

# May 2007 Election Report

## **Findings of the Open Rights Group Election Observation Mission in Scotland and England.**

Prepared June 2007



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# Executive Summary

## **The Open Rights Group cannot express confidence in the results for areas observed.**

**The Open Rights Group (ORG) believes that the problems observed at the English and Scottish elections in May 2007 raise serious concerns regarding the suitability of e-voting and e-counting technologies for statutory elections. E-voting is a 'black box system', where the mechanisms for recording and tabulating the vote are hidden from the voter. This makes public scrutiny impossible, and leaves statutory elections open to error and fraud. The Government has prioritised the introduction of e-voting because of the perceived convenience of new technologies, ignoring other vital considerations such as confidence and trust in the electoral system. ORG considers that the problems observed and difficulties scrutinising results delivered by e-counting systems bring their suitability for statutory elections into question.**

### **Observing**

As a technology-focused organisation, the Open Rights Group is actively interested in e-voting and e-counting developments. ORG welcomed the opportunity to observe the electoral modernisation pilots taking place this year in England as well as the e-counting planned for Scotland.

Given that this was the first time accredited observers were permitted in the UK, it was unsurprising that there were some difficulties with the observation process. English legislation, regulations and orders did not mandate that observers should be allowed to monitor pilot-specific arrangements and case-by-case negotiation for access proved necessary. In both Scotland and England election administrators, unused to the presence of observers, sometimes did not understand what observers wished to see and varied widely in their approach to information provision and local 'house rules' for observation. In England observers were frequently subject to seemingly arbitrary and changeable decisions via unclear lines of authority, and on occasion observers were granted less access than the media. The Electoral Commission intervened on several occasions to guide election administrators.

### **Procurement**

The 2007 English pilot programme was announced by the Department for Constitutional Affairs on 17 October 2006, but official notice of approved schemes was not given until 29 January 2007, some three months before the pilots were due to run. This provided authorities with insufficient time for considered procurement processes to be conducted. The resulting schedule was completely inadequate for development and implementation of robust live systems, especially considering that they involved immature technologies. Based on the limited information available, the timetable in Scotland for implementing e-counting appears to have been more reasonable.

### **Testing and Management**

E-voting and e-counting technologies have a poor track record in the countries that have used them. The e-voting and e-counting technologies deployed on this occasion did not perform to the standards expected by Returning Officers (ROs), candidates and their agents.

Inadequate attention was given to system design, systems access and audit trails. Systems used both inappropriate hardware and software, and were insufficiently secured. Problems included: use of desktop productivity software, machines in public areas with open ports, informal transfer of files using personal devices, and single-factor authentication. ORG

observed an unwillingness to incorporate what it considers to be reasonable checks for this immature technology, such as manual sampling of e-counted ballots. Audit trails provided to date are inadequate and risk providing election administrators a false sense of security.

ORG was impressed with the dedication of elections staff in working highly unsocial hours and under considerable pressure to deliver these elections. However ORG observed a lack of management at Returning Officer and Government level, with a worrying transfer of power—without a corresponding transfer of responsibility—to vendors.

### **Role of Vendors**

On election day, vendors provided many assurances regarding progress to ROs that were all too frequently not met. Vendor technical staff at South Bucks were instructed not to communicate with observers, leading to absurd chains of Chinese whispers via non-technical staff. In Swindon, an ORG observer received conflicting reports from a Presiding Officer and a contractor about the status of what appeared to be malfunctioning voting equipment.

Software supplied by vendors incorporated elements that were dated and subject to known security vulnerabilities. This could have been prevented by a rigorous certification scheme for equipment and software, and the lack of such certification is of significant concern.

### **Problems Observed with E-voting**

On election day, there were numerous problems with electronic voting. In Swindon, laptops at polling stations used for e-voting and live electronic registers proved unreliable, with the majority of polling stations observed experiencing problems. At Rushmoor, the ballot displayed incorrectly at the opening of advanced voting and electors reportedly experienced problems with error messages. Online voters in Sheffield also had trouble casting their votes. Where they existed, cryptographic receipts were generally poorly designed and difficult for voters to use.

Though some newer remote-voting channels such as telephone voting may appear superficially attractive to groups of voters such as the elderly and housebound; in practice these were the very voters who appeared to experience most difficulties. ORG received a number of reports concerning difficulties in understanding and using the telephone voting system in South Bucks, and in understanding the registration process in South Bucks and Rushmoor. There was no evidence that usability testing had been conducted to ensure processes were as easy to use as possible. In the case of South Bucks, it was unfortunate that voters registered for remote voting, but who then experienced difficulties, were prevented from voting in person at polling stations. These voters were effectively disenfranchised.

### **Problems Observed with E-counting**

Chaotic scenes were observed at the English e-counting pilots, with very significant delays in the declaration of results. Scanner malfunctions and software errors slowed counts and the adjudication process. Scanner sensitivity to poor quality printing, incorrectly cut paper sizes, fold marks and tears from low quality perforations all contributed to high rates of ballots sent for adjudication. The result of these problems was that pilots in Breckland and Stratford abandoned e-counting in favour of a manual count. In Breckland, manual recounts—insisted upon by an election agent—revealed major discrepancies between the numbers counted manually and electronically. Breckland's Dereham-Humbletoft ward, the one ward in England that was counted both electronically and manually, was found to have 56.1% more District Council votes than when e-counted.

Candidates and agents reported receiving far less information than they expected. Many felt the process of e-counting to be opaque, with counts physically removed to distant locations, little visibility of processes and a generalised lack of information forthcoming from ROs concerning processes or progress. ROs themselves were heard to comment that they did not know what was happening. ROs and suppliers were often secretive about how results were derived, and in general the observability and scrutiny of e-counts was poor.

### **Experience of Voters, Candidates and Agents**

While many candidates, party workers and election workers reported initial positive attitudes towards election technologies to ORG—tempered with some doubts concerning the provision of timely information and the impact on the electoral process—by the latter part of the count process, many had expressed disillusionment. An early or extended voting period alters the

timetable of the electoral process. Insufficient consideration has been given to the impact on campaigning, canvassing, scrutiny and the information needs of candidates and parties.

At many stages throughout the entire electoral process, information was not provided in an open and timely manner. ORG itself experienced obstruction from some authorities and Government departments when seeking information concerning the elections; candidates and their agents were frequently left in the dark concerning count progress; suppliers were on occasion economical with the truth. Both authorities and suppliers should have anticipated problems with the immature technologies used and should have been better prepared to deal with them.

Despite the considerable resources and publicity given to the elections, including official leafleting and extensive local press coverage, there has not been a demonstrable and consistent trend towards increased turnout. The problems that arose in Scotland, in particular, are likely to have a long-term detrimental effect on voter trust and confidence. Pilots held to date suggest that e-voting will not deliver the additional voter engagement expected by the Government.

### **The Scottish Parliamentary Ballot**

Sixteen Scottish Parliamentary constituencies declared results where the number of spoilt ballots was greater than the winning margin. ORG considers that combining on the same day two elections, using different systems, was a contributory factor to the number of papers rejected. However, based on figures collected, ballots observed during adjudication as well as interviews with candidates, agents and electors, ORG's view is that the design of the Parliamentary ballot paper was the primary cause of spoilt ballots. Specifically the placement of the regional vote on the left-hand side of the paper ran contrary to voter expectations. This issue was compounded by information posters and instructions from poll workers which often failed to specify that one cross, only, should have been made in each column. Given that many smaller parties stood candidates nearly exclusively in the regional contests, the pattern of voting from previous Scottish Parliamentary elections and the types of spoilt ballots observed; it is ORG's view that smaller parties were unfairly penalised by the ballot design and associated errors.

The Electoral Commission made an inappropriate use of focus group studies when assessing potential ballot paper designs. The study conducted failed to test any designs with the constituency column on the left-hand side, an oversight the Commission should have corrected before allowing the study to proceed. That the results of the flawed study were presented as key evidence in support of the final Scottish Parliamentary ballot paper printed brings into question the judgement of both the Commission and the Government departments responsible. Both the Commission and the Government ignored advice from the Usability Professionals' Association in failing to conduct proper testing of the ballot design, as well as of other systems and processes observed in Scotland and England.

### **Conclusion**

The inability of ROs and the Government to understand events as they unfolded, let alone to manage those events, is of considerable concern. ROs were supplied with information by vendors as the counts proceeded, but were poorly equipped to interpret and act on its technical aspects. The lack of general technical understanding and knowledge about the e-counting and e-voting systems across all election staff was perturbing. Too often, ROs displayed a lax attitude towards problems that arose, sometimes appearing more interested in declaring any result, correct or otherwise, than in getting to the root of those problems.

ORG is concerned that the lack of reliable audit trails, the actions of some vendors that left no audit trail and a general reluctance to perform manual counts to confirm the results of e-counting mean that there is no meaningful way to verify that voters' intentions had been accurately counted.

**ORG concludes that, given the problems observed and the questions remaining unanswered, it cannot express confidence in the results declared in areas observed. Given these findings, ORG remains opposed to the introduction of e-voting and e-counting in the United Kingdom.**



# Introduction: Becoming Observers

## **Elections for England, Scotland and Wales**

3 May 2007 saw elections across most of the United Kingdom's mainland. Wales held National Assembly elections, Scotland local government and Scottish Parliamentary elections whilst, in England, local government elections were held in most authorities outside of London.

For the first time, the Electoral Administration Act 2006 was put into practice, including the provision which allows formal election observation to be conducted in the United Kingdom. Much of the act is beyond the scope of this report, which will focus primarily on the results of the election observations carried out in May.

An additional first was that, through the Local Governance (Scotland) Act 2004, Scottish local elections used the Single Transferrable Vote (STV)<sup>1</sup> for the first time. The implications of counting STV local government votes whilst also counting Additional Member System<sup>2</sup> votes for the Scottish Parliamentary elections led the Scottish Executive and the Scotland Office to introduce the electronic counting of votes to Scotland.

In England the Department for Constitutional Affairs (DCA)<sup>3</sup> had announced a new round of electoral pilots which could include electronic voting and electronic counting, along with a number of administrative innovations such as early voting. This was in line with the DCA's strategy to continue developing its e-voting programme with the aim of an 'e-enabled' general election after 2008<sup>4</sup>.

## **E-counting for Scotland**

### **Procurement**

Due to the problems in gathering information from the Scottish Executive and the lead supplier DRS Data Services Limited, the Open Rights Group (ORG) has very little information on the procurement process for e-counting in Scotland. London Elects, the election body for London with experience of two elections using the same vendor and technology as Scotland proposed, told ORG that they felt the advice they offered was not welcomed by the Scottish team leading the election implementation.

In a joint Scottish Executive/Scotland Office/DRS Data Services Limited (DRS) information sheet which was included in the DRS media pack for Scottish e-counting, the opening sentence provides the justification for the use of e-counting:

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<sup>1</sup> STV is a proportional election system where electors mark numbers on the ballot to rank their order of preference.

<sup>2</sup> In Scotland the Additional Member System consists of constituency seats being elected by simple majority and regional seats being elected through a proportional party list. To achieve this electors mark their ballot with a cross in a constituency column and another cross in a regional column.

<sup>3</sup> On May 9 the responsibilities of the DCA transferred to the new Ministry of Justice.

<sup>4</sup> *DCA Strategy 2005-9* Chapter 4, p66, <http://www.dca.gov.uk/dept/strategy/dcastratch4.pdf>

*“Due to their sheer size and complexity, e-counting is the only viable option for the combined Scottish Parliamentary and Local Government elections to take place on May 3rd.”*

ORG notes that the combined elections were not imposed on the Executive or the Scotland Office, it was their own decision to run both elections on the same day.

## **Pilots for England**

### **Procurement and Application Process**

At the beginning of 2006, the DCA began making local authorities aware that they would be able to apply to run electoral pilots in May 2007. It wasn't until 17 October 2006, however, that the pilot programme was publicly announced and, officially at least, applications could be made to run an electoral pilot. The closing date for authorities to submit their applications was only one month later, 17 November. This left little time for considered applications to be drafted or for discussions to be held with political parties in the application areas.

Earlier, on 3 August 2006, DCA had issued a call for tenders in the *Supplement to the Official Journal of the European Union*. The call was for a four year framework contract to supply electoral pilots with interested parties having a month to submit their responses.

Beyond discussions with the Electoral Commission and the Association of Electoral Administrators (AEA), ORG is not aware of any formal or informal consultation process undertaken by the DCA prior to or during the pilot tender, application and implementation process. This lack of consultation is surprising, given how important it is that election processes and—hence their results—are accepted by voters and candidates from across the political spectrum.

The timetable for the English pilot programme presented by the DCA in the pilot prospectus was as follows:

<i>October/November [06]</i>	<i>Discussions with prospective authorities</i>
<i>17 November 06</i>	<i>Final deadline for submitting applications</i>
<i>1–7 December 06</i>	<i>Decisions on pilot applications with response to local authorities within the week</i>
<i>January [07]</i>	<i>Drafting of Statutory Orders commences in consultation with local authorities, The Commission and suppliers</i>
<i>February/March [07]</i>	<i>Development and testing</i>
<i>26 March 07</i>	<i>All Statutory Orders signed by this date</i>
<i>27 March 07</i>	<i>Notice of election</i>
<i>3 May 07</i>	<i>Polling Day</i>
<i>May– August 07</i>	<i>Evaluation and reporting by the Electoral Commission</i>

Bridget Prentice MP, the minister responsible, spoke in late November to BBC Radio 4's *Westminster Hour*, stating that she would make decisions on the pilots within a month, implying that the DCA was running behind its timetable but that announcements would be made before the end of 2006.

But, by the turn of the new year, election officials in authorities that had applied for pilot status were still without any answer from DCA. According to ORG interviews, election officials were informed that discussions with potential suppliers were continuing and only received provisional approval around January 11th. It was not until January 29th that official notice of approved pilots was given<sup>5</sup>, nearly two full months later than anticipated in the timetable. Of the pilots announced, five were to provide Internet and telephone voting, compared with fourteen authorities in 2003 that were approved to conduct Internet, telephone and other forms of remote electronic voting. Six authorities were approved to use electronic counting in 2007 compared with two e-counting pilots that had been approved in 2004 and five approved in 2003.

Because of the delay in approving pilots, authorities had little time to invite bids and assess them before beginning project implementation. One authority undertaking e-voting received bids from suppliers on 19 January and just three days later, 22

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<sup>5</sup> <http://www.dca.gov.uk/elections/suppdocs.htm#1>

January, an evaluation panel at the authority met and approved one bid. Given that over £1 million of public money was at stake, it is surprising that such a decision could be taken so quickly with no further scrutiny.

Pilot programmes in previous years had been criticised for excessively tight time-scales which had resulted in the omission of important steps such as testing, causing problems during execution. The Electoral Commission was not alone in highlighting time-scales as a problem; suppliers and pilot authorities also voiced concerns. For example, a report to Sheffield City Council's Chief Executive reviewing their 2003 Internet voting pilot<sup>6</sup> noted that:

*"The Council had been pressing the [Office of the Deputy Prime Minister (ODPM)] to establish whether electronic voting pilots were to take place during the May 2003 elections. The ODPM was slow in responding and did not send out tender invitations until October 2002. In addition, the ODPM did not consult with local authorities on their proposals for the 2003 electronic voting pilots.*

*"In late January/early February the ODPM announced the successful contractors [...]"*

*"All members of the consortium that were interviewed and the Council's election officials have stated that the late decision making process within the ODPM, the new consortium arrangements, discussion regarding the level of funding to be provided by the ODPM and a late decision on the use of Smart Cards, had a detrimental effect on the planning process for the electronic voting pilot and prevented robustness testing of the electronic voting systems."*

The Electoral Commission wrote in their 2003 evaluation<sup>7</sup>:

*"All the suppliers produced comprehensive test plans describing how they intended to test the systems. However, the timetable was tight from the beginning of the project, and delays in the production of technical requirements, assessing the proposals, contract negotiation and the production of statutory orders caused further delay. This resulted in insufficient time for the suppliers and local authorities to implement the systems in a structured and methodical manner. As a result, it was not possible to provide an appropriate level of quality assurance throughout the process and in relation to all aspects of operation."*

In spite of such criticism the DCA had managed to slip two months behind an already tight schedule. Given the experiences of pilots in previous years it is inexcusable that the DCA left the process until so late, setting out with an unduly short timetable and no allowance for delays.

Although brief lists of framework suppliers had been published by the ODPM in previous years, the list of which companies had been accepted onto the DCA framework contract was not published in 2007. When a summary of the approved pilot schemes<sup>8</sup> was published by the DCA on 29 January, in conjunction with the official notice of their approval, no details of the suppliers on the framework was included. Indeed no more than two paragraphs of descriptive text were included for each pilot. This lack of public information made comment on the pilots by experts and political parties difficult. On request, the DCA did provide a list of suppliers to whom they intended to award a place on the framework and another request provided a list of which suppliers would be the prime contractors for each pilot. Details of suppliers' subcontractors as listed in Table 1 were collected through ORG's research.

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<sup>6</sup> Sheffield City Council *E-Voting Review Report, Report to the Chief Executive* (May 2003)  
<http://www.sheffield.gov.uk/index.asp?pgid=9472>

<sup>7</sup> The Electoral Commission *The Shape of Elections to Come* (2003), p59

<sup>8</sup> DCA *Electoral Modernisation Pilots – Local Government Elections 3 May 2007— Details of pilot initiatives* (January 2007)  
<http://www.dca.gov.uk/elections/pilots-may-2007.pdf>

Suppliers the DCA intended to award places on the framework (as at 31/1/07)

- DRS (Data and Research Services)
- ES&S (Election Systems and Software)
- Indra
- Software AG
- Strand Enterprises
- OPT2VOTE
- Tata

A number of major suppliers from previous pilot programmes, including BT, Unisys and Accenture e-democracy services, were not on the proposed framework list or the final list of pilot suppliers. Submissions to ORG from sources that asked to remain anonymous suggest that some vendors were unhappy with the structure of the pilot programme and as a result chose not to participate.

Authority	Internet & Telephone Voting	Electronic Counting	Suppliers (& Subcontractors)
Bedford Borough Council		Yes	Indra
Breckland Borough Council		Yes	Indra
Dover District Council		Yes	OPT2VOTE
Rushmoor Borough Council	Yes (Internet only)		ES&S ( <i>ScytI, IntelliVote, Reliant</i> )
Sheffield City Council	Yes		OPT2VOTE
Shrewsbury & Atcham Borough Council	Yes		OPT2VOTE
South Bucks District Council	Yes	Yes	ES&S ( <i>ScytI, IntelliVote, Reliant</i> )
Stratford-on-Avon District Council		Yes	Software AG ( <i>Dominion Voting, OPT2VOTE</i> )
Swindon Borough Council	Yes		Tata ( <i>Everyone Counts</i> )
Warwick District Council		Yes	Software AG ( <i>Dominion Voting, OPT2VOTE</i> )

*Table 1: English Pilot Authorities, Electronic Pilot Activities and their Suppliers, other authorities piloted paper-based advanced voting.*

During the DCA's consideration of the pilot applications, the Electoral Commission was asked to comment on the applications submitted. In a letter dated 1 December 2006<sup>9</sup>, Sam Younger, Chairman of the Commission, detailed the Commission's views of the applications. The Commission stated there had not been sufficient time for properly detailed applications to be submitted or for it to perform in-depth assessment of the applications. Owing to the lack of detail in applications, the Commission was unable to support any of the e-counting proposals, though the DCA did approve six of them. Similar criticisms applied to e-voting applications:

*"...we are concerned that many of these applications contained much less detail than we would expect for schemes of this level of complexity and risk. In particular, several applications demonstrate insufficient understanding of the important security issues relating to electronic voting." (p5 para 17)*

<sup>9</sup> [http://www.electoralcommission.org.uk/files/dms/FinalresponsetoDCAsigned\\_26426-17797\\_\\_E\\_\\_.PDF](http://www.electoralcommission.org.uk/files/dms/FinalresponsetoDCAsigned_26426-17797__E__.PDF)

Three applications—from Rushmoor, Sheffield and Swindon—showed 'effective project management and risk analysis'; these three authorities had conducted e-voting pilots before. The Commission felt that the other four applications did 'not provide enough evidence to give us the confidence that the potentially significant risks involved in the schemes would be managed appropriately,' and so the Electoral Commission could not support them as proposed. Nevertheless, of those four, Shrewsbury & Atcham and South Bucks were both approved by the DCA to run e-voting pilots.

