens to vote over the internet[3]. The project used a voting system that had been specifically tailored for this particular election and which was designed to mirror the existing postal voting procedures as closely as possible.

2 The London Borough of Islington worked alongside Electoral Reform Services to conduct the ballot.

3 'Voting Over the Internet Pilot Project Assessment Report', June 2001, http://www.fvap.ncr.gov

The online ballot was open to overseas citizens registered in particular counties within the states of Texas, Florida, and Utah, and in the whole of South Carolina. The voters were all volunteers and were almost entirely from the military services. 91 people used the system to register for an 'absent' vote, and of those 84 used it to actually cast their vote. It was the first time that electors had been able to vote over the internet in public elections for positions in all levels of government. The system had to comply with US electoral law.

Voters used personal computers with internet access from home or from work over a period of about 30 days. The FVAP supplied each voter with a CD-ROM which included software (a browser plug-in) that electors needed to install in order to vote. It also included the high-encryption version of the browser program for those electors who did not already have it installed on their computers.

Voters were issued with digital certificates as the mechanism for authenticating their identities. This was done through the Department of Defense's certificate distribution infrastructure, at no cost to electors who were all military personnel and their dependents. In order to receive the digital certificate, they were required to appear in person before an issuing authority with photographic identification. Voters also had to assign a password to their certificates.

The registered electors were contacted by e-mail to inform them the polling period had begun. They logged on to the FVAP server via the internet, using their digital signature and password. The system logged the time and date that these actions were taken. Having made his/her choice on the ballot paper screen using the mouse and/or keyboard, the voter had the opportunity to review the choice before clicking on the 'submit' button which encrypted the vote. The digital signature (along with the password) was applied to the vote, and the signed, encrypted vote was sent back to the FVAP server. Once again, the server logged the time and date that the ballot was submitted, authenticated the digital signature and forwarded it to the server in the appropriate local election office. Upon receipt in the local election office, the server sent a message to the voter acknowledging the vote. Votes were then stored in encrypted format on the server. Voters also had the option of logging on to a website which informed them of the status of their vote, i.e. whether it had reached the FVAP server, or the local election office server.

Once the election period had ended, two people, with privacy keys and passwords, in each local election office removed the signatures, decrypted, randomised and printed the ballots. These ballots were transcribed onto conventional paper ballots and the results were counted along with all the other ballot papers in the relevant jurisdiction.

The FVAP conducted a post-election survey and found that most respondents did not have any difficulty in installing the necessary software. However some difficulties arose as a result of a lack of familiarity with digital certificates. A problem arose when a couple tried to use the same computer to obtain their digital certificates. In order to do this successfully, the computer needed to be re-configured – a process that was found to be difficult and discouraged one person from voting.

FVAP Director Polli Brunelli has stated that "The electronic ballots worked well and we experienced no problems with them". The assessment report found that:

- the integrity of the electoral process had been maintained[4]
  - the authentication processes had ensured that only those entitled to vote had voted (and that they had only voted once)
  - the system provided greater protection against alteration of ballots than postal voting
- the system enhanced the enfranchisement of the overseas electors
  - inaccurate, incomplete and unclear votes were eliminated

4 Though it acknowledged that this would be far more difficult with greater numbers of voters, and non-military/Department of Defense voters.

- all votes cast were received and counted
- overseas votes were included in the ordinary counting processes, and not delayed until a later date

The entire cost of the project was $6.2 million.

Arizona Democratic Party Primary

The US Democratic Party's Presidential Primary election in the State of Arizona gave voters the chance to cast their ballots over the internet. In some states, primary elections are controlled by state election officials, this election however was run privately by the party and the balloting company, Votation.com (now known as Election.com).

This primary election took place in March 2000 and gave 843,000 registered Democrats the choice of voting at a polling station, by post or over the internet. In order to vote via the internet, voters had to request a registration form and provide some personal information that was subsequently used to verify their identities. All electors were provided with a randomly generated PIN, which was sent by post.

The internet ballot was open for 4 days from 7th – 11th March, with 124 polling stations open on 12th March. Some polling stations provided the option of internet voting alongside the traditional paper ballots. In order to vote over the internet, voters were required to visit the Arizona Democratic Party's website, or Votation.com's website. Once at the site, voters were required to enter their PIN, followed by their date of birth or social security number and finally their address, in order to verify their identity. Voters were then invited to click on one of four buttons on the screen, 3 candidates and a 'No Preference' option. Having made their selection, the voters were asked to confirm the choice. The vote was encrypted and transmitted over the internet to the election server using Secure Socket Layer (SSL) technology. Those who confirmed were presented with a screen confirming that their vote had been cast.

Around 35,000 electors chose to cast their votes via the internet – about 4.2% of registered Arizona Democrats. Approximately the same number voted by post, with around 18,000 people voting at polling stations on election day. The number of people voting at polling stations was lower than expected, because of the last-minute withdrawal of one of the candidates (after online and postal votes had already been cast). Online votes were cast early with nearly half of the final total having been cast by noon on the second day of voting.

Democrat officials hoped that utilising the internet would encourage more people to vote. Indeed, the overall turnout increased hugely from 12,800 (about 1.4%) in 1996 to 85,970 (about 10.2%) in 2000. However, unlike in 2000, the 1996 primary was uncontested (Bill Clinton was unopposed). Furthermore, as well as introducing internet voting, the 2000 election was the first in which postal voting on request was offered.