The Commission's letter also referred to the questionable level of consultation and support the pilot applications had received:

*"It was also of considerable concern to us that a large number of the applications were not able to demonstrate broad cross-party support for the proposed schemes. It will be absolutely essential to clarify the true level of local support before approving any of these applications, to ensure that risks to the successful delivery of the schemes are minimised. In particular, we are concerned that the administrative aspects of the election process should not become an issue of dispute in the election itself."* (p2 para 5)

ORG has received submissions from a number of political parties in pilot authorities which show that cross-party support was clearly not present<sup>10</sup>. In the case of Sheffield City Council, according to one major party, the application process was conducted without any form of discussion or approval from any of the parties.

When the detail of the Commission's letter emerged in early 2007, the letter—along with the DCA's brief acknowledgement—were filed in the House of Commons Library with a cover note from the Commission which stated that:

*"The Commission is content that the DCA [...] used our comments to help inform its subsequent negotiations with local authorities. It is satisfied that the design of the five e-voting pilot schemes which are now going ahead has been significantly improved by these negotiations, both in terms of their expected learning and the local authorities' appreciation of risk management."*

When this view was raised during a post-election meeting with the Returning Officer and Deputy Returning Officer of a pilot authority, they stated with certainty that, other than dropping online voter registration, their pilot had not changed on the basis of any DCA feedback. Despite this authority's application having been criticised in the Commission's letter, the authority had not been aware of the Commission's comments until they were raised by ORG.

In January 2007, the Committee for Standards in Public Life published its 11th Report covering the Electoral Commission and the integrity of the electoral process. The report highlighted weaknesses in the current electoral system, particularly relating to registration, which raised important questions over the integrity of the electoral system as it currently stood. Based on these views, whilst speaking at the February 2007 Association of Electoral Administrators' Conference, Sir Alistair Graham, the Committee's Chair, publicly called for the 2007 electoral pilots to be halted<sup>11</sup>. Sir Alistair's widely reported comments criticised the Government's plans to put voting convenience ahead of other considerations:

*"Electoral fraud is not a trivial matter. It is an affront to the democratic principle of one-person one vote. Left unchecked it will eventually undermine trust and confidence in the democratic process and by implication the electorate's consent to the outcome of elections. [...]"*

*"I should like to put this question to you. How does DCA or the Electoral Commission know about the extent of electoral fraud when neither of them have kept any statistics nor have undertaken any research on the issue? Is it that, in their obsession with increasing participation at all costs, they have turned a blind eye to the risks of electoral fraud and its consequences on the integrity of our democratic system? [...]"*

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<sup>10</sup> [F-5-0016]

<sup>11</sup> Sir Alistair Graham's speech to the Association of Electoral Administrators Annual Conference (27 February 2007) [http://www.public-standards.gov.uk/upload/assets/www.public\\_standards.gov.uk/aeafinalweb.doc](http://www.public-standards.gov.uk/upload/assets/www.public_standards.gov.uk/aeafinalweb.doc)

*“The current systems to combat electoral abuse in Great Britain are unsatisfactory already, so to proceed with these pilot schemes, appears ill-timed and betrays confusion over priorities. Unfortunately it appears to come down to the obsession with modernisation as a means of increasing participation at elections. [...]”*

*“In any event the primary responsibility for increasing participation at elections rests squarely with the political parties. Deep-seated voter disengagement will not be solved by tinkering with the mechanics of the electoral system. [...]”*

*“So in relation to the elections this May I am calling for the pilots to be put on hold. It is a matter of serious concern that we are experimenting with insecure methods of voting when the current registration and absent voting procedures are so insecure.”*

Such comments were not baseless. In its August 2006 call for tenders the DCA had written:

*“The Department for Constitutional Affairs (DCA) is exploring changes in electoral procedures to make elections straightforward, efficient, secure and, above all, readily accessible to all electors.”*

In effect, the Government is prioritising ease of access to voting over security and accuracy.

In April 2007 the Electoral Reform Society published a policy paper<sup>12</sup> which took a critical view of voting technologies, particularly for remote voting:

*Following a resolution at last year's AGM that was remitted to the Council, a policy paper on e-voting and e-counting was approved. The Council accepted that e-counting can have benefits, provided there are sufficient checks and safeguards, but that internet, text and telephone voting can, like postal voting, make elections more vulnerable to fraud.*

Also in April, the DCA published the Statutory Orders for the pilot elections<sup>13</sup>. These were the legal instruments that made it lawful to hold the pilots. The Orders contained a number of intriguing clauses, such as the following for electronic counting pilots:

*46 Re-count [...]*

*(4) In so far as the votes have been counted using the electronic counting system, the returning officer may treat a request for a re-count as unreasonable unless he has reason to believe that the system has not scanned the votes correctly.<sup>14</sup>*

Given that the systems were new and on trial, such bias in favour of the avoidance of a recount is surprising. To ensure the proper functioning of the e-counting systems it would have been better to mandate that a statistically significant sample of wards were manually recounted. Furthermore, to maintain confidence in the new systems and elections as a whole, it would have sensible to have allowed recounts when election agents raised credible doubts. It is quite plausible that the only way a Returning Officer (RO) could have reason to believe that the system had not scanned votes correctly would be if some or all votes were counted manually. In ORG's view requests for recounts, particularly in a pilot setting, should have been welcomed rather than discouraged.

The Statutory Orders were published on the DCA website without any notice on the home page or election news pages and with no public statements. DCA's approach was to provide as little public information as possible, though more details could be obtained by direct requests to civil servants. Given the public nature of elections ORG believes the DCA's approach to have been inappropriate.

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<sup>12</sup> <http://www.electoral-reform.org.uk/downloads/Electronic%20voting%20POLICY.pdf>

<sup>13</sup> <http://www.dca.gov.uk/elections/suppdocs.htm>

<sup>14</sup> Breckland District Council (Electronic Counting) Pilot Order 2007 p8, orders for other e-counting pilots had the same language thought not always with the same section number.

## A New System of Accredited Election Observers

The Electoral Administration Act 2006 allowed accredited election observers to operate in the United Kingdom. This brought the United Kingdom's electoral regime into line with the majority of democracies around the world<sup>15</sup>. The May 2007 elections would mark the first time this new legislation could actually be applied.

For the Open Rights Group, the opportunity to observe the e-voting and e-counting was particularly important. A key concern ORG has expressed over the use of technology in elections has been that it serves to obscure the workings of elections from voters and candidates<sup>16</sup>.

### Recruitment and Registration of Observers

As details of pilots emerged in January, ORG began to draw up a response. The Electoral Commission was also in the process of completing the advice and procedures on how individuals and organisations could apply for accreditation. Given the timing of the election and the Commission's guidance on processing times, ORG aimed to submit an organisational application in the first week of April. ORG kept in close contact with the Commission throughout the application process and appreciated the support received from their staff.

To help recruit volunteers ORG used the website PledgeBank.com to create a geographical 'cascading' pledge<sup>17</sup> covering each of the pilot areas. This pledge was launched on 29 January and received 29 volunteers by the time it closed. Initially ORG had been given the impression that, due to the Scottish Parliamentary elections being covered by different legislation, ORG would only be able to observe in England. However after clarification through the Electoral Commission office in Scotland, ORG learnt that observer accreditation would be honoured in Scotland also. As a result ORG's call for volunteers was opened to those North of the Border.

ORG chose to create its own registration pack incorporating, with permission, content from the Commission's registration materials. This greatly aided the administration of collecting the required signatures, personal information and photographs into ORG's organisational submission which, with the addition of a few late registrations, was accepted and processed efficiently by the Commission. Accreditation badges were received by ORG observers by 24 or 25 April, a week before election day.

To guide ORG's work, the following terms of reference for the observation mission were developed:

1. To evaluate the integrity of technologies and processes used in the electoral pilot schemes.
2. To examine whether the pilot schemes might increase the risk of electoral fraud or error.
3. To observe whether the pilot schemes risk the secrecy of the ballot.
4. To collect the views of voters, candidates and officials on the schemes piloted.

To further assist observers in their task, a handbook<sup>18</sup> was written based on international best practice guidelines, such as those from the Organization for Security and Co-operation in Europe's Office for Democratic Institutions and Human Rights. The handbook also included guidance relating specifically to the technologies to be used and British law. Observers received regular email updates and participated in a detailed online chat a couple of days before the election. For election day,

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<sup>15</sup> OSCE/ODIHR UK General Election 2005 Assessment Mission Report (August 2005)  
[http://www.osce.org/documents/odihhr/2005/08/15921\\_en.pdf](http://www.osce.org/documents/odihhr/2005/08/15921_en.pdf)

<sup>16</sup> <http://www.openrightsgroup.org/wp-content/uploads/org-evoting-briefing-pack-final.pdf>

<sup>17</sup> <http://www.pledgebank.com/electionwatch07>

<sup>18</sup> [http://www.openrightsgroup.org/wp-content/uploads/org\\_observer\\_handbook.pdf](http://www.openrightsgroup.org/wp-content/uploads/org_observer_handbook.pdf)

observers were issued with location-specific quick reference sheets and briefing papers, along with a printed handbook and a distinctive T-shirt to help voters, candidates and election workers understand who they were.

## **Negotiating Technology-specific Access**

Given that this was the first time that accredited observers were permitted in the UK, it was perhaps unsurprising that there were some difficulties. Many election administrations were clearly uncomfortable with observers' rights to attend any polling station or count unannounced. ORG became aware of this discomfort when ORG was forced to call the election office for each pilot area to negotiate access.

That such actions were needed became apparent on close reading of the legislation concerning election observation. The legislation does not cover elections piloting new voting methods and, in a major error, the statutory orders for the pilots made no mention of observation either. In order to be able to observe anything more than the polling station or count centre, such as technology demonstrations or the servers used, ORG had to enter into discussions with each Deputy Returning Officer (DRO).

### **England**

Embarking on these discussions for pilot authorities in England was challenging, because ORG knew so little about what form the pilots would take and which technologies were to be used. The lack of disclosure and the delays in receiving information requested from the DCA meant ORG had to plan its observation 'blind'. Furthermore, little local information was available, such as regarding when or where counts or technology demonstrations would be performed. Electoral offices were suspicious of ORG's requests for more information or details; many were unwilling to invite ORG observers to briefings unless they were accredited—Sheffield City Council was even unwilling to allow ORG observers to observe briefings if accredited and/or invited as guests of someone attending the briefing. Given the timing of the accreditation process and the logistics involved it would have been impossible for ORG to have accredited its observers in time for the briefings.

ORG felt that most of the electoral administrators spoken to had been clearly briefed about ORG before we spoke to them. However after a short conversation explaining ORG's aims for the observation, many became more open and willing to share their work with ORG. As a courtesy, ORG offered to provide administrators with a list of ORG observers that would operate in their area, a list always gratefully received. Yet, due to the highly compressed implementation time-scale and electoral administrators' lack of technological expertise, ORG often found it difficult to explain what ORG desired to know or view.

There was a lack of consistency in responses for access to briefings, whether cameras could be used and how ROs would interpret rules for observers. This created a challenge in tracking the interpretation for each area and briefing observers correctly for the area they would be operating in. As a result of ORG's feedback to the Electoral Commission—and the queries election administrators were sending them as the result of ORG's own questioning—additional guidance was issued to ROs for e-voting pilot areas. The guidance reiterated the rights observers had to view the count and polling stations, and recommended providing observers with access to view server installations and source code where possible, even though such access was not mandated by law. DCA staff also provided welcome assistance in negotiating access for observers, often supporting ORG's case to election administrators or suppliers.

Of particular interest to ORG were the servers where Internet and telephone votes were to be stored. As they store the votes, it is ORG's view that they should be treated like ballot boxes and polling stations, so ORG should have been able to observe them. Yet some electoral administrators clearly didn't understand what the servers were and said they would be present in the count centre on election night—when in fact the servers were tucked away in data centres. Only one authority, Swindon, fairly quickly decided to let ORG view the servers their e-voting system was using. Their supplier, Tata, quickly and efficiently arranged a server viewing for 1 May.

Sheffield and Shrewsbury & Atcham, both supplied by OPT2VOTE, were cautious but, after some persuasion, passed on ORG's request to OPT2VOTE. Unfortunately OPT2VOTE proved difficult to contact but, after expressing surprise at ORG's desire to see their servers, promised to examine the possibility of making arrangements. After a delay and pressure exerted by their clients and the DCA, a data centre viewing was arranged for election day.

South Bucks and Rushmoor, both with ES&S, initially declined ORG's requests. However Rushmoor's officers remained willing to change their minds and in fact did so once the Electoral Commission's guidance was issued recommending observers be given access to view servers. After the election it emerged that South Bucks' RO had also changed his mind about providing ORG's observers access to servers. Unfortunately ORG were not informed of this change by the vendor instructed to provide access. ES&S also proved hard to contact but, with additional pressure from the DCA, on the morning of election day, confirmed a server visit for that afternoon. Fortunately ORG was able to have an observer travel to the server location at short notice; nevertheless ORG notes that scheduled observations are against the spirit and purpose of trustworthy election observing.

A number of election offices wanted to continue the practice of issuing tickets for those wishing to attend their counts, however the Electoral Commission supported ORG's position that this was not necessary for observers and would undermine ORG's ability to monitor freely, without prior notice. Most offices were quick to understand this but Sheffield continued to insist on ORG observers requiring tickets to access their count right up to election day, despite several interventions by the Commission and the DCA. On the day of the count itself ORG's observers were given access without tickets.

### **Scotland**

In Scotland ORG had been led to believe that the framework agreement for e-counting covered observer access. However ORG was unable to receive a copy of the agreement despite repeated requests through the Commission's offices in Scotland and directly to the Scottish Executive. Nevertheless Scottish elections offices were open to ORG's requests for information. The Electoral Commission ran an excellent briefing session in Edinburgh, which ORG's Scottish observers highly commended. The briefing, specifically for observers, included presentations from electoral administrators and the lead technology vendor, DRS, whilst also giving observers a chance to meet each other and key members of the Scottish electoral community.

### **Observation During the Election Period**

Many poll workers were uncomfortable with the unfamiliar presence of observers, though most were aware that ORG could attend and some areas even had information sheets explaining what ORG's accreditation would look like. It is ORG's view that many areas were better prepared for observations due to ORG's extensive contact with election offices in the build up to the elections.

### **England**

Unfortunately on election night the Electoral Commission's additional guidance to e-voting pilot RO's was not consistently applied. Part of the guidance reads:

*Access to the count*

*... A good rule to follow is that observers must be able to see as much as candidates and their agents. This should include: [...]*

- Access to reports as provided to candidates and agents*
- Any 'zeroing' or clearing of devices*
- Unsealing or opening of devices used to transmit votes (or equivalent procedures)*
- The processes by which votes are totalled or displays or running totals are shown*

In Rushmoor ORG's observers were asked not to look at the screens of laptops processing electronic votes but to look at postal votes being processed, yet ORG has video and photographic evidence that press photographers were permitted to take pictures of the very same laptop screens. In most locations computer screens were positioned too far away from barriers to be observable or were turned away from view so they couldn't be observed. One pilot authority informed us that the DCA's security consultant had advised them to turn their screens away. Furthermore the DCA had required barriers

around the voting technology 'to protect from coffee spills' but the net effect was to further distance candidates, observers and agents from the count.

In Bedford, whilst candidates and agents were able to see the results prior to declaration, ORG's observers were not permitted to do so; yet elsewhere Electoral Commission guidelines were adhered to and results were observed before declaration. At no location were ORG able to observe the 'zeroing' of devices prior to the start of the election<sup>19</sup>, nor was the detail of any electronic unsealing or download process observable. Essentially the lack of opportunities and facilities to observe, coupled with the complexity of the technologies used, meant that there was no opportunity for meaningful scrutiny, verification or audit of the counts ORG's observers monitored.

Staff from one vendor, ES&S, had been instructed not to speak to observers resulting in absurd situations whereby an observer asked an RO a question who asked a company manager who would then ask a technician. This reply would then be relayed back through each person to the observer when clearly those in the middle knew far less about the technologies than the technician or the observer.

South Bucks and Stratford-on-Avon came in for particular criticism for leaving those attending the count in the dark, but at nearly every pilot observed candidates, agents and ORG's observers complained that there was little or no communication from the RO. There was dissatisfaction at the lack of explanation of what was happening and the difficulty in observing proceedings due to the layout of counts as well as the new technology involved. Furthermore display screens were either not informative (repeating the same information throughout the entire night) or showing incorrect information.

The rules over the use of electronic devices at counts were extremely inconsistent. For example in Bedford the election office had advised ORG that photography would be permitted from a balcony in the count centre. Yet, on election night, when taking photos from the balcony one of ORG's observers was confronted by a police officer. The officer forced the ORG observer to delete the pictures he had taken from his digital camera while members of the media were on the same balcony taking pictures and video of the count. In South Bucks ORG had been advised that cameras would not be permitted inside the count. No checks were made on entering the count, yet a few hours into the count when an observer reached to check the time on their mobile phone they were stopped by a police officer stating that the RO had forbidden all electronic devices. This rule had not been enforced for the first few hours of the count and it emerged the next morning that the RO had not issued such a rule, he had intended for only cameras to be forbidden. In Swindon even mobile phones were banned in case they contained cameras.

The lack of guidelines on how the pilot elections should have been conducted made it difficult, if not impossible, to assess whether workers and officials at polling stations and counts were using equipment correctly and following the appropriate procedures. ORG hopes to receive procedural guidelines regarding how the elections should have been run in Freedom of Information requests to local authorities. If received, they will be compared against ORG's observation notes. ORG believes it is vital such documents are made freely available at least two weeks before election day so that observers, voters, candidates and agents can familiarise themselves with their contents.

In Swindon an observer received conflicting reports from a Presiding Officer (PO) and the Chief Executive Officer of a supplier about the status of what appeared to be malfunctioning voting equipment. ORG's observer visited a polling station at the George & Ann Tweed Rooms<sup>20</sup>, arriving at 4.50pm on election day to note the presence of a support engineer from Tata, the lead contractor. On presenting herself to the PO, ORG's observer was then introduced to Lori Steele, CEO of Everyone Counts—the subcontractor to Tata responsible for Internet and telephone voting. When asked if the laptops at the present station were experiencing any of the problems observed elsewhere in Swindon (see next chapter for full details), Ms Steele responded that the machines were "up and receiving votes". Some minutes later, after Ms Steele had left the polling station to make a phone call and noting that the laptops did not appear to be working, the observer put the same question to the PO. He responded that they were experiencing "technical glitches". When asked what Ms Steele had meant by saying they were "up and receiving votes" the PO replied saying that she had been "diplomatic".

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<sup>19</sup> In Stratford other count attendees stated that they had seen a 'zeroing process' but this was not observed by ORG.

<sup>20</sup> Langstone Way, Swindon SN5 7BT

These two inconsistent reports raise serious concerns. ORG considers that the intention to mislead would be unacceptable conduct for anyone involved in the running of elections, whether or not they are directly employed by government. ORG is also surprised at the claims made in a press release from Everyone Counts which heralds the Swindon election as a 'historic' world first (a number of previous UK pilots have replicated much, if not all, of the Swindon setup in 2007) with support from "Former U.S. Election Assistance Commission (EAC) Chairman and international elections expert Paul DeGregorio" who the press release cites as an observer when in fact ORG observers noted Mr DeGregorio's presence in Swindon polling stations as a manager working for Everyone Counts, and Swindon's DRO has confirmed he was working for a supplier. ORG has also confirmed that Mr DeGregorio was not registered with the Electoral Commission as an accredited observer, yet the presentation of his comments in the release give the appearance that he was not there in any capacity other than to observe.

Subsequent to the elections, one local authority, South Bucks, has been proactive in engaging with ORG observers to improve their learning from the pilots. No other English authority has done so.

### **Scotland**

Other than the problems with obtaining information, such as the framework contract, from the Scottish Executive, ORG's observers were extremely positive about their experiences. They found that, given the time pressures they were under, both election administrators and management from DRS answered questions as best they could. The briefing and the information supplied then had significantly helped in preparing for observation. After the elections some officials have initiated follow-up meetings with ORG's observers but DRS and the Scottish Executive have proven extremely slow in responding to follow-up questions.

# Elections in England

## General Observations

This first section details observations that are not specific to any one of the technologies piloted.

### Supporting Candidates and Agents

From interviews with electoral administrators and suppliers, ORG understood that few of those invited to briefings about the pilots actually attended. Conversely many candidates were unhappy that they had not been invited to any briefing about the technologies that would be used in their elections. ORG understands the logistical challenges of inviting all candidates to briefings; given the technical nature of the pilots, however, it was not reasonable to expect party election agents (who usually were invited) to explain the pilots to their candidates. Furthermore, in some pilot authorities candidates reported that only incumbent candidates had been invited to briefings. Such an approach creates an impression of favouring incumbent candidates and should be avoided.

Due to the extremely tight time-scales (see previous section) many of the briefings were not able to demonstrate the actual systems that were to be used on election day because the systems were still being built and were not yet in a state suitable for demonstration. In Swindon, for example, sample screenshots were used to brief agents and train Presiding Officers.

During counts, ORG's observers noted that comment from candidates and agents about the proceedings was overwhelmingly negative. Some parties which had been neutral to or positive about the pilots in their pre-election submissions to ORG changed their views to being extremely negative about the technologies used. Many said they felt unable to verify or audit the results and that the technology left them with no way of knowing how the count was progressing. People passionate about local politics were consistently being turned off by the e-voting and e-counting pilot counts in areas observed. ORG considers this to be a very worrying sign, given the DCA's stated aim of increasing participation and political engagement.

### Electoral Register Issues

A number of pilot areas observed experienced problems with their electoral register. It appeared that updates to the register, provided during the new extended period for registration, were not being reflected in the register provided to Presiding Officers in polling stations. In Stratford-on-Avon, ORG's observers were informed that there were problems with Northgate's Pickwick software. Rushmoor also experienced problems with its register. Both areas had new versions printed and delivered to polling stations before, ORG believes, midday. Nevertheless this should not have been a problem and ORG was disappointed that such an issue was not detected before election day. The result was that Rushmoor and Stratford disenfranchised some voters who had taken advantage of the longer period of registration, and ORG has received submissions detailing voters anguished at not having been on the register as they expected<sup>21</sup>.

### Polling Stations

ORG observers noted that, while information was provided in polling stations, it was generally printed in formats too small for electors to notice let alone read when entering the station. Possibly because of their illegibility, it was noted that POs often placed the notices in corners of their stations where electors were even less likely to see the notices. Additionally the signage used to indicate the location of polling stations within buildings was often observed to be confusing. This was particularly the

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<sup>21</sup> [S-6-0007]

case when several polling stations were located in the same building (see picture below). ORG believes that more thought should have been given to how voters experienced and used polling stations.



*Entrance sign for multiple polling stations at Putnoe Heights, Bedford*

### **Security and Accuracy**

Despite repeated calls by the Electoral Commission for a defined supplier certification process, the DCA chose not to implement such a process for the 2007 pilots. While observers received verbal confirmation from suppliers and election administrators that testing—including for security—had been conducted, there has been no official acknowledgement of this process. No reports or statements have been made about how the security and accuracy of the systems used for the pilots was assessed. Any credible technology implementation process requires systematic testing of usability, security and reliability. As the pilots were for a statutory election it is vital that the results of such testing be made public.

Unlike election officials or tellers where a team works together, checking each other's work, software is a single point of often unobservable failure within the 'black boxes' of computers. Well-constructed testing provides opportunities to detect potential failures and errors before they can occur in the live use of a system. Yet there were no public results for pre-election tests and no evidence of post-election tests to verify the continued accuracy of the systems used. Whilst ORG has been led to believe that the Commission, DCA and suppliers all conducted testing; it is surprising that none of the test reports were shared with local authorities. Without such testing processes, ORG cannot express any confidence in the elections conducted with these technologies.

ORG's observers also revealed concerns about the security of the count centres in pilot areas. Observers in Swindon were able to enter and exit the count centre several times without challenge, noting a number of unsecured laptops at the location. This was during election day whilst technology was being delivered and set up for the count that night. Swindon's DRO stated to the observers that none of the laptops observed would be used to count e-votes, but how the laptops were to be used for the count was not specified. Leaving any systems physically unguarded is cause for concern, such oversights provide opportunities for attackers to load unauthorized hostile software or maliciously modify software already installed. ORG suspects that the security of the count centres prior to the commencement of the count was not given enough priority by all parties to the pilots.



*Laptops at Swindon count centre unattended during setup on election day*

### **Over-Dependance on Suppliers**

There can be no doubt from ORG's observations, that local authorities were hugely dependent on the suppliers they selected to provide the pilots on their behalf. Returning Officers and their deputies were observed to have little or no technical knowledge, leaving them unable to judge the quality of the technologies supplied. They were unable to monitor technical issues—and hence hold their suppliers to account. As problems occurred before and on election night, ROs were totally reliant on what the vendor said, whether or not it was true. Some ROs took a more robust approach to managing their suppliers than others, but all essentially could only tell their suppliers to 'make it work now'. The lack of a local-authority- or DCA-provided technical expert to assist ROs on election night left ROs often seeming lost and unable to do anything more than hope suppliers could resolve whatever issues they were having.

ORG observers saw a number of instances where supplier staff took actions which ORG believes were not properly auditable, and worked outside of the defined boundaries of the systems provided. In South Bucks technicians were observed using a USB key<sup>22</sup> to transfer files between computers. Such devices can be used to load unauthorised software or modify existing software to behave in malicious or unexpected ways. ORG does not know what the key contained or why a transfer was needed to resolve the software problems encountered at South Bucks, but it was clear that the RO and DRO were not aware of any implications from such an action. USB keys were also observed inserted into computers used at the Rushmoor count. In Warwick a submission from a party present at the count indicates that files and directories had to be moved around and even deleted to restore software operation<sup>23</sup>. Once again this was done without concerns expressed by the RO or DRO over the effects this would have on the audit trail or accuracy of the election. It is ORG's view that in both cases an absence of expertise with which to properly judge events and implications led ROs to have insufficient concern for actions observed.

Given the quantity of money being spent and the importance in maintaining confidence in the integrity of ORG's electoral systems ORG finds it surprising that greater attention wasn't given to providing technical support to authorities. One RO commented, after their pilot had been completed, that the DCA and the Commission had been always 'just observing'. The

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<sup>22</sup> A small key fob or pen-shaped memory device for the storage and transfer of files between computers via the standard USB ports available on most modern computers.

<sup>23</sup> [S-7-0008]

RO felt, especially given the tight timescales, that they should have been given more support, advice and help from the DCA but also advice on best practice from the Electoral Commission.

Good practice requires that suppliers are held to account to prevent errors and to make successful pilots more likely. Suppliers also need to be closely monitored to ensure that their actions do not threaten the integrity of the elections they are contracted to run. A number of vendors in the electronic voting market have been shown to provide false information to their customers<sup>24</sup> (governments), to citizens and to independent testers. As detailed above, one of ORG's observers in Swindon received conflicting reports from a supplier and PO regarding apparently malfunctioning voting equipment. ES&S, the lead supplier for South Bucks and Rushmoor, has been shown, contrary to law, to have knowingly used uncertified software in elections abroad including, for example, the state of Indiana<sup>25</sup>. ES&S has also supplied systems with far-reaching security flaws which comprehensively compromise the security of their touchscreen e-voting systems. Even after similar flaws in systems sold by Diebold (ES&S's main US competitor) had been identified by researchers, ES&S continued to sell their systems unmodified.

An independent report by academics commissioned for the Florida Department of State<sup>26</sup> found that for the ES&S touchscreen iVotronic voting systems:

*"Each of the other passwords mentioned above is fixed and hard-coded into the source code. They are the same for all iVotronic machines in the country, and likely to be known to every election official who manages elections on an iVotronic machine. They can never be changed, without changing the firmware on the iVotronic machine. This represents poor practice. [...]"*

*"Our judgement is that the password mechanisms on the iVotronic are poorly conceived and poorly implemented. The consequence is that the passwords by themselves do not do a good job of preventing unauthorized individuals from accessing critical system functions."*

The basic need for e-voting and e-counting suppliers to produce profits can create conflicts that influence supplier conduct and potentially jeopardises the security and accuracy of elections using their systems.

## E-voting

For the 2007 pilots, e-voting consisted of voting via the Internet or by telephone. All e-voting pilots offered both options except Rushmoor which only offered Internet voting. South Bucks conducted e-counting of paper ballots in addition to e-voting. Remote forms of voting whether postal, telephone or Internet are the most high-risk, as the voting is done outside of a controlled location, such as the polling station. Because of the Internet's global nature and the low cost of access the potential for attacks from anywhere in the world are considerable. It was with these concerns in mind that ORG's observations were made.

## Technical Observations

### The Servers

ORG observers visited three server hosting locations, one for each of the vendors providing e-voting at the pilots. At two locations, for Tata and ES&S, observers were actually shown server computers that were said to be receiving live votes. However there was no way in which it could be verified that the servers shown were in fact being used as described. In the third case, for OPT2VOTE, e-voting had closed the day before election day and OPT2VOTE only managed to arrange a visit

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<sup>24</sup> For example, as portrayed in the HBO documentary film *Hacking Democracy*, Diebold Election Services categorically denied programs could be stored on memory cards when in fact they could be, presenting the opportunity for manipulation of election results.

<sup>25</sup> Indiana Election Commission Minutes January 20, 2004  
[http://www.in.gov/sos/elections/pdfs/IEC\\_Minutes\\_January\\_20\\_2004.pdf](http://www.in.gov/sos/elections/pdfs/IEC_Minutes_January_20_2004.pdf)

<sup>26</sup> Yasinsac, A., Wagner, D. et al. *Software Review and Security Analysis of the ES&S iVotronic 8.0.1.2 Voting Machine Firmware* (February 2007) p67 <http://election.dos.state.fl.us/pdf/FinalAudRepSAIT.pdf>

to their datacentre on election day. Furthermore ORG observers were not permitted to view the servers holding ballots nor approach the floor they were held on and no OPT2VOTE staff attended the visit with ORG's observers. In the case of ES&S and OPT2VOTE very few details of their server setup were shared, but it was confirmed that all three suppliers had servers in at least one other datacentre, in case of problems.

ORG was unable to examine or verify the servers or systems they used in any meaningful sense. While ORG considers that the physical security for the ES&S and Tata locations was reasonable—and very good for the OPT2VOTE location observed—ORG is unable to comment further on the servers. Without more information on the specifications of the systems and clear rules on the access observers could request in pilot situations, ORG was restricted to what the suppliers were willing to offer or what their clients were willing to support.

No matter what access was provided, fundamentally the servers are opaque to the human eye. No observer would be able to examine what the server was doing, what data it was sending and receiving or whether problems were occurring, without detailed technical access to the software and its operating system, yet it would be inappropriate and is clearly against guidelines for observers to handle anything to do with the running of the election. Hence ORG must conclude that the servers and their operations were—and will remain in future elections—unobservable.

Nevertheless, assessing the physical security of the servers is a useful part of auditing and monitoring the arrangements for an e-voting election. ORG is, thus, extremely disappointed to learn that nobody from the DCA or the Commission inspected any of the server facilities used for the pilots. Furthermore, of all the piloting authorities, only the DRO for Rushmoor had visited one of the data centres used by their supplier. One RO even argued to us that it was better that nobody including himself knew where the servers were hosted, as they then could not be accused of an 'inside job'. ORG finds such an attitude worrying; it merely transfers power without responsibility to the suppliers—who are less open to scrutiny and checks than civil servants and hence harder to hold to account.

### **A Vulnerable System**

ORG received a submission<sup>27</sup> which leads it to believe that the system used to host Internet voting for Rushmoor and South Bucks was vulnerable to a number of attacks. In particular cross-site scripting attacks<sup>28</sup> were believed to be possible, meaning that content could be changed on the pages and control of user interaction could be deflected from the voting server. Cross-site scripting attacks could permit an attacker to perform actions such as steal the authentication details submitted, monitor how users had cast their votes or modify the ballot appearance to throw the election results.

Furthermore, the submission stated that the versions of software used on the Internet voting system were dated and thus had unpatched security vulnerabilities, leaving the system open to further attack.

While ORG has not been able to verify some of these claims, a software version listing released by the DCA through a Freedom of Information (FoI) request<sup>29</sup> supports some of these issues. The single page file, named 'Software Inventory Sth Bucks.pdf' contained a list of software and versions used, reproduced here:

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<sup>27</sup> The source of which asked to remain anonymous.

<sup>28</sup> For further discussion of this type of attack see Rafail, J. *Cross-Site Scripting Vulnerabilities* CERT Coordination Centre [http://www.cert.org/archive/pdf/cross\\_site\\_scripting.pdf](http://www.cert.org/archive/pdf/cross_site_scripting.pdf)

<sup>29</sup> [F-2-0002]

ES&S Applications

IRC v1.0.128  
Adjudication v1.0.26  
BallotReceiptService v1.0.26  
BallotRecognition v1.0.26  
BallotDisplay v1.0.26  
CleanupService v1.0.26  
ContestReport v1.0.26  
ControlPanel v1.0.26  
EMLWriter.exe v1.0.26  
SettingsEditor v1.0.26  
StatusDisplay v1.0.26  
UserManager v1.0.26

Reliant Applications

ScanTerminal v1.0.0.36  
BallotHandler v167  
BatchController v167  
IntelliVote Applications  
eVotingApp v1.2

Scytl Applications

Pnyx Core v1.5  
Pnyx Proxy v1.5  
Easysoft ODBC Driver for Linux 3.0.18

3rd Party Products

Microsoft Windows Server/2003 SBE  
Microsoft MSDE 2000 SP4  
Microsoft .NET Framework 2.0  
Mitek QuickStrokes SDK 3.3  
Oracle 10g Database 10.2.0  
Oracle 10g Application Server 10.1.2  
Red Hat Linux Enterprise v4  
Ubuntu v6.10  
Apache Webserver 99.99  
Tomcat Servlet Container 5.5  
Aspose Barcode.NET v2.2.2.0  
Ubuntu 7.04  
Ruby v1.8.4  
Ruby on Rails v1.2.1  
Steel Bank Common Lisp v1.0  
Firefox v2.0.0.3  
Sun JRE 1.4  
Struts 1.2  
EJB 2.1

*Contents of 'Software Inventory Sth Bucks.pdf'*

Whilst it is surprising that so many of the ES&S applications were the same version number and so young as to still be 1.0 products; without more information ORG is unable to draw any further conclusions. However the third party products are all well documented. In particular Oracle 10g Application Server 10.1.2 was released mid-2005 and has a number of known vulnerabilities which updates would have fixed, although without a complete version and revision number ORG cannot be certain of the patches which have been applied. ORG nevertheless believes it was this dated piece of software that was used to run the Internet voting channel.

Other listed products with publicly-known security vulnerabilities include Microsoft Windows Server/2003 SBE, Oracle 10g Database, Ruby and, Ubuntu. Some data on the list is incorrect, Apache has only reached version 2.2.4, not version 99.99; clearly the person tasked with providing the software inventory was not sufficiently knowledgeable to know which version numbers were wrong and nobody at the DCA picked this up before releasing the document. Without further information about how the software packages were integrated with each other and combined with audit trails and security policies it is impossible to comment further.

ORG can state for certain that dated pieces of software were used to provide e-voting, apparently with the full knowledge and approval of the relevant authorities and the DCA. Additionally, whilst the framework contract had provisions for authenticating which software versions were used by suppliers, the DCA stated they had not felt the need to make use of this capability.

## **Audit Trails**

Through FoI requests ORG has received what appears to be a 'complete' audit trail for one authority and 'sample' audit trails for two others<sup>30</sup>. The fact that no information has been supplied with the complete trail to verify whether or not it is unabridged is cause for concern. There also appears to be nothing to verify the authenticity of the audit trails provided; ORG would have hoped to see cryptographic features to protect the integrity of the audit logs. That sample extracts of the audit trails can be provided raises concerns over what protections were in place to ensure that the audit trails could not be modified. Technically and procedurally, providing incomplete audit trails is unacceptable.

Furthermore, as previously noted, ORG is concerned that actions taken by suppliers were often outside the bounds of systems that created audit trails. Technicians were observed having to make modifications behind the scenes of the e-counting or e-voting systems to resolve problems. These changes, at more fundamental technical levels than the systems causing problems, were beyond the audit systems' controls and so any changes made, whether legitimate or not, would not have been captured in the audit trails. The audit trails that ORG has seen collected insufficient information and risked providing ROs a false sense of security. ORG also has been provided with no information or assurances regarding who has examined the audit trails and how often they were checked.

## **Problems for Voters**

ORG's observers recorded reports of specific voter difficulties with e-voting in Swindon, Rushmoor and Sheffield. Because remote voting occurs in homes and workplaces it is very difficult to observe and so ORG was heavily reliant on submissions and comments volunteered by voters on elections day.

### *Swindon*

In Swindon there were serious problems with the configuration and operation of laptops used to provide e-voting and live electronic registers in polling stations on election day. Problems including having to reboot the laptops regularly, not being able to start them up at all and intermittent Internet connectivity. Seven out of nine polling stations randomly picked by ORG for election-day monitoring in Swindon had experienced or continued to experience problems when observed. One location had a total of ten laptops, including spares, but for at least six hours none of them functioned. Other locations had some of their computers working but no spare laptops to draw on. Problems began as soon as polls opened and persisted, intermittently, until at least 3.30pm in some locations. One station reported having been unable to get their Internet connection working until 10am, three hours after the opening of polls.

Engineers from the supplier, Tata, shuttled between locations trying different versions of the CD used to run the laptops, which were reported to be without hard discs. POs reported that some of the disks provided were faulty but the precise problem proved difficult to identify. ORG finds it surprising, given the scale of the pilot, that testing for the laptops and their software was not more robust so as to prevent such widespread problems.

POs were tasked with collecting laptops and other equipment relating to the setup and operation of polling stations. POs are expected to lead the opening and running of their polling station with security a primary concern. It is therefore surprising, given the security concerns that should accompany the use of computers in elections, that POs were allowed to take the laptops for voting home with them one day or more before the election. This provided considerable time for potentially malicious or fraudulent modifications to the laptops, by POs and others to whom they could have given access.