Whilst more people were encouraged to vote than in the past, there were some technical difficulties. It was reported that downloading the election web page onto voters' screens was a slow process and in some cases took so long that voters' connections timed out[5], probably due to insufficient server capacity. The website was out of action for an hour on the first day of voting, once again most likely due to the fact that the servers could not cope with the quantities of traffic. It was also reported that some electors were presented with a blank on-screen ballot paper, rather than one with the four available options[6]. Also, people using Macintosh computers and older browsers had difficulty getting access to the site[7].

The election was challenged by the Voting Integrity Project, a pressure group that supports further development of internet voting systems but advocates caution until current security concerns are addressed. It took out a legal action in an attempt to stop the election and later to have the results declared void. The basis of its case was the debate about voter access to the technology: voting opportunities available to some were not available to all. The Voting Integrity Project argued that rich, generally white voters had greater access to the internet and that the election was illegal in discriminating against the

5 Wired News, http://wired.com.news/politics/0,1283,34830,00.html

6 Australian Electoral Commission, http://www.aec.gov.au/about/action_plan.htm

7 'Is Internet Voting Safe?', Deborah M. Phillips & David Jefferson, Voting Integrity Project Report, July 2000

poor and the non-white. This racial dimension to the debate hinges on evidence that in the US African-Americans and Hispanic-Americans are 40% less likely than white-Americans to have access to the internet at home[8]. In response to the Voting Integrity Project's lawsuit the judge recognised that there was a 'digital divide' but allowed the election to proceed.

Contra Costa

In the Californian county of Contra Costa a mock internet election was held in parallel with the US General Election. This trial, contracted out to Safevote Inc. by the Secretary of State, aimed to test polling-station-based internet voting. During the five-day voting period, 307 people voted. The cost per voter, as estimated by Safevote, was between approximately US$1 and US$1.70[9]. Although the result of this election was not binding, it provides an important demonstration of security issues. Voters logged onto a computer using a unique 'Digital Voting Certificate' (DVC), which is "a cryptographic combination of six letters and numbers" provided by election officials. No computer disk was required as in the case of some such cryptographic keys. The DVC confirmed the identity of the voter and his/her eligibility to vote, as well as ensuring the correct ballot paper was displayed. It also encrypted and certified the authenticity of the ballot data submitted by the voter.

The technology employed placed voter's computers in a 'stealth mode' on the internet, so that voters could see and mark their ballots but could not be seen by others on the internet. Safevote invited computer hackers to attack the electronic system "to try to penetrate or cripple the system". Safevote states that "No attacker was able to compromise the network in any way" [10].

Plans for the future

Trials of online voting in public elections around the world have been limited and only now is access to the technology becoming sufficiently wide for governments to give it serious consideration. Amongst others, Costa Rica, Estonia, the European Union, the Netherlands, the United Kingdom and the United States have explored the possibility of online voting.

The United Kingdom

The Government has commissioned a research project into "the practical requirements for the implementation of remote electronic voting". The study will attempt to identify technological and social obstacles to successfully introducing online voting and ways in which they can be surmounted. The specific concern in the introduction of such a system is whether it should operate "in parallel with existing arrangements" or whether "a comprehensive modernisation in which polling station and out of station methods are integrated into one system" is required[11]. The Department for Transport, Local Government and the Regions is actively seeking local authorities to pilot online voting via the internet, digital televisions or mobile phones – possibly including text messaging.

In Scotland, the Highland Council is proposing to evaluate online voting as a method of increasing voter participation in this remote location. It plans to investigate public attitudes to and the feasibility of online voting from personal computers, digital televisions and public kiosks.

European Union

In September 2000, the EU Commission established a 'Cybervote Project' – a research and development programme that is designing a system to produce "fully verifiable on-line elections guaranteeing absolute privacy of the votes and using fixed and mobile internet terminals", with a view to increasing voter participation. The system is to be piloted in local elections in Kista Borough (Stockholm), Issy-les-Moulineaux (Paris) and in Bremen. The 3000 voters involved in the trials will have the option to vote via the internet or by more conventional methods. The project has a budget of 3.2 million Euros and the Commission believes that a substantial cost reduction is likely to be achieved[12]. The project is due to be complete by March 2003.

The Netherlands

The Netherlands has established its own distinct 'Remote Voting Project'. It operates on roughly the same time-line as the Cybervote. The Remote Voting Project will experiment with internet voting from any polling station of the voter's

8 SecurePoll.com Internet Voting Updates 3rd March 2000

9 Answer given in response to questions asked by the Commission, July 2001

10 Safevote's Contra Costa Report, http://www.safevote.com/contracosta/ccc-fr.zip & Safevote's Technology, http://www.safevote.com/tech.htm

11 Dept. of the Environment, Transport and the Regions, Summary Research Specification: The Implementation of Electronic Voting, 2001

12 EU Commission Press Release, 13th October 2000, http://www.eucybervote.org

choice and from special public 'voting columns' in the Provincial Council elections on 11 March 2003. In the run up to this election a number of pilots will be held that will enable any necessary adjustments to be made to the system. In addition, research into remote online voting will be undertaken. The aim is to make voting in all public elections less "location dependent" and, in the long-term, "enable every citizen to vote from any location of his or her choice" [13].

United States

The United States Federal Election Commission (FEC) produces guidelines for the running of US elections called 'Voting System Standards' (VSS). Independent designers and testers use these standards to evaluate voting system hardware and software across the United States. The FEC has been unwilling to permit remote internet voting. The 2001 Voting System Standards provide guidelines which state that:

"At this time it is widely recognized that the technologies now used to develop internet-based business systems do not fully address the requirements and risks associated with voting over the internet. Consequently, the VSS do not promote Internet voting.[14]"

However, they also state that:

"The Standards allow for internet voting systems operated in parallel with another voting system, and do not address or allow for a stand-alone Internet Voting System.[15]"

The California Secretary of State's Internet Voting Taskforce found electronic fraud was too much of a risk to permit remote internet voting, although it did leave the door open to internet voting from polling stations. Another US report thought it "appropriate for experiments to be conducted" to test "poll site internet voting". However, it found remote voting to be "a significant risk to the integrity of the voting process, and should not be fielded for use in public election until substantial technical and social science issues are addressed"[16].

Whilst the failings of the electoral system in the 2000 presidential election have spurred on research into new voting methods, the decision-makers have been unwilling to underwrite the risks in using such bold technology. Security is the major concern; most have been unable to satisfy themselves of the privacy and secrecy aspects of transmitting votes from remote sites over the internet. As discussed above, the US did, however, permit some US citizens overseas to cast ballots via the internet in the 2000 presidential election, and there are plans for a similar pilot in the mid-term elections in 2002. Furthermore, at least 12 states have been considering legislation to provide for internet voting[17], including the possibility of a pilot using digital television in a primary election in Los Angeles[18].

Estonia

Following significant steps in the field of e-government, Estonia has changed its laws to allow internet voting in local, parliamentary and presidential elections. It has also passed legislation that recognises electronic signatures. The Ministry of Justice is preparing a system that it plans to pilot in one municipality in the 2002 local government elections. Should this prove successful, the system will be rolled out for the parliamentary elections in 2003.

Reuters reported that 35% of the 1.4m population is now connected to the internet[19], and the figure may in fact be as high as 45%[20]. In addition, 90 Public Internet Access Points have been established throughout the country. Estonia's local authorities are now competing to be the first to hold an election online.

Evaluation

Access

Levels of access to the kind of technology that allows for online voting vary across society. The Commission surveyed members of the Association of Electoral Administrators (AEA) on their attitudes towards the introduction of remote online voting. All respondents agreed that differences in voter access to the technology would be a disadvantage.

Figures from the Office of National Statistics show a strong link between levels of income and use of the internet, with lower usage amongst lower

13 Ministry of the Interior of the Netherlands, 29th May, 2001 http://www.minbzk.nl/international/documents/pub2781.htm

14 US FEC VSS, 2001, Section 1.5.4, 3rd paragraph

15 Ibid., last paragraph

16 Internet Policy Institute, Report of the National Workshop on Internet Voting: Issues and Research Agenda, March 2001, p.34

17 DM Phillips and D Jefferson, VIP Reports, Is Internet voting Safe?, http://www.voting-integrity.org/text/2000/internetsafe.shtml

18 'California Firm Prepares to test voting via Digital TV', Kevin Featherly, Newsbytes, 29th November 2001

19 Reuters, New Media Age, 5/7/2001, pp. 35-39

20 Estonia Today, Information Society, Fact-sheet 23/1/2001

income groups[21] (see Appendix 1, p. 96), which points towards something of a 'digital divide'.

Many people have access to the internet at work, or via public libraries and internet cafes (see Appendix 2, p. 96). The Government has set up 1500 UK Online centres across the country, based in village halls, school, shops etc. Surveys have found that 51% of British adults have accessed the internet at some time[22].

That said, access to online technology is growing all the time, from 9% with access from home in 1998 to 35% in 2001 (see Appendix 3, p. 97). And it is not simply a question of the internet; in July 2001, 6% of adults who had ever used the internet reported that they had done so using a digital television, and 8% from a mobile phone[23].

It may be that the growth in access to digital television will outstrip the growth in access to personal computers (for e-mail and the internet), particularly with the predicted switching off of analogue television in about 2010[24].

For many, the problem is not access to the technology, but the know-how necessary to use it.

The issue of access arose in relation to the Arizona Presidential Primary election in 2000. The Voting Integrity Project took legal action contending that the election violated the 1965 Voting Rights Act because it allowed online voters four days during which to cast their votes, whilst those voting in person at a polling station were only allowed one day. It was also argued that online voting increased access to the electoral process amongst those with internet access at home (predominantly the wealthy), whilst discriminating against those without (predominantly minorities and the poor).

The voting experience

Remote online voting is able to make geographical location largely irrelevant. The Electoral Commission's report on the 2001 General Election identified a need for greater flexibility about when and how we vote. Their survey found that 21% of non-voters at the 2001 General Election say that they did not vote because "I couldn't get to the polling station because it was too inconvenient"[25].

Indeed, the Chair of the Society of Local Authority Chief Executives (SOLACE)'s Electoral Matters Panel, David Monks believes "The increase in postal votes indicates a demand for more convenient ways of voting. Technological developments offer real-time voting via the internet or email, enabling people to vote from any location without the time delays of the postal system."

The Commission's survey of electoral administrators also found unanimous agreement that convenience would be an important potential benefit of remote online voting. However, this did not necessarily translate into confidence about its effects on levels of turnout, with 40% of the respondents undecided about the impact of remote online voting on turnout.