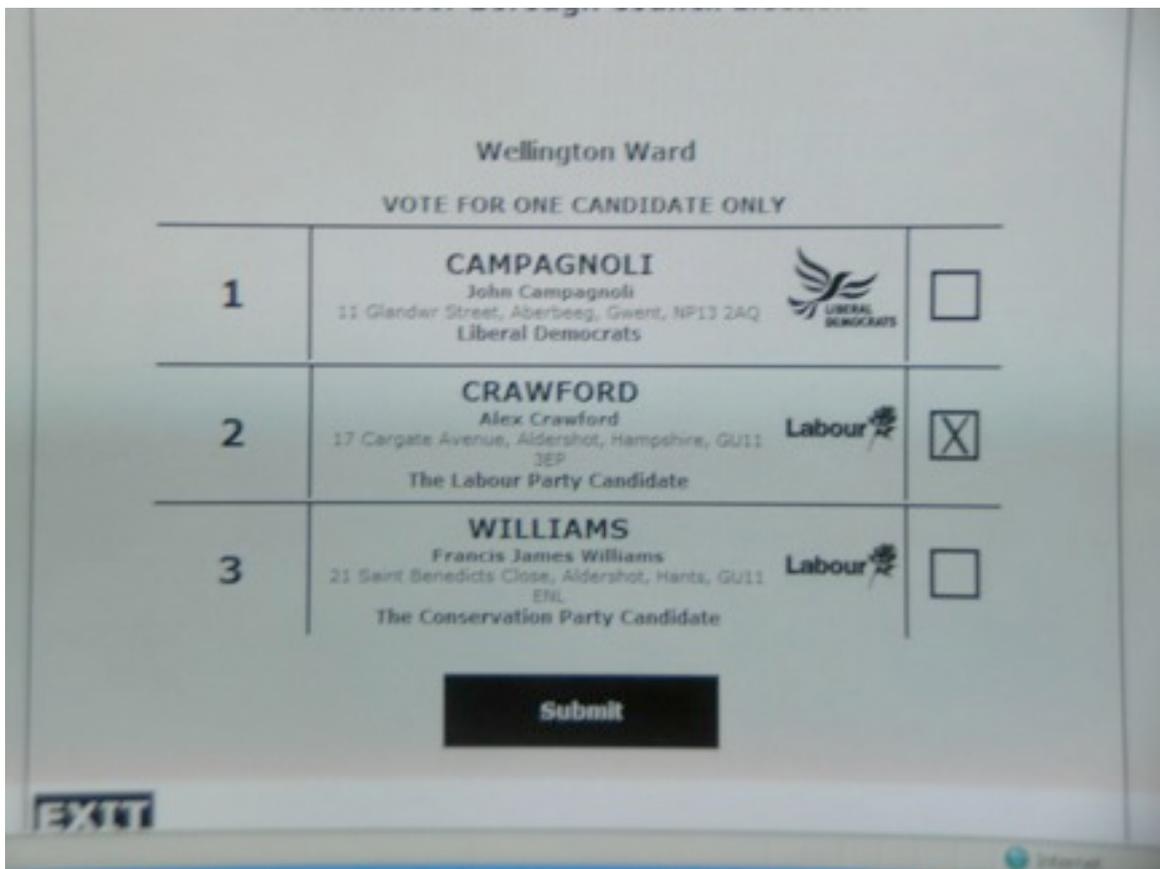
It was also noted by observers in Swindon that poll workers were often unclear on procedures when the electronic systems did not function as anticipated. For example, where electoral register laptops had failed, hushed discussions over how to deal with voters marked on the paper backup registers were often observed. Workers were unsure whether to enter voters onto the online register once the laptops worked again or whether to stick to the paper or proceed by checking both registers from then on. Many workers felt that whilst their training had tried to cover everything, the lack of working software during training to let them 'try things out' made it difficult for them to feel confident in administering the election.

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<sup>30</sup> [F-1-0001, F-3-0003, F-4-0004]

### Rushmoor

At 6am on 26 April Alex Crawford, the Labour Party candidate for Wellington Ward in Rushmoor, logged onto the Internet voting site in the hope of being the first to cast his vote when early voting opened. In doing so he discovered a serious problem with the display of the ballot. His Conservative Party opponent, Francis Williams, was shown on the ballot with the Labour party logo next to his name and a description of 'The Conservation Party Candidate'. Nevertheless Mr Crawford tried to continue with casting his vote only to be advised to call a helpline number which, when called, had a message stating it would open at 8am.



The screen Mr Crawford saw when casting an Internet vote for himself in Rushmoor (Courtesy: Alex Crawford)

Mr Crawford contacted the RO and DRO by email, who stated that by 6.56am their suppliers had made the necessary changes. The RO stated in an email<sup>31</sup> to Mr Colver that:

*The problem has been resolved and the necessary changes made to the electronic ballot paper.*

*This was achieved by 06.56 am following immediate contact with the suppliers. In addition we have accessed the system and confirmed that only one vote had been cast in the Wellington Ward prior to the correction. As I am sure you can appreciate we have no idea who the voter was or for whom they voted.*

*I am at a loss to know how the mistake occurred at this late stage as all of the electronic ballot papers had been checked personally by Andrew Colver before we went live.*

*All other Wards has [sic] also been checked and no errors found.*

*We asked for an explanation form [sic] the Suppliers and will monitor the position closely.*

<sup>31</sup> [S-6-0014]

*It was also unfortunate that you were unable to make contact through the helpline. Ironically this was manned personally by Andrew from 6.00am from his home, however because of connectivity problems, he elected to drive to the office, which resulted in the delay in opening the help line to approximately 6.20am.*

*I hope you will be reassured by the actions taken and hopefully things will run smoothly from this morning onwards.*

Mr Crawford was able to cast his Internet vote at 6.41am and obtain a receipt on completion. It is surprising that such an error was allowed to go live, either by RO oversight or by supplier error. ORG is concerned whether Mr Andrew Colver, Rushmoor's DRO, had sufficient business-level connectivity facilities with proper support to be running the election helpline from his home.

Mr Crawford's experience and ability to record the problem with his camera also highlighted the point Ms Prentice so artfully avoided in her written answer to Jonathan Djanogly MP, on 28th March 2007:

*Jonathan Djanogly (Huntingdon, Conservative)*

*"To ask the Minister of State, Department for Constitutional Affairs what steps her Department is taking to prevent coercion and intimidation being used in the trials of (a) internet and (b) telephone voting."*

*Bridget Prentice (Parliamentary Under-Secretary, Department for Constitutional Affairs)*

*"If an elector does not feel comfortable with using an e-vote or any form of remote voting they can still vote in person in a polling station.*

*"Electors will be using identifiers that are specific to them in order to access the system and, as with a traditional ballot, there will be no receipt that can be shown by the elector to anyone else afterwards to show how an elector has voted." <sup>32</sup>*

Evidently, depending on an e-voting system's design, a digital camera, or a screenshot obtained by pressing 'Print Screen' on a PC<sup>33</sup>, might be used as receipts which the elector (like Mr Crawford) could show to others. Furthermore, as will be discussed below, in some areas choosing to vote on paper after having registered to vote another way was either impossible or very difficult—so not the alternative Ms Prentice suggested.

Observers in Rushmoor also received reports that Internet voters were struggling with error messages and finding the server to be inaccessible. ORG's monitoring found the main rushmoor.gov.uk website, which had the links to the e-voting sites, to be fairly unreliable but that the actual e-voting site was consistently available.

An ORG observer visiting Farnborough Library to inspect the terminals available for public online voting, discovered five empty USB ports on one machine and at least two on another. Given that the machines were designated for Internet voting use, they were clear targets for attacks, including keylogging software to track how users were voting or the installation of software to manipulate electors' voting experience. Repeated queries to Hampshire County Council (who operate the library) about the security precautions taken for those terminals have elicited no response. However, a call to an observer from Chris Hartfield from Hampshire's IT department stated that if the department had known the library was to be used for e-voting they would have installed 'dumb terminals with inoperable or no USB ports'. ORG agrees this would have been preferable but remains concerned by the lack of preparation of the staff or equipment at Farnborough Library.

### **Sheffield**

In Sheffield a number of reports were received by ORG's observers that people were having trouble casting their votes online. This was confirmed to ORG's observers by an OPT2VOTE representative at the count who stated that a '.NET issue' was preventing some people from voting online. If Microsoft's .NET was indeed being used on electors' computers as part of

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<sup>32</sup> <http://www.theyworkforyou.com/wrans/?id=2007-03-28a.130274.h>

<sup>33</sup> Or using the Grab tool on a Mac.

the Internet voting process, ORG is surprised that a more cross-platform software technology, such as Java, was not chosen when Government put such high regard on ease of access and convenience.

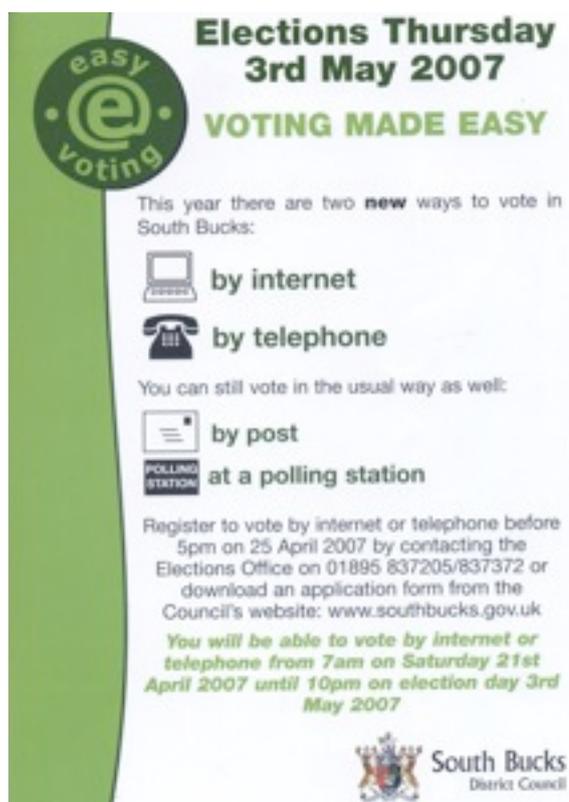
## Usability Observations

### Registration Confusion

A commonly reported complaint in both South Bucks and Rushmoor, both pilot areas provided for by ES&S, was that the registration forms for the different voting channels had been confusing. Quite a number of voters ended up registered for e-voting when they had not meant to, whilst others reported struggling to register for e-voting.

Publicity was also confusing, for example in South Bucks stating that 'you can still vote in the usual way as well', when it should have been made more clear that voters could vote using one method *or* another, but were not able to keep their options open until election day. While the form for registering to vote by Internet or telephone was clearly designed, nowhere did it or the accompanying letter make clear that completing the application would eliminate the elector's option to vote in person at the polling station. So while it is possible, as some officials felt, that many had completed the forms because 'they always complete council forms', ORG believes others had done so thinking they would be able to change their minds at a later date.

It is possible that these reasons also explain the low rate of people actually using e-voting when compared against the number registered to do so. For South Bucks the e-vote turnout was 50.58% for the district elections and 47.33% for the parish elections. 16.3% and 16.38% respectively of the votes cast in each election were by phone or Internet, though this proportion was not evenly distributed between the wards. Early figures from Rushmoor also suggest that only half of registered e-voters actually cast their votes. Even given the reasons discussed previously, it is surprising that so many people who went to the effort of registering to vote by phone or Internet and received their voting credentials by post ended up not voting. Such a low usage rate indicates to us that there were not only problems in understanding the registration process but also perhaps in the process of e-voting, resulting in electors being disenfranchised. ORG would be interested to know if the suppliers had tracked the abandonment rates and, if so, what those rates were.



*Sample voter registration publicity poster, South Bucks District Council*

The confusion over registration in South Bucks and Rushmoor was exacerbated by the procedures adopted with regards to the electoral register. Because the register in those areas was not 'live' but a printed copy, all voters registered to vote remotely were marked as such and not permitted to vote in person at polling stations. In Rushmoor polling staff were able to call a number which, with participation from the elector through a five-minute process, could permit a vote to be cast in the polling place if it had not already been cast online. However at one polling station observed, voters registered to vote remotely were turned away on attempting to vote in person until a candidate intervened.

South Bucks did not offer a telephone service through which an elector's registration could be changed. At polling stations electors were often observed being turned away and being told to use the method they had registered for. On a minority of occasions electors were observed being told they could vote in person by presenting themselves, with identification, to the Electoral Services Office at the District Council's offices. Due to work, transport difficulties or the late hour many were unable to attend the offices to complete the forms required for a paper ballot to be cast. Whilst, given the limitations of the paper register, it was important to prevent double-voting, ORG believes that more should have been done to handle the case

where an elector attending a polling station was registered to vote remotely. POs should have been better briefed to provide consistent guidance to electors and, in the case of South Bucks, there should have been a more-accessible and better-publicised but still rigorous process for allowing paper ballots to be cast in lieu of remote votes not yet cast. ORG believes that the net effect of the procedures used was that some electors who registered for remote voting, whether intentionally or accidentally, were prevented from casting their vote.

Furthermore, given that the Internet and telephone voting methods were being piloted, it would have been prudent to anticipate how voters would have been allowed to cast their votes if any form of significant system failure occurred on election day. Given the procedures at both Rushmoor and South Bucks, ORG does not believe polling stations and their telephone support in electoral offices would have been able to cope if high numbers of electors registered to vote remotely attempted to vote in person. Shrewsbury & Atcham and Sheffield both decided to close their e-voting the day before election day, somewhat simplifying the management of electoral registers in polling stations on the day. This allowed voters who hadn't used their e-vote to automatically be allowed to cast a paper ballot if they so chose.

### **Telephone Voting Difficulties**

In both South Bucks and Swindon, observers noted a considerable number of comments regarding difficulties in voting by telephone. Voters would present themselves at polling stations with their problems whilst other electors would mention that their parents or grandparents had experienced difficulties whilst voting by telephone. In Swindon a voice-activated system was reported to be difficult to operate for users unfamiliar with such a system.

In South Bucks, the system would time out and reset if electors took too long select their choice. However the amount of time provided was considered by many to be too short. Additionally, pressing a button before all menus had been described resulted in users being returned to the main menu and left unsure whether their votes had been cast. Furthermore, the use of the hash key on the phone was confusing for some as, observers were told, the system described it as a 'square hatch key'.

Candidates, party workers and agents in South Bucks were critical of phone voting, reporting that it only provided eight seconds for voters to enter their IDs and no opportunity to recast votes. This time limit made the telephone voting system difficult to use but, as there were no second chances, also meant that an audio recording of the telephone voting session would form a reasonable receipt for vote selling.

In both Swindon and South Bucks some elderly voters could not remember their date of birth or other numbers they needed to authorise their use of the systems, whilst others lost the numbers they needed to vote with. A few voters claimed they never received their voting credentials.

Some of the problems reported could have been rectified through improved documentation and usability testing of the telephone voting systems. However, given the limitations of telephones, it is inevitable that the interface for casting votes through the telephone will be to some extent tortuous. ORG questions the utility of such a voting system which clearly provides very significant challenges in terms of usability, security and vote secrecy. Indeed, usage was low: in South Bucks telephone voting only accounted for 1.35% and 1.25% of the electorate for district and parish elections respectively. Given such levels of use and the problems encountered ORG argues that telephone voting is not worth pursuing further.

### **Voter Privacy & Ballot Receipts**

In Swindon, ORG's observers noted that the placement of laptops used for voting was often less than ideal. Not only were they sometimes placed on low desks without chairs, making use a case of awkward leaning whilst standing, but often the screens were in full view of all those entering the polling station. Polling staff commented on their discomfort at how indiscreet the laptop screens were. Given the importance of the secret ballot, ORG believes greater efforts could and should have been made to make voting through the laptops in the polling places more private.

It is also important to note that laptops are considered sub-optimal in terms of usability. The majority of computer users are not laptop users and often find themselves unfamiliar with the particular, compressed, layout of keyboards each laptop manufacturer chooses.



*Receipt slip provided in Swindon polling places*

In Swindon, Internet voters were asked to provide a word which was combined with information from their vote to create a receipt which did not show how they had voted yet cryptographically could be connected to their vote. Voters were then invited to check their receipts after the election through a special website, the intent of which was to show that their votes had been stored and counted as intended. Special slips of paper were even provided in polling stations on election day for noting down the receipt codes (see sample above). The slips were, however, often observed to be left in a distant corner of the station. ORG questions how easy it would be for electors to note down the quantity of characters provided accurately. Indeed responding to a query from ORG, the supplier concerned confirmed that only ‘about 100 people had used the service’ to check their receipts.

In South Bucks and Rushmoor, receipts were provided to voters in the form of two sets of alphanumeric, case-sensitive characters. They consisted of a twelve-character ‘voting receipt’ and a much longer ‘ballot signature’ (see below for sample). In contrast to the online form provided for checking Swindon receipts, Rushmoor provided merely a downloadable Portable Document Format (PDF) document of receipts. South Bucks provided no way to check receipts online and its DRO confirmed that no requests had been made to check receipts.

Here is your voting receipt for  
Wellington Ward

7dec 052a 0b4a ab9c

Ballot Signature

vlqSZuDUv9Ew8LfrgaaFMK0NJVTWfLtw  
TE83kHBPJ21vz1QEJw45gb7jKbA6+eyJ  
oAcmGjE1kyyTIZLKMGSStH44MYXDqZIB  
BaesaNNAJFdykmrrTDHWZv3dhMolYeap  
ev9uqnV3wZeHTSJXUhajURcczhY8HpdC  
9cEar+qy7TU=

*Sample Internet voting receipt, Rushmoor. (Courtesy: Alex Crawford)*

The receipt download is a 69-page document (see image opposite) displaying what appears to be a signed XML file<sup>34</sup>. The receipts are provided within XML tags, in a format different to that shown to voters. Hence Mr Crawford's receipt of '7dec052a0b4a ab9c' is displayed in the receipt file as '<ballot\_id value="7dec052a0b4aab9c" index="1846" />'. ORG finds it surprising that, without any instructions, voters were expected to download this large file which, in contrast to Swindon, was not mentioned or linked from the receipt issued. Voters were then, again without directions, expected to understand what this technical file constituted. Furthermore the receipt codes were present in the midst of XML codes and without the spaces. Thus voters were expected to understand that to find their receipt code they should remove the spaces and then do a search of the PDF file. Again no guidance or directions were offered on what to do if a receipt code could not be found. This is a highly unfriendly process for voters to undertake. It appears to have not been usability tested at all and given little or no consideration by the authority or the DCA.

The 69-pages of receipts raises further questions about the voting system used. The receipt codes are in 'ballot\_id' tags which suggests that the receipt codes could in fact be unique identifiers for ballots and not cryptographic hashes of the contents of the ballot (how the voter voted), so not in fact proof of the vote being cast as intended. Given the receipts were provided in a PDF file with no further instructions it is not clear at all how actually to check the apparent digital signature, which might authenticate the origin of the file's original contents. The PDF gives no indication as to which election it relates to, its purpose or who published it — authenticity is impossible to verify. Additionally, no guidance has been offered as to what purpose was actually served by the long 'ballot signature' provided to voters; it does not seem that it can be checked.

Whilst in maths cryptographic functions can be proven to have certain properties, these proofs operate in the ideal hermetic world of the equation. ORG does not believe that cryptographic receipts provide much confidence to voters and the low usage reported would seem to confirm this view. ORG must also note that it would be trivial for a system to report a matching receipt code to a voter whilst having used a different value for the counting of their votes. Hence ORG believes receipts only serve to provide voters and election administrators with a false sense of verification.