The ballot period can be substantially longer than the single day allowed for polling-station voting. This would also have the effect of spreading out the level of service demands placed on the infrastructure. It would also affect the way in which political parties run their election campaigns.

Online voting via the internet and digital television could offer increased accessibility to electors with visual impairments. Adjustable font-size and a screen-reading system with head-phones would allow voters who traditionally need assistance, to cast a vote independently and privately.

Certain forms of online voting, such as those using the internet and digital television could also allow for the provision of further information about the candidates standing for election, thus enabling voters to make a better informed choice. However, such measures raise numerous and complex issues which fall beyond this Commission's remit. However, we consider the issue worthy of further consideration.

A survey conducted by this Commission of companies proposing online voting systems showed that almost all proposed systems give voters the opportunity of confirming the choices that they have made before actually casting the ballot. The systems can also be configured to prevent voters from spoiling their ballot papers, or at least to warn them that if they confirm their

21 National Statistics, 'Internet access', March 2001, www.statistics.gov.uk/pdfdir/int0301.pdf

22 National Statistics, 'Internet access: Household and Individuals', September 2001, www.statistics.gov.uk/pdfdir/int0901.pdf

23 National Statistics, 'Internet access: Household and Individuals', September 2001, www.statistics.gov.uk/pdfdir/int0901.pdf

24 However, at present only digital television via a cable network is capable of interactivity. Neither terrestrial nor satellite connections can currently support the kind of interactivity that would be necessary for voting.

25 Electoral Commission, Voter attitudes surveys for the 2001 general election http://www.electoralcommission.gov.uk/moripoll.htm

current choice it will be a spoilt ballot. It would also be easy to provide a 'none of the above' option for voters wishing to express dissatisfaction with all candidates, should legislation so require.

Most systems incorporate a mechanism which confirms the fact that the vote has been cast and received by the system, as a reassurance to the voter. Some do this by means of an almost immediate on-screen message. Others allow the voter to visit a secure website to check whether their name appears, or – for added security – whether there is a confirmation number next to their name which matches a confirmation number that was given to them on completion of their ballot. None of these systems reveals the way in which the vote has been cast.

Secrecy and Security

Although increasing numbers of financial transactions are being conducted online, and although many people believe that this means that online voting is safe, the security and privacy issues involved are very different. For instance, financial fraud on the internet is not uncommon, and companies are happy to underwrite this to a certain extent; this is not acceptable in an election. With financial transactions, customers can be issued with a receipt which confirms exactly what happened and when; in order to maintain secrecy and protect the voter from undue pressure, this is not possible with voting. Customers identities' are intrinsically bound to financial transactions; with a vote, the two must (at least to some extent) be separated.

The following are the main secrecy and security issues which apply to voting systems:

a) Voter authentication: In order to enter the online voting system, voters would have to produce some form of identification which would enable the system to check their entitlement to vote. Three methods have been proposed: biometrics, usernames/PINs, digital signatures or a combination of the three.

Biometric identification is perhaps the most secure method. This uses personal information such as voice, finger and retinal data to establish identities. This technology is still under trial and expensive. It would also require an enormous (and probably intrusive) amount of data to be collected from the electorate.

Alternatively, voters might be sent a voting pack containing the necessary security information, probably in the form of security numbers or PINs, much as discussed in the chapter on telephone voting. Where identity cards[26] or smartcards exist, it would make sense to require that the PIN be used in conjunction with the number on the voter's card, in order to further ensure that the PIN was being used by the individual it was intended for. Alternatively, a PIN in conjunction with a date of birth or some similar piece of personal information already known to the voter could provide similar security. Both of these measures would require legislative changes in the United Kingdom.

Security is clearly of utmost importance. However, since one of the main arguments in favour of online voting is convenience to the voter, one should bear in mind that a system of voter authentication which involves too many administrative steps will counteract these potential benefits. All the more so if the process has to be repeated for each new election. Security measures should not make it difficult for two people to vote from the same terminal.

It is likely that as more and more government services go online, that increasing numbers of people will be issued with some form of smartcard (or a series of separate smartcards) that will incorporate a digital certificate[27]. In order to be issued with a digital certificate, an individual must prove his/her identity, by producing a document such as a passport – the process is strong enough to put the identity of the individual beyond reasonable doubt. A smartcard of this sort, along with a PIN, could be one method of authenticating voters' identities and ascertaining their entitlement to vote. Specific kinds of smartcards can also be used with WAP phones[28].

These sorts of digital certificates would also help in terms of linking the vote to an individual voter, as required by electoral law. The Electronic Communications Act (2000) recognised the

26 Finland and Italy have started to introduce electronic identity cards, with the purpose of facilitating access to electronic government services, and possibly eventually to online voting

27 Smartcards of this sort could facilitate online voter registration

28 Mobile phones which access the internet via Wireless Application Protocol (WAP)

validity of electronic signatures in establishing the authenticity and the integrity of any communication or data. Clearly, the vote and the signature must be separated before the votes are counted, and would need to be stored in separate databases, probably connected by a key. A trusted party, such as the Electoral Commission, would need to hold the key to ensure that the two databases cannot be matched up unless authorised. The two databases act as an 'audit trail' of the election.

The voting companies surveyed by this Commission showed that most are currently working on the basis of usernames with a PIN and/or a password, with the possibility – where available – of a personal identifier (such as a date of birth or a National Insurance number) for added security. One system requires voters to re-enter their PIN before confirming their vote in order to ensure that it is the same person completing the process as began it. Although only one of the respondents has used a 'Digital Vote Certificate', most envisage electronic signatures and digital certificates as the way forwards.

b) Undue influence: With any form of remote voting, undue influence is difficult to address. Clearly, bribery and vote-buying and selling is easier from remote sites than from supervised polling stations. One approach (the current one) is to have penalties and to publicise the penalties prominently.

This Commission's survey of online voting companies similarly revealed a lack of methods for dealing with this issue. The only original proposal was one which allows multiple entry to the system and multiple votes, with the knowledge that the final vote would replace any previously cast. In this way, it was suggested, it would be impossible for someone attempting to exert undue influence to know that the vote they had seen being cast was actually the final vote cast. However this would also open up the possibility of undue pressure being brought to bear on those who had already cast a vote in secret to recast their vote. It would also allow those casting a vote online the opportunity to change their mind, which would not be the case for those voting by other methods. It would be a major departure from the traditional view of casting a ballot being a decisive, unchangeable action.

Clearly, it would be essential to ensure that having cast the vote, there was no way of returning to or recreating the ballot paper screen or page as completed and submitted by the voter. This applies equally to a home computer, a computer based in a workplace or in a public place. It is possible that changes would need to be made to existing employment law in order to ensure the privacy of those wishing to vote online from their workplace.

Other security issues relate more to the technology itself than to the physical location of the voter. 'End to end' security is essential to safeguarding the integrity of the ballot. Security threats could come from both within the system (source code reliability, election officials) and outside (hacker attacks). Standards, certification and testing procedures need to be in place to ensure the correct functioning and reliability of the system. And clearly, election procedures need to be governed by strict security guidelines to prevent unauthorised people using election site computers. Trust should be divided so that a number of officials must concur before decisive steps are taken in the ballot.

The more serious and unpredictable threats are external ones.

c) Protecting the voter: With internet voting via a personal computer, attacks on voters' machines, in the form of viruses represent a significant risk, since their machines are unlikely to have the same levels of protection as the election site computers and will not be scrutinised by officials. Since Personal Computers are designed to carry out multiple tasks, and are able to download new software (which itself is likely to have vulnerabilities), it is extremely difficult to make them secure. Viruses take many different forms, such as Trojan Horse viruses which hide within another program, worms which spread through networks and time bombs which take effect on a specific date. Viruses could be spread by e-mail in the run-up to an election and could be specifically aimed at damaging the software used by the elector to cast a vote; they

could be specifically designed to alter the candidate for whom the vote has been cast, without the voter's knowledge. Virus protection software – already installed on most machines – is the only way to prevent this kind of attack. This problem does not as yet apply to digital television which currently has far less flexibility and therefore far less vulnerability than a PC.

One of the e-voting companies surveyed suggested the possibility of getting every voter to download a free firewall. Special secure browsers anti-virus programs could also be distributed to voters. Any such additional software must be compatible with as many types of computers and be simple to install. It should be noted that voters in the United States Federal Voting Assistance Project pilot encountered some difficulties in dealing with this. Furthermore, care must be taken that necessary security measures do not make online voting so inconvenient as to discourage people from casting a vote.

d) Protecting the communication link: Another danger is unauthorised interception or reading of ballots between the vote being cast and being received by the system. Encryption can be used to help solve this problem. Furthermore, encrypted data can be bound with an electronic signature to show that it has not been altered en route. This kind of technology is becoming increasingly common for business transactions, as is Secure Socket Layer (SSL) technology[29], and is currently being developed specifically for e-government services. The equivalent of SSL technology for mobile phones which can access the internet via Wireless Application Technology (WAP), is Wireless Layer Transport Security (WTLS)[30].

Encryption can also be used at the election site for storing all votes cast. If it is considered necessary it is also possible for a physical record of each vote cast to be created, for example by 'burning' each one onto a write-once CD-ROM. This would provide a back-up in case of corruption of or interference with data.

e) Protecting the election site: 'Website spoofing' is where somebody creates a website that looks like the election website, with a very similar web-address, in order to intercept data and prevent electors from casting a vote. Voters mistakenly visiting this site may have no reason to suspect that they have not cast their vote on the valid website.

There are several measures that can be taken to protect against this kind of scenario. Firstly, election authorities need to be vigilant for such spoof websites, which tend to be high profile and easy to spot. Once they have been identified steps can be taken to have them shut down rapidly. Secondly, a website verification code could be issued to voters as part of their voting pack. When a voter types in their security ID the real website would show the correct verification code; a spoof website would be incapable of doing so. Thirdly, the ability to log on to a website to check that the voting system has received one's vote could alert a voter to the fact that their vote has not been received and that something is amiss.

Denial of service attacks present another problem. They are designed to hurl masses of information at the website servers, or the routers, by making many spurious queries or, attempting to access the site many times over simultaneously. The aim is to slow the system down and ultimately to prevent it from functioning at all. This is a very basic form of attack and although they have caused well-publicised problems[31] there are now strong methods have been developed for dealing with the problem. The effect of such an attack can be absorbed if a sufficient number of redundant computer servers are used, and once the attack has been detected it is also possible to switch over to different servers altogether. Such an attack can also be detected, and before its effects strike the website, the election site computers can be programmed to refuse further access to the source of the attack.