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<sup>34</sup> There is no doctype declaration included to know if this is intended to be an EML file or adheres to any other standards.

```

<?xml version="1.0" ?>
- <signed by="EB_ENV" item="VERIFICATION_DATA">
  <signature>kkj/xziDJPovcSIwmX2HzK53bJFr1JFa/SZ5tdIZ13v9yw92fOHNmns3w
- <data>
- <verification_data>
  <ballot_id value="2f95fedbae3e351c" index="1" />
  <ballot_id value="b2b193279990614f" index="2" />
  <ballot_id value="5f7dc711bc65485c" index="3" />
  <ballot_id value="a693437fc3daa445" index="4" />
  <ballot_id value="71261a33142b29ae" index="5" />
  <ballot_id value="8223778768760693" index="6" />
  <ballot_id value="44c70c8d3f24eb5a" index="7" />
  <ballot_id value="8d4ff98d699bafd8" index="8" />
  <ballot_id value="564b2f4ac7299a65" index="9" />
  <ballot_id value="5aa3863404f20242" index="10" />
  <ballot_id value="17e4f2310eea00bc" index="11" />
  <ballot_id value="119ee17a82c4868a" index="12" />
  <ballot_id value="d73a20d544e849bb" index="13" />
  <ballot_id value="95452f5c61d44ff8" index="14" />
  <ballot_id value="b038ded76044f3fa" index="15" />
  <ballot_id value="a6c1935378e9c96f" index="16" />
  <ballot_id value="cb860efba272237f" index="17" />
  <ballot_id value="086f499fa07d4f74" index="18" />
  <ballot_id value="8292ef37cf1aefe9" index="19" />
  <ballot_id value="8181cff5e9bd8a7" index="20" />
  <ballot_id value="71cdf5c05e84e06" index="21" />
  <ballot_id value="e6ac3fed90842640" index="22" />
  <ballot_id value="ddd563ce8e7bebbe" index="23" />
  <ballot_id value="e8be4a858efec300" index="24" />
  <ballot_id value="8a415e945118154c" index="25" />
  <ballot_id value="b8bd59362896b030" index="26" />
  <ballot_id value="a9bcd4a627b1616b" index="27" />
  <ballot_id value="72dba13dea84042d" index="28" />
  <ballot_id value="9cfd659e0cc8a72b" index="29" />
  <ballot_id value="d61004c6a06abe57" index="30" />
  <ballot_id value="da57a8c7d5cd8cbe" index="31" />
  <ballot_id value="f01f88a173cd4283" index="32" />
  <ballot_id value="c96c706f3ece959f" index="33" />
  <ballot_id value="f905f9414cf135fc" index="34" />
  <ballot_id value="acc5e078f04131e0" index="35" />
  <ballot_id value="ad15420ed649eed7" index="36" />
  <ballot_id value="2a1a32dc6d83ca66" index="37" />
  <ballot_id value="6ab128fb08f60101" index="38" />
  <ballot_id value="39bf52559418c489" index="39" />
  <ballot_id value="bcc07d00cedc85e" index="40" />
  <ballot_id value="1088823e5f3bf9bb" index="41" />
  <ballot_id value="93fb371d96209cc2" index="42" />
  <ballot_id value="d4a59bd8a8262ebc" index="43" />
  <ballot_id value="99b395521883b224" index="44" />
  <ballot_id value="92ad028eec87ef1e" index="45" />
  <ballot_id value="f5254a6c461e00a7" index="46" />
  <ballot_id value="843456cac8bb971a" index="47" />
  <ballot_id value="cfd230b1ee44136" index="48" />
  <ballot_id value="c544eac0dbc86cf0" index="49" />
  <ballot_id value="c1290cd2421775d5" index="50" />

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*First page of receipts document provided by Rushmoor for checking e-voting receipts*

## Procedural Observations

### Difficulties Campaigning

A common issue raised with ORG observers by party candidates, agents and activists was the difficulty that remote forms of voting posed to their campaigning activities. Whilst they acknowledged that easier postal voting had increased the number of remote voters, they were still a small number. The addition of new channels such as telephone and Internet voting were a tipping point which made canvassing, getting-out-their-vote and leafleting all the more difficult. They obviously didn't want to spend time on people who had voted, but had no way of knowing who had voted. Party workers were also wary of the risk of being seen to influence voters registered to vote from home. Many commented that it was harder for there to be a sense of 'event' in the build up to and on election day now that so many people could have already voted. Electors in polling stations often also commented that they enjoyed coming out to see candidates and fellow voters.

In a number of wards observed, agents had decided not to post tellers at polling stations because they felt too many people were registered to vote in other ways. Many noted that, because of this distribution of voting methods and the longer times during which votes could be cast, it was becoming increasingly difficult for parties to build good intelligence on the election result. Previously, canvassing and telling gave all the parties a sense of how they expected to do, which provided a valuable check when presented with results before declaration. In pilot areas, in addition to finding counts extremely difficult to

monitor, agents had less basis on which to judge whether results needed challenging. ORG agrees with agents that this is not a desirable outcome and is a strong argument against the introduction of remote voting channels.

### **Uncertain Privacy of Votes Cast**

ORG has not yet received explanations of how the privacy of electors' e-votes was maintained during and after the elections. ORG would expect that electronic votes would be stored for at least a year, as paper ballots are. Details on the arrangements for this storage with regards to the pilots has not been published. As votes in the United Kingdom are not truly anonymous, accessing stored votes risks compromising the secrecy of electors' choices. Considering the pace of developments in computer science an entire year when data could be open to attack for decryption is cause for concern.

Once the period for storage of votes has expired, it is unclear how the votes are to be permanently destroyed. ORG has not been made aware of any procedures in place nor checks that will be made to ensure suppliers do actually correctly and fully destroy voters' secret ballots.

### **A 'Black Box' Process**

How and when electronic vote tallies were combined with other subtotals was, in all observed areas, a mysterious process not open to observation or verification. The phrase 'black box' is used to illustrate the opacity of the systems and procedures. Electors cast their votes and ROs declared results; whatever occurred in the time between those actions was hidden from view by the technologies and processes used.

In South Bucks and Swindon votes were downloaded and counted on computers controlled by supplier's staff without any candidate, agent or observer able to examine the process. What could actually have been seen on the computer screens is itself questionable, but the very fact that this was not allowed to be observed was an unacceptable restriction on the count process. In Swindon, CDs were delivered which were said to have the e-votes on them, but nobody had observed the votes being downloaded to the disks or seen what had happened to them until they were inserted into 'clean' machines at the count which, attendees were told, decrypted and counted the votes.

In Sheffield, apparently due to technical difficulties, the time and location of the downloading of e-votes was changed without notifying observers. As a result only a single Electoral Commission observer was present — by chance, as he'd been there to monitor postal voting procedures. The download of the votes was done at the council offices the night before the main count. On the night of the count no breakdown of votes from different channels was provided to attendees: these were kept in sealed envelopes and declared 'ballot boxes'. Officers then manually added figures together using pencil and paper before presenting the figures to candidates and agents. Understandably agents at the count felt that the numbers had 'just appeared' and were unhappy the process had not been more transparent.

There was a similar experience in South Bucks, with no breakdown provided on the night of how votes had been cast. Candidates and agents had to just accept that the totals for each ward were correct and actually did include all the telephone, Internet, postal and paper votes cast. In contrast, Rushmoor did provide a detailed breakdown of votes cast for each candidate by channel in each ward. This offered the potential for slightly improved scrutiny before the result was declared. However the figures appeared to have been copy/pasted into a word-processed document, providing little assurance as to their source or accuracy.

Overall, in terms of observability and scrutiny, the e-voting counts were extremely poor. Candidates, agents and observers found there to be very little indeed to monitor, and significant portions of the e-voting process were administered in servers physically remote to the count locations. ROs and their suppliers were often secretive and evasive about the substance and detail of results and how they were derived. Whilst some were willing to discuss matters further or publish more details after the count, this was too late. Once the result is declared it can only be changed through an election petition at great financial cost to the petitioner.

ROs were keen to have efficient, orderly elections which demonstrated the success of their pilots. Additionally suppliers were focussed on not being caught making errors. Taken together with the considerable technological paraphernalia involved in delivering the counts, the result was that counts were 'black box' processes. The amount of information provided to candidates and their agents was wholly insufficient for them to be able to verify in any meaningful sense that the results were

accurate before accepting their declaration. Nothing in the process of downloading and counting e-votes was open to observation and verification. ORG has observed nothing and received no submissions or FoI releases which would give us confidence in the accuracy of the results produced from the e-voting systems or their collation with results from other channels.

No methods or opportunities were provided for candidates, agents or observers to verify the security and accuracy of the software used nor the results the software produced. Despite some basic attempts at providing receipts, there was nothing to ensure that voters intentions had accurately been recorded or counted as intended. Whilst ORG believes that error is more likely than fraud, ORG is unable to rule either out due to its inability to observe any of the crucial parts of the e-voting elections conducted.

## **E-counting**

With the exception of South Bucks, where e-counting was combined with telephone and Internet voting, e-counting pilots in England continued with paper ballots marked by voters in polling stations or completed as postal votes. To facilitate the new counting technologies, changes were made to the details of how votes were cast by electors.

It will be noted in subsequent sections that the adjudication process was cause for concerns and delays. To provide the reader sufficient context, it is helpful to note how adjudication is conducted at traditional election counts. As ballots are sorted and counted by tellers any ballots where voter intent is unclear are referred to the RO. Once all ballots have been sorted the RO will gather agents and adjudicate whether each doubtful ballot will be counted and, if valid, for whom. Candidates and agents can challenge a RO's interpretation during this process, but the RO has final say. The number of ballots examined in this manner is usually very small.

Due to the limitations of image recognition software, e-counting systems tend to send a larger number of ballots for adjudication. Quite often the doubts the software has had can be resolved by the human eye without trouble. Thus to prevent the RO spending all their time examining ballots which do not have truly unclear voter intent, most e-counting systems introduce two levels of adjudication. The first level is manned by staff only able to input the choices of votes which are clear to the human eye, the first level cannot reject ballots as spoilt, missing the official mark or unclear. Such ballots are referred by first-level adjudicators to second-level adjudication, where the RO performs effectively the same role as in a traditional count.

It is also helpful to note that in traditional elections an important check to catch errors early on in a count is the batch check. This involves ensuring that the number of ballots counted to have been in a ballot box (known as a batch of ballots) matches the number of ballots issued, as recorded by PO in the polling station. This check can spot problems such as ballot stuffing or incorrect ballot boxes being opened.

## **Technical Observations**

### **Paper Matters**

The scanners used in the e-counting pilots were extremely sensitive, presumably to ensure accuracy. A submission from a former employee of one of the leading e-counting suppliers<sup>35</sup> notes that a matter commonly overlooked was the fine tolerances to which papers needed to be printed and cut. Delays were noted at a number of e-counting pilots, including Bedford, due to the poor print quality of ballot papers. As a cost-saving measure printing had been undertaken by a contractor, Print UK, for Bedford Borough Council instead of through the supplier, Indra. One batch of ballots had an ink change during the print run which, ORG observed, caused problems with the scanners. Once the cause of the problem was identified the scanners had to be recalibrated and the batch recounted.

Also in Bedford some postal votes were printed at subtly the wrong size creating additional challenges which affected the detection of voters' marks and barcodes. Once trimmed by hand and scanned, all of these ballots had to be sent for adjudication as the supplier, sensibly, was unwilling to make changes to the mark detection system on the night.

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<sup>35</sup> [S-8-0009]

ORG observed in a number of polling stations that Bedford also had problems with poor perforations of ballot papers. The result was that papers were often torn whilst workers tried to remove them from the book to be issued. Torn papers had to be repaired at the count but still would slow down scanners and were usually recorded as having additional marks requiring adjudication which further slowed down the count.

Bedford chose to use thermochromic ink for the official mark on ballot papers. To warm the ink so that the mark could be checked, poll workers had to blow hard on the paper or press on the mark with a finger for a few seconds. This made it impractical to check any significant number of ballots and would make verification by candidates and agents at the count difficult. According to meeting minutes supplied under FoI<sup>36</sup>, the thermochromic mark was suggested by the vendor Indra, probably because this would ensure the mark wouldn't interfere with the scanning process. However ORG considers that a mark so subtle—and one that is time consuming to check—is inappropriate for the official mark on ballots.

Stratford-on-Avon's ballot papers were printed by OPT2VOTE and, according to the RO, not fully delivered until 10pm the night before the election, giving some cause for alarm. Additionally the low quality of the printing was noted to ORG's observers by representatives of lead contractor Software AG as a contributing factor to the problems experienced in Stratford.

### **Serious Problems Delivering Results**

ORG observers monitored serious problems and chaotic scenes at three e-counting pilots whilst ORG also received detailed submissions from Breckland Green Party<sup>37</sup> and a shorter submission from Mid-Norfolk Labour Party<sup>38</sup> concerning the count in Breckland.

#### ***South Bucks***

The count in South Bucks began at the close of polls, 10pm. According to comments from count workers overheard by ORG observers, scanners was operating below their expected speed and visual inspection confirmed their slow pace. Additionally, as confirmed after the election by the RO, one of the three scanners used was inoperable for some of the time. Further complicating the count was that, for an unknown number of wards, a small number of postal ballots had been placed into the wrong ballot boxes. Whilst the scanners detected this, the incorrect ballots had to be removed and the batches re-scanned. It is possible that this cross-contamination occurred because ballot papers only showed which contest they related to in small print on the rear-side, not on the side voters marked their ballots.

It was cause for significant concern amongst attendees that, apart from a rolling pre-prepared slideshow describing the e-counting process, no information was forthcoming from the RO or his staff. No batch counts or checks could be observed when ballot boxes were opened or when batches were scanned. Disquiet grew until at 00.30am the RO came to the barriers dividing attendees from workers and the counting equipment. The RO stated that the e-votes were being downloaded and they were half-way through counting paper ballots.

By 1:25am only the second round of adjudications had been begun. Meanwhile technicians were seen to be in deep discussions about an unknown issue. By 2am the police had left and e-counting had stopped. Rumours were circulating between candidates and their agents. The RO came to speak to attendees stating that he had no idea what was wrong but they couldn't 'extract vote results from the system'. A Conservative Party agent requested that the count be abandoned until 10am. The RO discussed this with his supplier and returned to confirm that attendees should reconvene at 10am.

As security guards tried to make ORG observers leave the building, observers confirmed with the RO that attempts to count the votes would continue through the night. With the RO's permission ORG observers were allowed to remain along with observers from the Electoral Commission. At 3.55am the RO announced that the technicians believed they could retrieve results for all elections not requiring adjudication. However at 4.30am the RO reported that it would be another 40 minutes

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<sup>36</sup> [F-5-0005]

<sup>37</sup> [S-9-0010, S-9-0011, S-9-0012]

<sup>38</sup> [S-10-0013]

before they would be able to produce results less the 111 votes requiring adjudication. At 5.20am the RO informed observers that it would be another 30 minutes before results would emerge.

At 6.30am, intermediate results sheets were printed not including the votes requiring adjudication. The RO checked one sheet to ensure there was a result on it. With one sheet per ward, the sheets were counted face-down to ensure they matched the number of wards, before the sheets were sealed unseen in an envelope and locked in the RO's briefcase.

ORG's observers departed at 6.50am leaving the RO and his team along with a Commission observer to remain. At 9.45am ORG's observers returned and adjudication ran from 10am without incident. From 10.50am results began to be declared. The intermediary results sealed in the envelope were not used.

Throughout the night ORG observers received a variety of explanations as to what had happened. Most suggested that vote files had become corrupted possibly due to being too large. Despite the RO being happy with ORG observers' requests to ask more questions of the supplier and to view the computers processing votes, ES&S declined and the RO felt obliged to support its decision. Further explanations suggested that files had to be manually edited and processed as individual Election Markup Language (EML) files instead of as one single EML file of all votes. The next day the RO suggested that the single EML files had been recombined into a single file to make the count work. Finally the Commission's e-counting consultant observer suggested that the problem had been conversion not from the scanned images to EML but from EML files to 'full text XML' which had resulted in data corruption. At the time of writing neither ORG nor South Bucks District Council have received a full explanation from ES&S as to what actually took place, what went wrong, and why it took so long to process the votes that intermediary results were only available ten and a half hours after the count began. It is also not clear whether the changes made to resolve the problems were tracked by the audit trail and hence verifiably had no effect on the accuracy of the results declared.

In subsequent discussions, the RO expressed frustration with the lack of project management leadership provided by their supplier, ES&S, for the count. The two senior managers, Mr Wang and Mr Summers, had been at their other, less complex, count in Rushmoor until late in the night when the South Bucks problems had emerged.

It is ORG's view, based on ORG's observations and local party submissions, regardless of the project management available, that the lack of communication regarding the problems encountered seriously shook candidates' and agents' confidence in the accuracy and reliability of the election process. Furthermore ORG is troubled about the continued dearth of information regarding the problem encountered, how it was fixed and whether the results could have been affected.

### **Stratford**

Admirably Stratford had invited candidates to a public test of the e-counting system to be used, which ORG observers also attended. Unfortunately this was the morning of election day and so few candidates attended as most were busy getting out their votes.

At 10pm the count began with the counting system being 'zeroed' in full view of attendees. Ballot boxes were then opened and paper sorted into baskets whilst postal votes were verified. Once postal vote checks had been completed, electronic vote scanning began. This proceeded at what company representatives stated was the expected speed. After approximately every 1,500 papers scanned, operators took a minute to open the scanners and clean them with compressed air; the supplier confirmed to ORG's observers that this was a precautionary measure to prevent malfunction.

The counting machines sent a high number of ballots for adjudication, causing operators to re-scan batches. This meant candidates and agents worried about votes being counted twice, although the use of unique barcodes was designed to prevent this. Attendees' concerns were exacerbated by operators' screens and scanners being turned away from view as well as by the distance created by a row of tables used as a barrier around the systems. No public announcements about the progress of the count were made until 11.40pm, when the RO announced which ward had been allocated to each scanner. Dan Hannah, Conservative party Treasurer for Stratford Avenue and New Town, commented to an observer that:

*"It's like sitting at home, looking at the back of a television with the sound turned off. The process isn't being communicated to us, and most people have no clue about what's going on. It's a shambles."*

At midnight a power surge disabled four of the five scanners, though the servers storing votes were protected with uninterruptible power supplies. After four minutes of systems checks by staff from subcontractor Dominion Voting, scanning resumed with the batches in progress being started again from scratch. Immediately after scanning resumed, the RO explained what had happened and reassured attendees that votes could not be counted twice.