A similar form of attack bombards the website with potential passwords in an attempt to discover valid access information through a process of trial-and-error. Again, similar defences to a denial of service attack can be employed along with 'firewalling', which defends against unauthorised access attempts by creating extra layers of security. One type of firewalling uses a proxy server. This server intercepts all messages passing through the site, effectively hiding the

29 Secure Socket Layer technology provides a secure a secure network connection session between a client and a server, usually between a web browser and a web server

30 Wireless layer Transport Security provides a secure network connection session between a WAP device and a WAP gateway

31 Such as the shutting down of Yahoo in February 2000

cyber-location of the true computer server.

More pernicious attacks have greater subtlety and act on the source code of the website. More subtle attacks might attempt to use 'gaps' (flaws) in the programming to gain access to secret information. The type of programming employed by software developers is clearly an issue here. There is an ongoing debate about the relative merits of open-source and closed-source computer programming. In any case, the security of the system should not rely on maintaining the secrecy of its inner structure, since this may not be possible. What is clear is that the source code of the system must be made available on an official basis to those who have the qualifications to ascertain just how secure the program really is.

By running the election at many server sites the risks to the integrity of the ballot would be minimised. For example, it is unlikely that a General Election would be run from a single system, but would be far more likely to be based in local authorities. This would ensure that a successful computer attack on an online election would have less destructive potential in that targets would be spread out and susceptible only to localised problems should defensive measures fail. It would also mean that the electoral register, although online, could remain on an authority-by-authority basis, as is presently the case, rather than as one centralised electoral register.

The system should not be totally dependent on any one element or connection. That is to say if one part of the system fails, this should not prevent the system as a whole from functioning. Therefore, the design must incorporate back-up facilities, such as redundant servers, alternative power supplies and connections, as appropriate. Any hackers or fraudsters responsible for attempts to corrupt the integrity of an election must face suitable penalties.

Scrutiny

The purpose of scrutiny in our current system, is to make the voting and counting processes as transparent as possible. Candidates and their agents are able to see that the electoral process is being carried out in accordance with the rules specifically designed to protect elections from corruption of any sort. If they see that the process is not being carried out properly, of if because of their observation, they believe a mistake to have been made, they are able to make a challenge. Because of this transparency, there is general confidence in the process and in the result.

Scrutiny of the voting and the counting processes is not possible with remote online voting to nearly the extent that is possible under the current system. Many of the processes are just not visible in the same way – one cannot see the voters themselves, nor their names being marked on the register and the ballot papers issued, nor the fact that they are casting votes free from undue influence or bribery. One cannot see the ballot boxes being sealed nor the individual ballot papers being counted into piles for each candidate.

Trust in an online voting system means having confidence in the machinery and infrastructure, rather than simply in the physical and administrative processes. In order to gain that confidence, all systems must conform to certain criteria which ensure that they maintain the security of the electoral process – standards must be in place by which to judge each system. A certification process needs to be in place for all systems which meet those standards. Furthermore, once a system has been certified, there must be strict protocols about the testing procedures during the period leading up to the election and on election day itself – for example, the practice of showing that the ballot box is empty before polls open could be replicated by a procedure to show that no votes are stored on the system. Candidates and their agents would need to have the opportunity to be present during these tests.

Another measure which could to some extent increase confidence in the system is to take advantage of the fact that online systems are able to provide more information during the course of the election. Most proposed online systems are able to provide turnout statistics at any point during the voting process – either for election officials only, or on a website. The provision of such information could help to reassure candidates and agents that the process is working

as intended, and it could also help with their campaigning.

Speed and Accuracy

The counting process is an electronic tallying of electronically stored records. It is potentially far quicker and more accurate than a hand count.

The Commission's survey of electoral administrators found that all respondents agreed that fast and accurate vote counting was one of the most important potential advantages of internet voting, particularly where more complex voting systems are involved.

This was borne out by the survey of online voting companies all of which claimed that several thousand votes could be counted within minutes of all data being available.

As with electronic machine voting, recounts are not meaningful as they would simply give the same total again. Although 80% of electoral administrators surveyed did not see this as a particular problem, we acknowledge that candidates and their agents are more likely to have reservations, particularly when there is a very small winning margin.

Cost

The cost of online voting would vary enormously depending on the type of system employed and the type of security used (passwords, software, biometric identification).

Setting up a public infrastructure for internet voting, in the form of personal computers for polling stations, other supervised sites and election offices would be costly. Once this cost is met however, the remainder of the costs would be similar to those for postal voting. One of the e-voting companies surveyed by this Commission estimated that the cost of remote internet voting used on its own would currently be US$0.20 to US$0.50 (roughly £0.14 – £0.36) per voter. Another company estimated that after initial set up costs, an online voting system would cost about A$0.5 (about £0.19) per voter.

In addition, there will be costs incurred by using a telephone line to vote via the internet, which would be publicly funded in the case of supervised sites and would be paid for by voters in the case of remote sites.

Conclusions and Recommendations

The Commission regards the internet as a transformative technology which is having and will continue to have a profound effect on public communication, including the electoral process. Whatever role the internet may play in relation to elections, it is vital that public confidence in the system is maintained.