As scanning continued, candidates and agents increasingly expressed concerns to ORG's observers. Shortly before 1am the RO declared that e-counting was taking too long and that, in response to requests from agents, some wards would be hand counted. Manual counting continued until 2.15am at which point, with a few wards declared, the RO agreed to continue the count at 10am. Subsequently a manager from lead supplier Software AG had discussions with the RO who, the manager stated to ORG's observers, had decided to switch to manual counting without consulting them. The manager also asserted that staying with the e-counting would have been quicker than switching to a manual count. At approaching 3am, the RO announced that all wards for the district council elections would be manually counted, though three multiple-seat parish council elections would be electronically counted as they would still be slower to count manually.

At 10am the manual counts began and were completed without incident, followed by the e-counted parish elections which were also declared without further problems.

Staff from the local authority and suppliers raised several reasons for the problems that occurred. Firstly the print quality, as previously mentioned. Secondly the scanners were flagging up more ballots than expected for adjudication. The RO estimated that 25% of votes cast were being sent for adjudication. Not only was the adjudication process slow but any batch with doubtful votes was completely re-scanned, further delaying the process.

It isn't clear why re-scanning was required or why so many votes were sent for adjudication. However the RO has ordered a report to be written into the conduct of the election and has suggested to ORG observers that he feels the problems encountered warrant withholding at least some of the payment due to the suppliers.

The pilot in Stratford was run jointly with Warwick District Council. A submission to ORG from the Green Party concerning the count in Warwick<sup>39</sup> recounts similar problems which resulted in the count there extending to a second attempt on the afternoon of 4th May. Problems reported were system freezes, vote images being replaced onscreen with large red crosses and a large amount of files needing to be manually moved and deleted after an 'operator accidentally hit the wrong key'. Furthermore scanning seemed to be very sensitive, causing ballots with small crosses, large crosses and non-centrally aligned crosses as well as folds to require adjudication. Finally the submission raised concerns that attendees, including the submission's authors, had not felt clear how errors, double-counting of votes and under-counting of ballots stuck together were avoided.

### ***Bedford***

At the close of polls at 10pm, ballot boxes were delivered to the count centre where they were opened and sorted. As up to three different types of ballot (Parish, Borough and Mayoral) could have been in a box, ballots were manually sorted into separate piles. To reduce the chances of jams any damaged ballots, such as those torn due to poor perforations, were repaired with tape. A representative from supplier Indra informed ORG observers that tape would be detected as an additional mark and the papers would be sent for adjudication. The representative stated that the RO had required that any mark anywhere, right to the edges, caused a paper to be sent for adjudication. ORG's observers were given the clear impression that this order had been against the supplier's advice. The sorted piles were re-sealed into boxes for storage overnight.

Based on their tests, an Indra representative informed ORG observers at the count that about 15% of ballots had been referred for adjudication although they expected the figure to be higher after some fine-tuning prior to the actual count.

At 10am the next morning six scanners began reading the ballot papers. Twenty first-level adjudication stations were provided for decisions to be made about ballots the scanners had rejected. Adjudicators were sent a mix of ballots to decide, some with mayoral ballots with ones and twos, others for borough votes, making the workflow and decision-making

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<sup>39</sup> [S-7-0008]

process more complex. Adjudication was further complicated by the poor software interface provided (discussed further in the next section). By 2pm ORG observers noted that around 80 out of 140 ballot boxes had been counted, with a couple of wards declared. At this stage candidates and agents were beginning to voice doubts about the process and concerns in particular about the number of unexplained ballot box movements. Whilst ORG observers felt that the handling of ballot boxes and papers was robust, this was not explained to attendees. When a visual count of boxes by ORG observers didn't tally with information displayed on a screen, a question was raised with the RO which revealed that the display screens were not including votes yet to be counted from the mayoral election, only wards.

The scanners went quiet at 4pm and technicians worked to perform a system reset. Whilst waiting for scanning to restart a representative from Inda commented to ORG observers that an hour was lost in the morning when ballots printed with the wrong ink had all been rejected by the scanners, forcing a re-calibration. At 4.45pm ORG observers noted another pause in scanning, with no explanation provided. All ballot papers were returned to ballot boxes and the boxes were gathered in an area different to that specified by the tracking log, thereby rendering the log inaccurate. Scanning resumed and by 5.15pm the last ward was being scanned. Second-level adjudicators were being presented papers that had remained folded as they were scanned. The votes on these papers were not visible and so needed to be retrieved from ballot boxes using the barcode as identification, if it had been visible in the scans. Due to a lack of zoom facility in the software, the reading of codes and the fetching of papers was time consuming but unlike for other types of adjudication the system didn't allow these folded ballots be skipped. At 6.50pm the scanning finished, with 37% of mayoral ballots having been referred for adjudication. ORG observers noted that the combination of two types of election in Bedford was also contributing to the high numbers of ballots sent for adjudication<sup>40</sup>. Specifically, when voters had marked the mayoral ballot with a single X instead of a 1/2 preference the RO would accept the X as a valid first preference vote. However, the system was unable to recognise Xs when reading mayoral ballots and all ballots where voters had confused the voting systems and used an X were sent for adjudication.

By 7.50pm the inability to skip past ballots with missing or illegible barcodes was causing serious delays to second-level adjudication. By 8.25pm the first-level adjudication had slowed to a crawl as the software was observed to struggle with all the incorrectly-printed postal votes in the queue, which totalled 2,558 at that time. At 8.32pm the queue was 2,377 and at 8.42pm it was 1,690 but at 9pm it still stood at 1,690. Computers showing count statistics were seen by ORG's observers to fail with an 'Error 91' accompanied by text in Spanish.

By 9.45pm it became clear that the same ballot papers were being adjudicated repeatedly with decisions not being saved. At this point all staff were asked to log off their computers and the system was reset. The statistics available showed for the Mayoral election that, of 56,913 total papers, 45,641 were verified; 17,315 were sent to adjudication whilst there were 1,129 still to be processed.

At 10.20pm a delegation of three main parties (Labour, Conservative and Liberal Democrats) were observed telling the RO that they were 'losing confidence', that the count was taking too long and that ballot papers reappearing for adjudication was causing them concern. Given that it was a Friday, they requested that for maximum confidence in the election to be achieved a manual count should be undertaken the next working day (a Tuesday). The RO responded that Indra had assured him in writing that votes could not be counted twice and that abandoning e-counting at that point would undermine confidence in the results already declared. Indra offered to show the Visual Basic code that saved votes and prevented double counting, but the RO stated that this would not be helpful. ORG notes that on 16 January, the Bedford Liberal Democrats had sent to the DCA written notice of the party's concern over the use of e-counting in Bedford<sup>41</sup>.

ORG observers noted that at around 10.30pm the number of ballots reported as queued for second-level adjudication began to fall. However no staff were logged into second-level adjudication and had not been for some time. More complaints to the RO were observed from 11.05pm, including suggestions that the vote total could be wrong. The RO announced

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<sup>40</sup> Local government elections used a simple majority vote whilst the Mayoral contest used a first and second preference voting system.

<sup>41</sup> [F-5-0016]

forcefully, and in ORG's view inappropriately, that 'You don't have a recount on an electronic system.' He also stated that 'Breckland got the same answer on a manual recount' which presumably referred to the recount at Indra's other pilot. It is surprising that the RO made mention of this as, based on the submissions ORG have received as noted below, Breckland's manual recount raised serious concerns about the conduct of its count. Meanwhile second-level adjudicators examined ballot papers that had stuck together when scanning which required retrieval from ballot boxes to interpret.

Around 11.30pm ORG observers monitored second-level adjudicators being presented upside-down ballot papers which the scanners were unable to recognise. There was no rotate command in the adjudication software, making it difficult to examine and mark the ballots.

At 11.50pm agents and ORG observers began to inspect the totals. One agent asked to see manual figures of ballots issued by POs to be told that they were not available. There was some confusion as the paperwork included batch re-scans after jams or when batch counts didn't tally. The same agent spotted that for some ballot boxes the number of scanned ballots differed by 100 from the PO reported value as entered into the e-counting system. In another case, 31 ballots were expected but only 12 were counted. The RO responded that he was not concerned, as these discrepancies occurred at every election and were arithmetic mistakes by POs. It is ORG's view that such batch checks are a key measure against fraud and should not be dismissed lightly.

The DRO prevented ORG observers from attending the reading of results to agents before declaration. The first round mayoral result was announced at 1.26am with the second and third place candidates only 159 votes apart. In the previous mayoral election, they had been about 500 votes apart and a recount had been conducted as, due to the preference voting system used, who comes second can affect the final result. On this occasion the RO was not interested in a recount and at 1.36am the final mayoral result was declared and the count ended.

Documents released under FoI reveal that Indra originally proposed using only four rather than six scanners<sup>42</sup>. There were clearly flaws in the system used and ORG is yet to receive an explanation for the error messages observed in Bedford. Additionally unexpected variation in the printing required considerable effort for the e-counting system to scan and process, a situation which would not have arisen with a manual count. An extract released from Breckland Council's Project Initiation Document<sup>43</sup> indicates an expectation of completing the count within six hours. In reality it was observed to have taken just over fifteen and a half hours for the count to be completed and the result declared.

### ***Breckland***

Vote scanning at the count in Breckland began below normal speed owing to poor ballot perforations. Fragments of paper left attached to the ballots when they were removed from the books caused the scanners problems. On seeing the scale of the issue the RO assigned workers to manually remove any paper remaining from the ballot paper edges.

The RO also reported cross-contamination, with papers for one ward in the boxes of another, causing further delays to the count process. Mr Timothy Birt, Breckland Green Party's election agent and author of the Green Party submissions for Breckland<sup>44</sup>, noted that system performance graphs showed the processors and memory usage at nearly 100%, yet no data was being passed to adjudication terminals, indicating system performance was also an issue.

When barcodes on ballots were found to be unreadable by scanners, they had to be manually entered by count staff. Mr Birt had been informed by a representative from the supplier Indra that barcodes had a checksum digit to immediately detect errors when barcode numbers were entered. It is standard practice to include a checksum digit when generating barcodes such as for the International Standard Book Number (ISBN).

Despite assurances from Indra, on inspecting the barcodes, Mr Birt had a suspicion that there was no checksum digit. Hence he requested that a count worker attempt entering a barcode with a deliberate error. The worker did so and the

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<sup>42</sup> [F-5-0006]

<sup>43</sup> [F-5-0015]

<sup>44</sup> [S-9-0010, S-9-0011, S-9-0012]

system accepted the number entered—indicating either an absence of checksum digit or a poor checksum algorithm which failed to catch the error. Either case is cause for concern.

Whilst observing an adjudication screen, Mr Birt saw an image where the system had scanned two ballot papers and read them as one. The adjudication station operator, on Mr Birt's request, stored the ballot for second-level adjudication by the RO. When the RO prepared to declare the result, Mr Birt had asked how the 'double ballot' had been resolved. The RO was unaware of the issue and wanted to declare the result as one or two ballots would not have changed the result. Mr Birt protested on the basis that the problem could have occurred in other wards also. On investigating the problem it was shown that one candidate should have received an additional vote. The RO offered to 'manually' add the extra vote to let the result be declared. This caused Mr Birt further concern as he felt that such manual changes would circumvent the checks he believed the electronic system had, although why the batch counts hadn't caught the missing vote wasn't explained. The RO later explained to Mr Birt that one of the ballot papers in the 'double ballot' had been cut short by the voter causing the initial scanning problem.

Turnout for the Breckland District election in the Dereham-Humbletoft ward was declared as being 13.91%, a figure which Mr Birt had noted to the RO before declaration as being surprisingly low. When the Town election in the same ward was declared with a turnout of 31.55%, concern grew, because each elector would have been given ballot papers for both contests: For the Town election 653 votes had been counted with three rejections, whereas for the District election only 288 votes were counted with one rejection. Mr Birt noted the subsequent developments:

*"After some discussion it was agreed to do a manual recount [of the District election] which netted 486 ballots with no invalid ballots. It was then noted that postal votes were not included, these were counted and the final result was 656 with no invalid ballots. However one ballot from Dereham-Central was found in the Humbletoft box – the bar code on this ballot indicated that it had been counted so it is unclear how it got there."<sup>45</sup>*

The manual recount had netted 56.1% additional votes when compared with the number of ballots counted electronically. The winner of the election remained unchanged thus, Mr Birt reports, the RO stated his wish to ignore the error on the basis that the outcome had not been changed and that a correction could not be made after the result had been declared. Mr Birt objected to hiding the error, as did the Labour Party election agent. The RO announced to attendees the result of the recount but the originally declared result stands and is the officially published result on Breckland's website.

On the night of the count Mr Birt also noted to the RO, though no action was taken, that the Dereham-Central ward showed a similar discrepancy, with the District result having been declared at 32.34% turnout against the Town election's turnout of 15.86%. By way of comparison, Dereham-Toftwood ward had a turnout of 31.11% and 30.00% for District and Town elections respectively whilst Dereham-Neatherd had exactly 36.00% in both elections.

Due to the slow pace of counting, the electronic count was abandoned on 4 May, with a manual count beginning on 8 May. Despite written requests for a manual recount of votes declared from electronic counts on 4 May, the RO refused. Mr Steve Blake, a Green Party official, requested to the RO that no formal declarations be made until all votes were counted because of concerns that ballots could have become mixed, as in the case of the Dereham-Humbletoft manual count. The RO refused stating, as Mr Birt reports, that he had 'total confidence' that ballots were not cross-contaminated. As a result of this refusal at the 8 May count, Mr Birt made a formal statement on behalf of his party that they had lost confidence in the RO, a sentiment supported by other party representatives and noted by the RO. No mention of Mr Birt's statement was made in ORG's Fol request to Breckland though this specifically asked for any objections made.

The manual count was held at Breckland Council's offices, and while Mr Birt has noted that candidates and agents could watch the count and that the staff counted the papers accurately, no serial numbers or logs were provided to show that all ballot boxes had been transferred securely from the previous count location.

Throughout the day ballot papers from the wrong wards were discovered in ballot boxes. Often the ballots were for wards already declared. Despite continued requests to delay declarations until all votes had been counted, the RO refused in all

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<sup>45</sup> Breckland Green Party, Electronic Count Submission [S-9-0010] p2

cases except for Dereham-Toftwood, which it was decided to declare last. Mr Birt and his colleagues noted twenty ballot papers identified to be in the wrong ballot boxes and one folded ballot paper in the midst of a batch that had been scanned<sup>46</sup>. Mr Birt notes that there may have been more mixed ballot papers but they were hard to track; and that when found they were 'quickly spirited away and no further reference was made to them by the Returning Officer'. The remaining results were declared by the RO on 4 May.

On the basis of continuing doubts over the results declared, Mr Birt and a colleague, Mr Alan Osborn, requested and were granted permission on 22nd May to inspect the marked lists for two wards, Two Rivers and Thetford-Castle; the lists show the total number of ballots issued at polling stations. Taken with the postal vote records, the analysis submitted indicates that 221 more ballots were included in the Two Rivers result than expected. Thetford-Castle records showed that six fewer papers were included in the count than expected. Furthermore ORG analysis shows that the declaration paper<sup>47</sup> for Thetford-Castle was incorrect, claiming 563 ballots were included yet totalling the figures presented gives 565 ballots<sup>48</sup>. The Thetford-Castle Town election, Mr Birt notes, also received 9.5% fewer votes than the District election, raising the question of a third ward undercounted.

An examination of the audit logs provided by Breckland as a result of an FoI request raises a number of questions<sup>49</sup>. Firstly actions do not match within the logs, for example, the final six entries in the 152-page log, all dated 4 May, are for three 'Scan Star' actions (which ORG takes to mean Scan Start), one 'Scan End' and two logins by the same user. It is concerning that the log can end when, according to the log, two scans and two login sessions are still active. Secondly, whilst adjudication actions are shown many times with what appear to be ballot paper identifiers, the log does not record if the ballots were accepted, rejected or forwarded to second-level adjudication. There appears to be an insufficient level of detail in the log for meaningful analysis or verification of the count process. Finally ORG has been provided with no method by which to verify the accuracy and integrity of the log files provided.

Media reports<sup>50</sup> corroborate the problems described in the submissions ORG has received from the Green Party and Labour Party, as does a letter alleged to be from the leader of the Labour group of councillors on Breckland District Council<sup>51</sup>. Repeated requests for the views of other parties in Breckland have not elicited any response, and a detailed FoI request to Breckland Council has not provided a single item of documentation or communication concerning events during or after the count. ORG have requested clarification from Breckland Council as to why only pre-election planning documents were provided in response to ORG's request. Breckland Green Party has requested an independent public review into the results as the only way to restore confidence in the electoral system.

## Usability Observations

### Difficult Adjudication Interfaces

Observers in Bedford and Stratford, as well as Green Party submissions from Breckland and Warwick, noted numerous problems with the adjudication interfaces provided by e-counting suppliers. It was frequently reported that there was poor

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<sup>46</sup> As with all other pilots observed, the scanners could not handle folded ballots.

<sup>47</sup> <http://www.breckland.gov.uk/thetford-castle.pdf>

<sup>48</sup> Similarly Weeting Ward's District declaration states 735 papers included but shows 736 in the breakdown whilst East Guiltcross's District declaration states 552 papers yet the breakdown shows 551.

<sup>49</sup> [F-1-0001]

<sup>50</sup> *EDP24* "Breckland Ward Anomaly: recount not allowed", 11 May 2007

<http://new.edp24.co.uk/content/news/story.aspx?brand=EDPOnline&category=News&tBrand=edponline&tCategory=news&itemid=NOED11%20May%202007%2011%3A39%3A26%3A263>

*Thetford and Brandon Times* "Breckland election fiasco", 9 May 2007

<http://www.thetfordandbradontimes.co.uk/content/tbtimes/news/story.aspx?brand=TBOnline&category=news&tBrand=TBOnline&tCategory=news&itemid=NOED09%20May%202007%2016%3A33%3A31%3A573>

<sup>51</sup> <http://norfolk blogger.blogspot.com/2007/05/breckland-election-votes-fiasco.html>

alignment between software boxes to receive vote marks and the positioning of boxes on ballot papers making visual inspection of how the system had interpreted a ballot—particularly with a large number of candidates—a difficult process. The adjudication systems ORG observed also required a considerable amount of mouse operation, which proved to be slow and tiring for operators. Some common operations, such as selecting the reason for rejecting a ballot in Stratford, always took a minimum of two mouse clicks to select. The interfaces should have been streamlined for heavy use while being clear for party observers to verify and query if necessary. According to a Green Party submission<sup>52</sup> one ballot adjudication queried in Breckland took thirty minutes to retrieve and re-code from the system, after having been stored before an agent had a chance to protest.



*Examples of e-counting ballot boxes (Scottish Elections, May 2007)*