The Commission believes that by increasing convenience for the voter, online voting has the potential to increase turnout (though there is not yet sufficient evidence of its use in public elections to be certain), particularly amongst sections of the population which have recently become disengaged from the electoral process, such as young people. It also has the ability to prevent voters from unintentionally spoiling their ballot papers and to deliver results with greater speed and accuracy than our current methods.

Our principal concerns lie with issues surrounding differential access to the technology, the reduced possibilities for scrutiny that an online voting system is able to provide, and the security of the systems from interference. We believe that solutions to the problems of voter authentication can be found. The election website, the servers, and the communication of the vote from one place to another can be made relatively secure. However, if remote voting from home computers is used, the Commission remains concerned about the lack of security surrounding these machines.

We recommend as follows:

1. Before any pilots using online voting are run, a Technology Taskforce should be established in order to evaluate and challenge the system. This would be in addition to any other evaluations that might be taking place.

2. At present, there is a case for online voting as an addition to existing voting methods and not as a replacement.

3. Electors who already have digital certificates (issued by a recognised authority) and the necessary software must be allowed to use them as a form of voter authentication.

   Electors who do not have a digital certificate, or who prefer not to use it for voting, should have the option of being issued with an Elector Card by their local authority. Voters would be required to use their PIN in conjunction with their Elector Card number, making personation far more difficult.

   A second option would be to make changes to the way in which electoral registration functions (as has been proposed in the Electoral Fraud (Northern Ireland) Bill). Then voters would be required to use their PIN in conjunction with their date of birth in order to increase the security of the system.

   If neither of the above were acceptable, the only way in which to increase security would be to send the ballot number and the PIN to the electors separately.

4. The voter's identity must be stripped from the vote and both must be sealed and stored separately. No individual or individual agency should have the capability to match the two sets of records. The two sets of records must be matched only if a court order requires such action to be taken.

5. PINs must be generated randomly, and not on the basis of electoral registration numbers or any other existing number that may be allocated to the elector.

6. Buying or selling PINs must be made an offence; the penalties should be widely publicised.

7. It is essential for there to be sufficient servers with adequate capacity so that at no point do electors have difficulty connecting with the voting system.

8. Voters should be allowed to cast a blank ballot; however, voters must be warned that this constitutes a spoilt ballot and be given the opportunity to cast a valid vote before confirming their action.

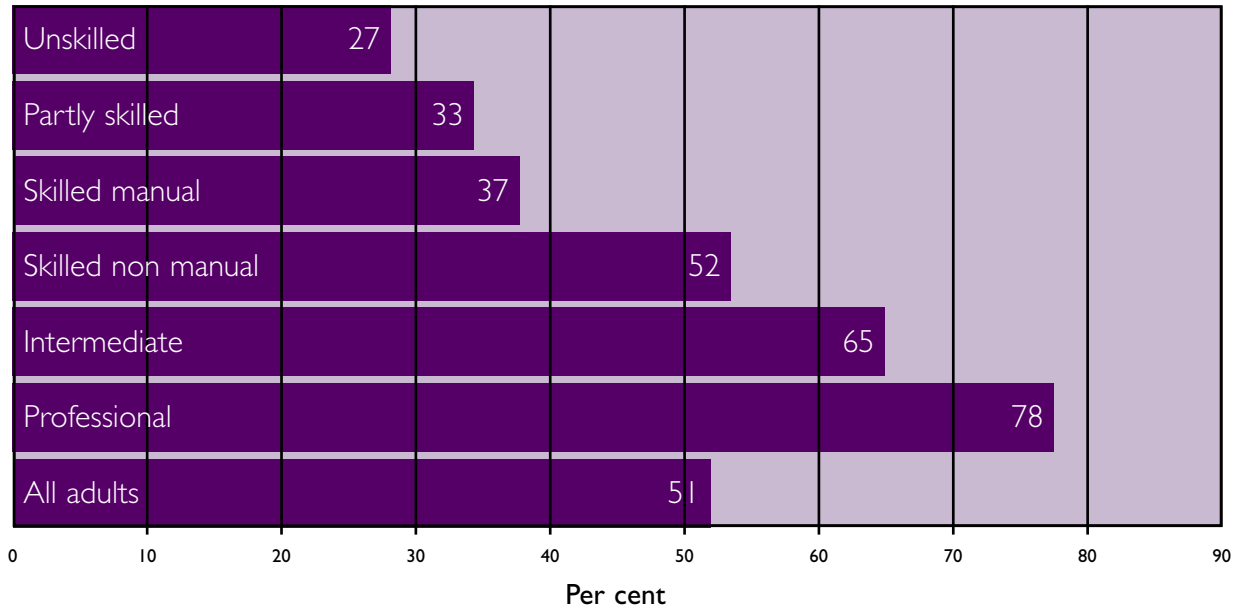
9. When an elector has not received the requisite security information in the post, and there is not enough time to apply for a replacement, the voter should be entitled to attend a polling station in the relevant constituency and be issued with a tendered ballot paper after answering the statutory questions (suitably amended). This would avoid electors being unnecessarily disenfranchised.

10. A detailed breakdown of voting, by the smallest appropriate polling division (equivalent to a polling station), should be made available to candidates and their agents as soon as possible after the declaration of the results. It could be argued that it would logical to extend this to all methods of voting.