### **Flimsy Ballot Box Design**

To encourage voters to refrain from folding their ballot papers new ballot box designs were introduced in several e-counting pilot areas. These ballot boxes were flat-pack designs constructed from corrugated plastic, with wide front-facing slots to facilitate papers forming an orderly stack within.

Observers as well as candidates and agents interviewed raised concerns about whether the boxes and their seals were robust enough to prevent ballot stuffing after the close of polls. Given that the majority of ballot boxes were delivered to count centres by POs on their own, the security of ballot boxes is a valid concern. ORG notes that locked metal ballot boxes provide a good degree of protection for votes and reassurance to voters, candidates and agents.

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<sup>52</sup> [S-9-0010]

ORG observers in Bedford, where metal boxes were still used, noted that, when nearly full, the boxes proved difficult to add further ballot papers to, often resulting in folding or damaging papers within.

### **Folded Ballots**

To assist with the tracking of ballot papers, all the e-counting pilots were observed to have barcodes printed on the ballots. To avoid obscuring this barcode, poll workers in Bedford were asked to fold the ballot papers in a way which avoided the barcode. These pre-folded ballots were then given voters in the hope they would re-fold papers in the same way. One polling station in Bedford was observed to have an unusually small ballot box which forced electors to fold their ballot papers twice to fit them into the slot.

Elsewhere voters were asked not to fold their ballot papers at all; this was not only due to barcode concerns but also to prevent the vote scanners detecting fold lines as additional marks requiring adjudication. However ORG's observers noted that many voters and poll workers were uncomfortable with the lack of privacy that not folding ballots provided. Furthermore, due to the long tradition of folding ballot papers, many voters ignored or forgot the instructions and continued to fold their ballot. These occasional folded ballots slowed the electronic count process as they had to be unfolded, flattened and were often sent for adjudication.

### **Procedural Observations**

#### **Batch Checks**

In the pilots ORG observed there was a lack of evidence to show that batch checks had been conducted or had been done with a sufficient level of care. For example, South Bucks failed to provide any paperwork to agents to show that POs' counts of ballots issued matched with the papers actually counted. The official declarations published on South Bucks District Council's website fail to provide the numbers of papers issued, turnouts or breakdowns of why papers were rejected<sup>53</sup>. Bedford's RO, on the other hand, provided a breakdown of batch checks (though without original numbers from POs) but was willing to ignore discrepancies of up to 100 votes.

ORG believes that agents should always be provided full batch check numbers prior to a result being declared and that, particularly in a pilot situation, ROs should be concerned about all discrepancies that such checks reveal.

#### **Poor Process Design**

The Electoral Commission's findings on the May 2006 e-counting pilots noted that adjudication was the major bottleneck for e-counting systems<sup>54</sup>, but lessons were not learnt and adjudication continued to cause significant delays in 2007. Often other factors, such as printing problems were the cause of high numbers of votes being sent for adjudication. Given the Commission's clear findings from the 2006 pilots, ORG believes that the high numbers of ballots being sent for adjudication should have been anticipated and a robust system for dealing with them put in place.

ORG also questions the process design in Stratford and Warwick, which required entire batches to be re-scanned when a single ballot was rejected by the scanner. Given that scanners observed showed an extreme sensitivity to tears, folds and marks, ORG believes better planning should have gone into how this was to be handled during the counts. Because the DCA preferred standard high-capacity Commercial Off-The Shelf (COTS) scanners over more specialised scanners dedicated to e-counting, options for more intelligent ballot-handling during scanning were limited.

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<sup>53</sup> Since publishing the declarations online, South Bucks has subsequently posted turnout figures online, but no rejected ballot rates or breakdowns. [http://www.southbucks.gov.uk/documents/parish\\_council\\_elections\\_turnout\\_figure.pdf](http://www.southbucks.gov.uk/documents/parish_council_elections_turnout_figure.pdf)

<sup>54</sup> The Electoral Commission *Findings: May 2006 electoral pilot schemes, e-counting* (August 2006) p3

# Elections in Scotland

## General Observations

In Scotland each local authority was given the option to use e-counting provided through a national framework, and every one chose to do so. The result was deployment of e-counting across all 32 authorities throughout the challenging geography of Scotland. In all locations the Parliamentary votes were counted first from 10pm on election day, with local government votes counted on 4 May.

The complexity of where responsibility lay for the conduct of the May elections in Scotland is of concern. The Scottish Parliamentary elections were the responsibility of the Scotland Office, the British central government department tasked with Scottish affairs. The local government elections were the responsibility of the Finance & Public Services division of the Scottish Executive, the devolved government of Scotland. However the detail of each count was down to the discretion of the Returning Officers and their electoral administrators in each local authority. ORG believes that, if possible within the current devolution settlement, Scottish elections should be administered by one department alone, with ROs retaining appropriate levels of discretion for decisions surrounding the details of their counts.

## Technical Observations

### Lack of Security Controls

ORG observers noted that the DRS vote-scanning machines had open, unguarded USB, parallel and serial ports available, as well as a CD drive. In general, observers noted good security in the count locations observed, however as the PS9000 iM2 scanners used comprise a complete Windows XP Professional PC with a full standard motherboard, the open ports do present a security risk. Given the number of scanners (32 observed in Glasgow alone), the number of people attending counts and the length of time for which the counts extended, it would be a simple matter for unauthorized individuals to gain access to one or more of these ports enabling the manipulation or loading of software. The scanning machines were networked to the other scanners and to the large number of PCs used at the count. In Glasgow, for example, ORG noted 47 PC workstations and one rack-mounted server. The PC workstations also had open ports, further increasing the risk of unauthorized individuals gaining access to a port unnoticed. Due to the systems being networked, compromise of one system can lead to compromise of all computers at a count location.

It was also observed in Edinburgh and East Dunbartonshire that the network infrastructure had not been secured. Network hubs were left on the floor with power and network connections loose. In one case in Edinburgh a hub was observed in easy reach of attendees with ports free lying beneath a table providing an opportunity for unauthorised access to the e-counting system's network. ORG has not been provided with details of the network architectures built for e-counting. However ORG believes their purpose was to facilitate movement of scanned ballots between scanners, servers and adjudication stations. Additionally, in some count centres at least, connections to outside systems were made via the Internet to facilitate with what ORG understands were regional member calculations.

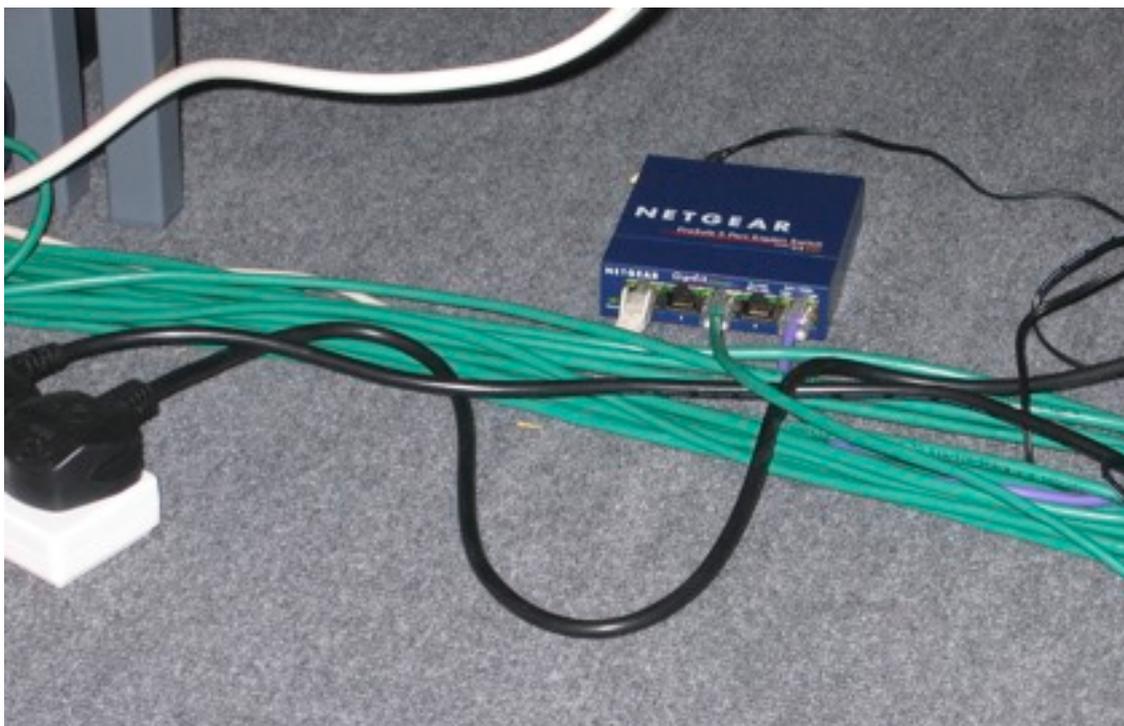
In response to these observations DRS has stated that there were protections in place concerning the software the scanners could run and also stated that data on the network in the count centres was encrypted; but DRS was unwilling to provide further details which would allow ORG to verify the quality of the protections in place. ORG notes that if one PC on a network is compromised it is quite possible for access to be gained to encrypted network traffic.



*Rear view of a DRS PS900 iM2 scanner with open ports at Edinburgh count*



*PC workstation with open ports at Edinburgh count*



*Network hub at Edinburgh count with open ports and power connection unsecured.*

It was observed that count staff logged in to the DRS e-counting software by scanning a barcode on their identification badges. This was the case for all users from first-level adjudicators to ROs. It is ORG's view that single-factor authentication with only a barcode is an insufficient level of protection for an e-counting system. At the very least a second factor such as a password or PIN should have also been required.

Finally, while no detailed explanation is currently available, ORG's observer in East Dunbartonshire was informed of a failure to connect with a DRS data centre in Glasgow. After the completion of the Parliamentary count early on the morning 4 May, the DRS system attempted to upload results to the Glasgow data centre. Whilst not informed of the precise nature of the data transmitted, ORG's observer was informed that a calculation should have been completed before data was returned to the East Dunbartonshire count centre. The process was reported to ORG's observer by election staff to have failed in seven count centres. Subsequently ORG has been informed anonymously that it was, in fact, the server in East Dunbartonshire that failed, and not the data centre in Glasgow. ORG believes a software patch was applied to the server at 9am on 4 May which resolved the issue.

In addition to the failure of the upload system, ORG is concerned with the implications that the DRS system was connecting to the outside world. The risk of outsider manipulation would be far better managed if no outside connections to or from the DRS e-counting system were possible.

### **Scanner Sensitivity**

Specifications provided by DRS state that the scanners used provide 256-bit 200 dpi greyscale scans using red illumination. The result is that certain colours, particularly red, and certain inks (such as for highlighter pens) can appear invisible or barely visible to the scanners. This was confirmed to ORG's observers by a DRS representative at the Commission's pre-election briefing for observers. ORG notes that voters were not informed of the scanners' characteristics and an ORG observer did speak to one voter in Edinburgh who had used a red pen to vote.

This caused problems particularly in Edinburgh, where it was observed that for a number of ballots second-adjudicated it was unclear whether there was any mark on the paper either due to insufficient pressure being applied or a colour being undetectable. On occasion the zoom facility did prove helpful in identifying marks made by electors. However, in Edinburgh,

when marks could not be identified, no reference was made to the original ballots. Whilst the RO did offer to retrieve the paper ballots, he discouraged this, commenting that the result would take even longer to declare (Edinburgh was behind schedule due to problems discussed later in this section). As a result Edinburgh's unclear ballots were rejected for uncertainty. Given that the election administrators were aware of the scanners' colour blindness, but voters were not, ORG believes these votes should have been retrieved as a matter of course and not rejected. Furthermore, for a greater understanding of the scanners' weaknesses, it would have been instructive to note if and how these ballots were marked. Currently no breakdown of the numbers of each type of rejected paper has been published for Edinburgh's parliamentary count. However in the Glasgow region 69.5% of the ballot papers rejected were unmarked or void for uncertainty.

Also observed during adjudication in Edinburgh was a ballot paper where the system appeared to be confused by a fold mark. The result was that software voting options were presented only on the right above the fold mark and only on the left below the fold; the options should have been presented on both sides above and below the mark. DRS staff could not resolve the issue using the RO's login so the ballot was counted using a special manual entry. It is unclear if the DRS system experienced the same error with other votes, but counted the votes instead of sending them for adjudication.

It was observed that there were problems, as experienced in some English pilots, with the perforations used to separate ballots from the books they were supplied in. As a result ballots were commonly observed at counts with tears along their top edge, which was where the uniquely identifying barcode was located. This combination of perforation problems and the location of the barcode on ballots interfered with the barcode recognition process which contributed to the high number of ballots sent for adjudication in Scotland. ORG is surprised that neither DRS nor the Government foresaw that placing the barcode close to the perforations on ballot papers could cause problems during electronic counting.

### **Software Problems in Edinburgh**

A number of problems with the software used at the count were observed in Edinburgh.

The management information system (MIS), which provided count progress information and output the final results for declaration, was not available until 5am. No announcement regarding the MIS problems was made until 2.48am, when attendees were told that the system was being worked on.

During final RO adjudication, an error appeared when the RO tried to save the results of an adjudication: "Unable to complete requested operation. Do you wish to retry Yes/No?" Agents reported to ORG observers that this error had appeared several times previously. Clicking 'Yes' produced the same error message again. Clicking 'No' resulted in a box stating "Unable to complete. Ask an Engineer." This error message appeared on all the other adjudication stations at the same time. After five minutes the problem was resolved without explanation.

When ballot papers were being manually entered, error messages such as the following were observed to appear: "Batch: 96019912: Status Verify Hold Ballot Papers can only be entered against a Verified Passed Batch." No explanation was provided for these messages.

### **No Opportunities for Public Verification**

The official mark on ballot papers was a barcode called the Unique Identifying Mark (UIM), an eight-digit code including one checksum digit. Mr Tony Lee, Managing Director of DRS, stated at the Commission's pre-election briefing for Scotland that not all possible eight-digit numbers would represent UIMs, making it hard to forge ballot papers. However, checksum digit aside, the UIM format only provides for ten million possible numbers. Given that Scotland's population is over five million<sup>55</sup>, the odds of generating a valid UIM are good. The one protection is the algorithm for generating the eighth digit, the checksum digit.

Despite unrestricted publication being acknowledged best practice for cryptographic algorithms in government and corporate use, no information on the UIM checksum algorithm has been provided. Similarly, details of the encryption DRS state was used to protect the count centre networks has not been published.

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<sup>55</sup> <http://www.gro-scotland.gov.uk/files1/stats/mid-2006-population-estimates-scotland/j8527.pdf>

ORG welcomes the verification of the Electoral Reform Services eSTV counting software used to count the Scottish local elections. A team from Radboud University Nijmegen used good practice to test the accuracy of the results generated by eSTV and ORG is pleased that the team's results were published<sup>56</sup>. However no details have been provided on how or whether any assurance was provided that that the software version the Nijmegen team passed as accurate was actually the version used on election night. Furthermore, as eSTV was integrated into the wider DRS system, tests should have been undertaken as to the implications for accuracy of the integration process. Finally, whilst publishing the results of testing is welcome, complete source availability for the software used should have been required, to allow any stakeholder to examine the workings, not merely the team picked by the contracting authorities.

## Usability Observations

### High Number of Rejected Ballots

The most contentious issue of the Scottish Parliamentary elections has been the large numbers of ballots rejected. Sixteen Parliamentary constituencies saw winners declared with majorities smaller than the number of ballots rejected. ORG's observations from polling places and count centres offer some insight into the reasons behind the spoilt ballot rate.

### Combining Elections

As discussed in the Introduction, the complexity of the combined Parliamentary and Local Government elections was given as the justification for the need for e-counting. It was the combination of two different voting systems that also served to confuse voters and complicate the voter education message that had to be communicated.

Whilst the number of ballots rejected in the local elections was relatively small, attempts to vote in the Parliamentary elections with the numbered preference system used in the local elections were observed. The use of Single Transferrable Vote (STV) in local elections was new to Scotland, and ORG believes it was thus inevitable that voters' minds would have been focused on using the STV system when they cast their vote. Assisting voters with the two quite different voting systems used also was observed to be a challenging workload for polling station staff.

The image shows a sample ballot paper for the 'Election of the Scottish Parliament'. It is titled 'Election of the Scottish Parliament' and 'You have two votes'. The ballot is divided into two main sections: 'Regional Members' (left, orange background) and 'Constituency Member' (right, purple background). Each section has a list of candidates and a box for marking an 'X'.

Regional Members		Constituency Member	
Vote local only (X)		Vote once only (X)	
B Party		C Candidate	
F Party		F Candidate	
G Party		G Candidate	
K Party		N Candidate	
M Party		R Candidate	
S Party		Z Candidate	
T Party			
Y Party			
A Individual Candidate			
E Individual Candidate			
P Individual Candidate			

Sample Scottish Parliamentary election ballot paper (Source: Vote Scotland)

<sup>56</sup> Koopman, P. et al *Testing the eSTV program for the Scottish Local Government Elections* (March 2007) <http://www.cs.ru.nl/W.Pieters/reportWIGUniNijmegenMarch2007.pdf>

### *Order of Columns*

Most ballots observed to be rejected for the Parliamentary elections were due to two marks being made in the left-hand, regional vote column with none in the right-hand, constituency vote column. A variant of this was when only one mark was made in the left-hand column. The first, most common, case observed can be classified as an overvote for the region and an undervote for the constituency, and the second case being only an undervote for the constituency. Figures compiled by an ORG observer in Glasgow confirm the high rate of spoils for the constituency column as would be expected from the rejections observed during adjudication (see Table 2).

Constituency	Regional Column		Constituency Column	
	Spoilt	Total (approx.)	Spoilt	Total
Glasgow Kelvin	584	15,000	1,195	23,500
Glasgow Baillieston	886	15,000	1,850	17,272
Glasgow Anniesland	975	20,000	1,736	22,139

*Table 2. Spoilt regional and constituency votes in three Glasgow Parliamentary constituencies.*

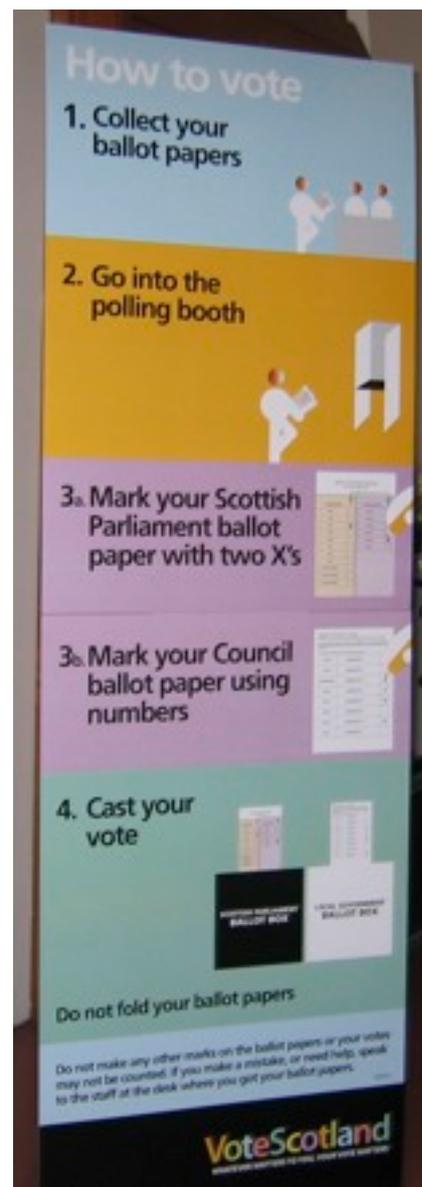
*Note that papers could be marked as spoilt for either or both columns.*

*Regional totals are from values recorded during the count. Final regional totals have not been provided in results published.*

ORG's view is that the most important factor in electors unintentionally spoiling their ballots was the design of the ballot paper. ORG notes that, in general, media coverage tended to place constituencies before regions when reporting on the Parliamentary elections. Additionally constituency results were counted by ROs before regional results. As a result many electors assumed the first column was for the constituency or were not aware of the distinction. Once a vote was cast in the first column the voter could only find their other choice in the first column also and so placed a second mark there. Comments to ORG observers at counts by election agents support this view with several reporting that voters had stated they expected the columns to be the other way around.

The elimination of the explanatory arrows at the head of the ballot papers for Edinburgh and Glasgow<sup>57</sup> will have increased the chances of such confusion, explaining in part at least the higher levels of spoilt ballots experienced in those cities. It is ironic that fears over fitting in the large number of candidates onto a machine-readable ballot paper were what led to the elimination of those arrows. If e-counting had not been used a clearer ballot paper or a paper for each Parliamentary vote could have been used thereby reducing voter error.

Additionally electors could have been misled by the large format voter information posters observed at the entrance of polling stations (see right for sample from Edinburgh) which did not make it clear that the two X marks were in fact one X for each column. An ORG interview with an SNP candidate noted that POs often only told voters to vote twice, not once in each column. The candidate also mentioned that a common voting pattern was voting for the SNP in the constituency and the Green Party in the region. The fact that, in most areas, Green candidates only contested at the regional level and the first option presented in the top left was for the SNP, leads ORG to believe that voters marked the first SNP box they saw and then found that that the Green option was in the same column. This fits with observations of adjudicated ballots. It is ORG's view that the ballot design unfairly penalised smaller parties which only stood regional candidates.



As part of the Scotland Office's consultative process in changing to a single Parliamentary ballot paper, the Electoral Commission engaged consultants to conduct 'public opinion research' using focus group studies on five different ballot designs. Usability experts are agreed that focus groups are not an appropriate method for testing for the usability of a design. While such groups may reveal superficial opinions concerning a form's visual appearance, they do not reveal problems that users actually encounter when trying to use a form or ballot to complete a task such as voting. Indeed, the Usability Professionals' Association notes in its Body of Knowledge that, 'Focus groups are useful for getting at attitudes toward something, but not very useful for understanding performance [...] A focus group is generally not considered a usability evaluation method.'<sup>58</sup> One-to-one usability testing, with known user intentions and clear measurement of success or failure in completing a task, is the most appropriate method for assessing whether people can successfully use a particular ballot paper design. ORG has been informed by the Usability Professionals' Association that extensive material concerning best practice in voting usability and the testing thereof was passed to the Electoral Commission in the period 2003-2005. Even given the weaknesses of focus groups it is surprising that none of the ballot designs presented to the groups had the constituency column on the left of the paper<sup>59</sup>.