11. In the case of a challenge to the result of an election, all election data must be made available to a court.

Appendix 1

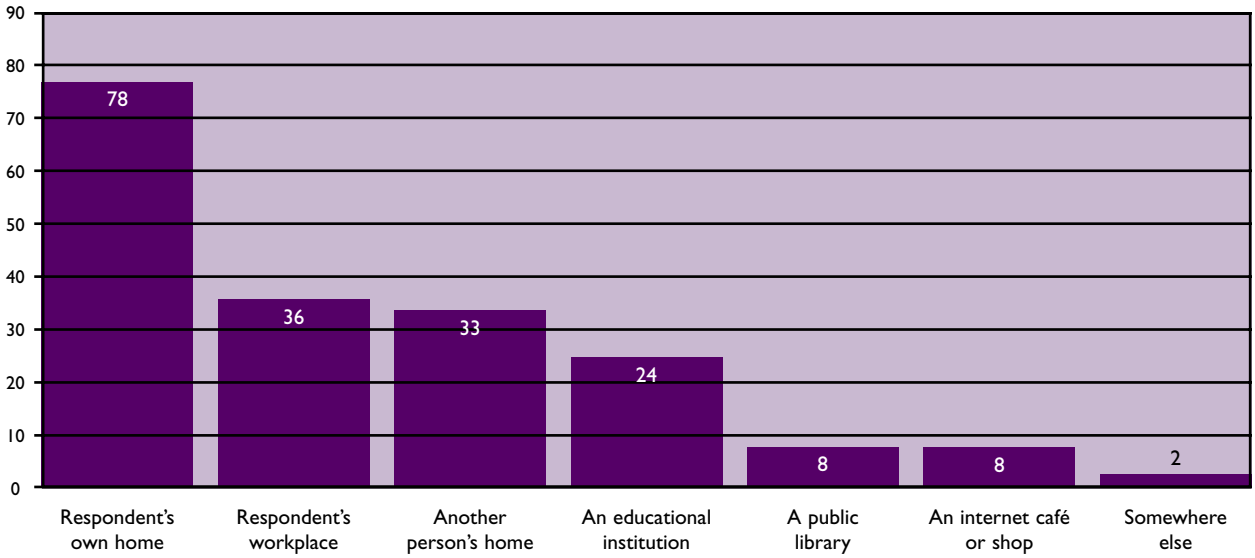
Proportion of adults who have used the internet by social class



Source: 'Internet Access', National Statistics, March 2001

Appendix 2

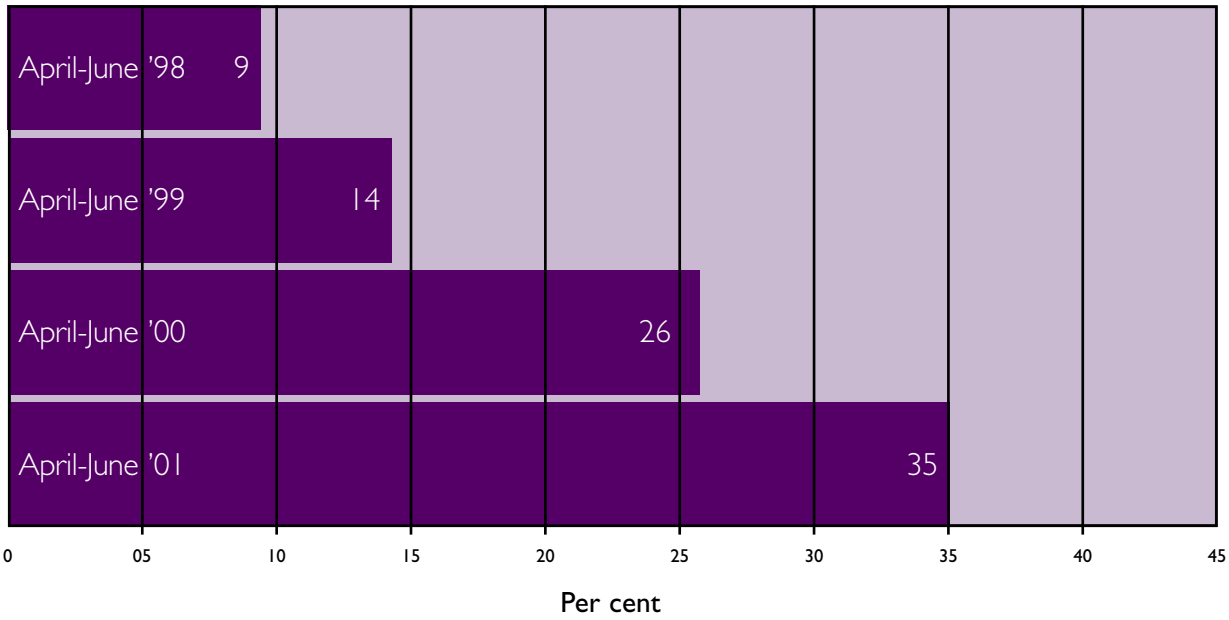
Locations adults have used to access the internet (for personal use)



Source: 'Internet Access: Household and Individuals', National Statistics, September 2001

Appendix 3

Proportion of UK households with home access to the internet



Source: 'Internet Access', National Statistics, September 2001

Submissions and other Information

(names in bold indicate individuals who have given oral evidence to the Commission)

Administration and Cost of Elections Project, www.aceproject.org

Australian Electoral Commission, www.aec.gov.au

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