<sup>57</sup> BBC News *Clue over voter confusion* (15 May 2007) <http://news.bbc.co.uk/1/hi/scotland/6656181.stm>

<sup>58</sup> <http://www.usabilitybok.org/methods/p866?section=special-considerations>

<sup>59</sup> Cragg Dawson Ross *Ballot Paper Designs for Scottish Parliament Elections 2007* (August 2006)

<b>Constituency</b> <i>Highlighted row indicates no. spoilt ballots is greater than winning majority</i>	<b>Winning Party</b>	<b>Turnout</b>	<b>Majority (votes)</b>	<b>Majority (%)</b>	<b>Spoilt constituency ballots</b>	<b>Spoilt constituency ballots (%)</b>
Glasgow Shettleston	LAB	14801	2881	19.5	2035	13.7
Glasgow Maryhill	LAB	16564	2310	13.9	1877	11.3
Glasgow Pollok	LAB	19416	4393	22.6	2106	10.8
Glasgow Baillieston	LAB	17272	3934	22.8	1850	10.7
Glasgow Springburn	LAB	17612	5095	28.9	1702	9.7
Edinburgh E	SNP	29967	1382	4.6	2521	8.4
Glasgow Cathcart	LAB	21657	2189	10.1	1717	7.9
Glasgow Anniesland	LAB	22139	4306	19.4	1736	7.8
Midlothian	LAB	25111	1702	6.8	1649	6.6
Glasgow Rutherglen	LAB	24252	4380	18.1	1495	6.2
Linlithgow	LAB	29637	1150	3.9	1722	5.8
Glasgow Govan	SNP	21521	744	3.5	1220	5.7
Airdrie & Shotts	LAB	27160	1446	5.3	1536	5.7
Edinburgh W	LD	34752	5886	16.9	1905	5.5
Hamilton N & Bellshill	LAB	25366	4865	19.2	1345	5.3
Banff & Buchan	SNP	27285	10530	38.6	1443	5.3
Clydebank & Milngavie	LAB	26765	3179	11.9	1400	5.2
Glasgow Kelvin	LAB	23500	1207	5.1	1195	5.1
Edinburgh Central	LAB	29396	1193	4.1	1501	5.1
Coatbridge & Chryston	LAB	25725	4510	17.5	1285	5
Livingston	SNP	33224	870	2.6	1634	4.9
Greenock & Inverclyde	LAB	23105	3024	13.1	1099	4.8
Edinburgh N & Leith	LAB	31685	2444	7.7	1536	4.8
Fife Central	SNP	26965	1166	4.3	1256	4.7
Dunfermline East	LAB	24568	3993	16.3	1162	4.7
Aberdeen N	SNP	24891	3749	15.1	1173	4.7
Ross, Skye & Inverness W	LD	31719	3486	11	1419	4.5
Cunninghame South	LAB	23422	2168	9.3	1055	4.5
Paisley South	LAB	25527	4230	16.6	1115	4.4
Edinburgh Pentlands	CON	34377	4525	13.2	1528	4.4
Edinburgh South	LD	32573	1929	5.9	1403	4.3
Carrick, Cumnock & Doon Valley	LAB	33785	3986	11.8	1432	4.2
Falkirk West	SNP	28785	776	2.7	1157	4

<b>Constituency</b> <i>Highlighted row indicates no. spoilt ballots is greater than winning majority</i>	<b>Winning Party</b>	<b>Turnout</b>	<b>Majority (votes)</b>	<b>Majority (%)</b>	<b>Spoilt constituency ballots</b>	<b>Spoilt constituency ballots (%)</b>
Dundee West	SNP	24268	1946	8	978	4
Kirkcaldy	LAB	24195	2622	10.8	954	3.9
Caithness, Sutherland & Easter Ross	LD	22334	2323	10.4	867	3.9
Aberdeen South	LD	29885	2732	9.1	1139	3.8
Motherwell & Wishaw	LAB	26150	5938	22.7	970	3.7
Aberdeen Central	LAB	21120	382	1.8	776	3.7
Clydesdale	LAB	33332	2893	8.7	1206	3.6
Moray	SNP	30274	7924	26.2	1018	3.4
Falkirk E	LAB	30333	1872	6.2	1019	3.4
Dundee E	SNP	26869	4524	16.8	913	3.4
Dumbarton	LAB	30054	1611	5.4	1014	3.4
Cunninghame N	SNP	30241	48	0.2	1015	3.4
Western Isles	SNP	13625	687	5	446	3.3
West Renfrewshire	LAB	29129	2178	7.5	956	3.3
Orkney	LD	8653	2476	28.6	285	3.3
Ochil	SNP	31553	490	1.6	1016	3.2
Inverness E, Nairn & Lochaber	SNP	39609	5471	13.8	1249	3.2
Galloway & Upper Nithsdale	CON	30318	3333	11	978	3.2
Hamilton S	LAB	23211	3652	15.7	711	3.1
East Lothian	LAB	34471	2448	7.1	1069	3.1
Argyll & Bute	SNP	28792	815	2.8	900	3.1
Strathkelvin & Bearsden	LAB	36595	3388	9.3	1098	3
Shetland	LD	9795	4909	50.1	294	3
Kilmarnock & Loudoun	SNP	33435	1342	4	1018	3
Dumfries	LAB	33419	2839	8.5	1006	3
Cumbernauld & Kilsyth	LAB	26382	2079	7.9	803	3
Tayside N	SNP	35396	7584	21.4	1025	2.9
Paisley N	LAB	23206	5113	22	667	2.9
East Kilbride	LAB	35903	1972	5.5	1033	2.9
Ayr	CON	31025	3906	12.6	873	2.8
Aberdeenshire W & Kincardine	LD	34823	5170	14.8	984	2.8
Tweeddale, Ettrick & Lauderdale	LD	30327	598	2	814	2.7

<b>Constituency</b> <i>Highlighted row indicates no. spoilt ballots is greater than winning majority</i>	<b>Winning Party</b>	<b>Turnout</b>	<b>Majority (votes)</b>	<b>Majority (%)</b>	<b>Spoilt constituency ballots</b>	<b>Spoilt constituency ballots (%)</b>
Angus	SNP	31960	8243	25.8	873	2.7
Dunfermline West	LD	29525	476	1.6	757	2.6
Perth	SNP	34862	2495	7.2	878	2.5
Gordon	SNP	35363	2062	5.8	849	2.4
Fife NE	LD	31552	5016	15.9	762	2.4
Roxburgh & Berwickshire	CON	25680	1985	7.7	599	2.3
Eastwood	LAB	42165	891	2.1	990	2.3
Stirling	SNP	32625	620	1.9	633	1.9

*Table 3. Scottish Parliamentary Constituency results ordered by proportion of spoilt constituency ballots. Highlighted rows indicate where the number of spoilt ballots is greater than the winning majority. (Compiled by ORG from election summaries and BBC Research<sup>60</sup>)*

### **Unclear Login Privileges**

One usability issue observed with the DRS software related to access privileges. An ORG observer monitored a situation where the RO for Glasgow was struggling to log into a station. Working with a clerk the RO had difficulty until they realised they needed to log out as the clerk before they could log in as the RO. The interface did not make it clear to users or observers what permissions the user had when operating a workstation. A clear visual indication of the level at which a user was accessing the system would have been helpful for both usability and security purposes.

### **Procedural Observations**

#### **Well-Defined Ballot Handling**

ORG observers were unanimous in reporting that they had monitored well-organised counts with clearly-defined procedures for handling ballot papers. Authority and supplier staff were clearly distinguished by T-shirts and badges. DRS staff had as little contact with ballots as possible with the majority of tasks except scanning being handled by local authority workers. The layout of counts was also generally felt to be well thought-out and as accessible as reasonably possible. In Glasgow it was observed that whilst batch counts were checked against PO records, the RO allowed figures to mismatch by between plus one and minus three votes. In East Dunbartonshire the RO allowed batch counts to mismatch by plus or minus one vote. ORG's view is that every vote should be counted and checked but ORG does welcome consistent guidelines for workers conducting batch count checks. Given the regional nature of the Parliamentary count ORG believes that it would be preferable if such guidelines were set nationally, and not locally by ROs.

In Edinburgh, count workers showed particular dedication in painstakingly repairing nearly every ballot paper damaged by an attack on a ballot box by a man with a golf club. ORG notes that metal ballot boxes would have been more resistant to such an assault.

<sup>60</sup> BBC News *Rejected votes more than thought* (9 May 2007) <http://news.bbc.co.uk/1/hi/scotland/6637387.stm>



*Election Count in East Dunbartonshire*

In the polling place, however, observers noted that POs needed clearer guidelines on how to advise voters consistently, particularly when they believed they had spoilt their ballots. ORG observers noted widely varying reactions by POs ranging from issuing new ballot papers to asking voters to cross out their marks and make new ones adjacent to the vote column. Observers also noted problems with ballot boxes, some of which could not quite take ballot papers unfolded whilst others filled too quickly. It was observed that the white ballot boxes had more trouble cleanly accepting ballot papers, often releasing curled and folded ballots when opened.

### **Results Collation**

At the count conducted by the Highlands Council, questions arose concerning the Highlands and Islands regional Parliamentary results that the RO intended to declare. Owing to the logistics of collecting ballots papers from across the geographically largest constituencies in Britain, these were the final Parliamentary results to be declared in Scotland. Given that the Parliamentary result thus far had the SNP only two seats ahead, the declaration of the final seven seats was keenly anticipated. Following a BBC News report<sup>61</sup> ORG interviewed Mr David Thompson MSP (SNP) and another person party to the count who wished to remain anonymous.

During the adjudication process, Mr Thompson had been keeping an informal count which led him to believe that the SNP was receiving approximately 35% of the votes for additional members (the regional list). However when the RO presented the regional results to candidates and agents prior to declaration, SNP representatives were shocked and disappointed to have not won any seats. According to Mr Thompson the results presented were:

Labour	4
Conservative	2
Green	1
SNP	0

After brief discussions with his agent Mr Thompson decided to challenge the result, managing to do so as the RO was on his way to the podium to declare the result. Mr Thompson told ORG that the RO had seemed surprised at the desire to challenge the result, asking Mr Thompson why he wanted to do so. Mr Thompson insisted and the RO offered to show the

<sup>61</sup> BBC News *Grandfather was SNP election hero* (5 May 2007) <http://news.bbc.co.uk/1/hi/scotland/6627657.stm>

workings used to calculate the result. The RO went through a number of A4 printouts from an Excel spreadsheet. It was identified that votes for the SNP had not been included during the calculations; the omission of SNP votes was probably owing to the spreadsheet operator's inability to see all the parties' votes on the computer screen at the same time. As parties were listed horizontally across the screen and a large number of parties had stood in the election, the data in the spreadsheet had become wider than the computer screen used. Thus without scrolling manually across the full range of the spreadsheet's columns, parties could be missed from the calculations used to allocate seats.

Whilst errors in the spreadsheet formulae could not be ruled out, the same file had been used for the 2003 elections. Once SNP votes were included in the vote distribution calculations the new result, eventually declared, showed a result more in keeping with what Mr Thompson's rough calculations had indicated:

Labour	3
Conservative	2
Green	0
SNP	2

These results kept SNP one member ahead of Labour in the new Parliament, that member being the last declared: Mr Thompson himself, who received profuse apologies from the RO.

Earlier that day Mr Thompson had come a good second place in a constituency seat for Ross, Skye and Inverness West and was disappointed not to have won. Given this result he was particularly focussed on tracking the regional results, but nevertheless he commented to ORG that if one SNP member had been returned he would have been less confident in challenging the result about to be declared. Mr Thompson noted that in other areas candidates had been shown the workings before declaration, and this should also have been done for the Highlands and Islands results. It would have taken an expensive challenge in the Court of Session to correct the result once the workings had been published.

Extreme tiredness also had a role to play in the proceedings. ORG's anonymous interviewee noted that some workers had been awake 35 hours non-stop, and tasked with counting a large number of constituency, regional and local government results, while e-counting had resulted in an unexpectedly high number of adjudications, with ballots sometimes being examined three times at different levels.

Nevertheless, ORG is surprised that the Excel software package was permitted to be used to perform such a crucial function in processing the election results. Four years ago the use of office productivity software such as Word and Excel in 2003 English pilots was criticised by the Electoral Commission<sup>62</sup>. Such software does not provide any audit trail or sufficient checks on calculations performed and hence is not appropriate for use in election counts.

### **Consistency in Adjudication**

It was observed that, given the large number of adjudication stations provided (as many as 20 in some count centres), it was difficult to ensure or monitor that decisions between stations were consistent. Whilst some ROs did provide written guidance for adjudication, others did not, however the Electoral Commission did provide mats with sample acceptable and unacceptable adjudications. Given the scale of adjudication ORG believes standards and training should be developed to ensure that adjudication decisions on what does or does not constitute a valid vote are as consistent as possible.

### **Confirming Count Accuracy**

A small-scale survey of voters leaving polling places conducted by ORG observers in Edinburgh indicated that in general voters were confident in the e-counting systems that were to be used. Comments suggested that voters felt e-counting would not have been used unless its robustness and accuracy had been proven.

However candidates and agents at all counts observed in Scotland frequently raised questions about how the accuracy of the count could be confirmed. No sample manual recounts were required at counts observed. Furthermore screens turned so attendees of the count could see them only ever showed ballots the system could not read, ballots the system was

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<sup>62</sup> Electoral Commission *The shape of elections to come* (July 2003) p56

confident about reading were never displayed. No observed tests were conducted after results were declared. It is unclear how one could have detected software manipulations or errors that maintained the total number of votes counted but changed to whom they were cast. ORG's observer in East Dunbartonshire noted the lack of manual checks on the results was by far the main concern repeated by poll workers and count attendees throughout two days of observation<sup>63</sup>.

Given the Scottish elections consisted of so many firsts (a single ballot paper for the Parliamentary elections, STV for local government elections and e-counting for all ballots) ORG believes that systematic manual recounts of at least statistically significant sample batches of ballots from each contest should have been mandated.

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<sup>63</sup> In a follow-up meeting after the election the RO for East Dunbartonshire stated that one batch had been manually counted early on the morning May 4, with the manual result matching the e-count. This manual count was not observed and ORG has received nor further details nor corroboration from other sources.



# Conclusions & Recommendations

## Conclusions

The Open Rights Group warmly welcomes the new opportunities for independent election scrutiny that accredited election observation provides. ORG believes that the conduct of elections in the United Kingdom will be greatly improved by the continued contributions observers can make. It is disappointing that some local authorities and Government departments have not continued in this spirit by obstructing ORG's Freedom of Information requests. It is ORG's view that the details of procurement and preparations for statutory elections should be made publicly available as a matter of course and should not need to be pursued through Fol.

ORG observed a large number of problems and potential vulnerabilities, and heard doubts expressed by candidates and agents. The large number of counts observed which experienced significant delays and problems leads ORG to believe that neither the technologies nor the processes used were sufficiently mature. The considerable number of procedural, technical and usability oversights also leads ORG to the conclusion that the procurement of technologies for elections in Scotland and England were flawed. The Scottish process was, overall, the better of the two, with some published verification of systems and procedures at counts much more clearly defined but neither was satisfactory.

## English Pilots

### *Management*

It is ORG's view that the English pilot procurement and management process had fundamental systematic flaws which led to grossly insufficient technology and risk management. Having created a tight timetable and introduced delays to the pilot process, the DCA then passed responsibility to insufficiently prepared local authorities without providing enough support. Given their generally very low levels of technical expertise, staff in local authorities exhibited disproportionately high levels of confidence in the technologies their pilots used. ORG finds it unacceptable that a company such as ES&S, who provided e-voting products with unsatisfactory security to other governments, could even be considered for participation in the UK pilot programme.

Overall, the management of the pilots by the DCA has not significantly developed since the 2003 pilots, whose conduct had raised numerous recommendations for fundamental changes from the Electoral Commission and other stakeholders. While ORG expects many problems and oversights will be blamed on the short timescales and the immovable deadline of election day, ORG does not find such excuses credible. These same excuses have been used in the evaluation of pilots since their inception in 2000. The DCA, the suppliers and the authorities have had ample opportunity to reflect on the conduct of the previous pilots. Their failure to do so is disappointing.

ORG recognises that elections are challenging projects which must deliver confidentiality, accuracy and integrity. The infrequency of statutory elections, annual at most, makes procedural improvements difficult—staff change and knowledge is not shared or experiences recorded. However, this has always been the case and the continued failures to learn from previous pilots suggests any changes to election practice made because of past experience have been inadequate.

### ***Problems Observed***

Despite there being very few opportunities for independent observation, a number of problems and potential security issues were identified in the e-voting systems used in England. It is cause for concern that so little information has been provided, either voluntarily or through FoI, regarding the precise design, implementation and administration of the e-voting elements of pilots in England. Given that, by its very nature, e-voting borders on the impossible to observe, the DCA and suppliers should have paid particular attention to explaining the systems used. Unfortunately this was not done and the DCA chose not to provide any defined, independent certification process of the systems used, as experience from abroad suggests is needed and as is recommended by computer scientists and the Electoral Commission.

ORG believes the conduct of e-voting in 2007 confirms ORG's fundamental concern that e-voting presents a 'black box' process in which voter intention cannot be verified as having accurately been recorded or counted. ORG does not consider it acceptable to conduct statutory elections in such a manner.

### **Electronic Counting**

Despite repeated assurances from suppliers in Scotland and England that their e-counting systems were proven and reliable, this was shown not to be the case. Systems were not robust in the face of minor issues such as imperfect perforations, folds, changes of ink used for printing, variable ballot paper sizes and mixing of ballots from different contests. Given that other countries have already experienced such issues, it is disappointing that they were not foreseen by suppliers or the Government. That these issues did cause detectable problems leads ORG to be concerned that other errors could have gone unnoticed. The resistance of ROs to conducting manual recounts and the complete failure of Government to mandate any form of manual counts, even of sample batches, indicates overconfidence in the systems purchased. Manual counts of at least some votes would have served to increase confidence in the results declared whilst providing important information on the level of confidence e-counting systems should be accorded. The one manual recount that did occur, in Breckland, found a significantly larger number of votes than e-counting reported.

It is also notable that very significant delays were experienced due to the number of ballots sent for adjudication. It is ORG's view that this could and should have been anticipated, as the Electoral Commission had noted, after e-counting pilots in 2006, adjudication was the key bottleneck in e-counting procedures.

Because e-counting does not eliminate the paper ballot, ORG believes ROs and Government were overconfident and not sufficiently careful in their preparations for e-counting votes. Given e-counting's long history, particularly in the United States, there were ample sources of information from which common problems and potential solutions should have been identified.

### **Scottish Elections**

ORG's observations indicated that, overall, the Scottish elections were well presented and had superior preparations for observers. Unfortunately, insufficient attention to detail led to elections which ORG does not believe were entirely fair. Parties which only stood candidates on the regional ballot of the Parliamentary elections were unfairly penalised by the poor ballot design which probably lead voters to mark their constituency choice in the regional column. Given the close result and the fact that it was primarily smaller parties that suffered, ORG believes it is unlikely that the finances will be raised to file an election petition to challenge any of the elections.

### **The Electoral Commission**

In general ORG observed the Electoral Commission's conduct to be good, within the limitations of its statutory role. Individual staff from the Commission were observed to show the highest regard for election integrity and their politically neutral role in the process.

However, in Scotland and England, the presentation of electoral matters often left stakeholders, such as candidates and agents, unclear as to where responsibility lay between the Commission and the Government. ORG believes that in both Scotland and England, the Commission became too closely entangled in supporting the Government in the successful delivery of the elections and the technologies selected. It is ORG's view that the Commission should have taken a more hands-off approach; such an approach would have strengthened the Commission's impartiality and would have reinforced its role as being independent of the Government. Whilst the Commission should, of course, be referred to for advice, ORG

believes the Commission's value is in its independence from Government. It is perhaps indicative of the lack of resources within the Government that the Commission was pulled into more active support of delivering the elections. Nevertheless ORG believes the Commission could have been stronger in resisting this pull.

Furthermore, one key criticism of the Commission is that the research it contracted, which examined possible Scottish ballot paper designs, was fundamentally flawed. That a ballot design with the Constituency column on the left was never investigated was a considerable oversight which the Commission should have addressed before the report was conducted. That the report was presented as key evidence in support of the final Scottish Parliamentary ballot paper printed brings into question the judgement of both the Commission and the Government departments responsible.

### **Design and Usability**

It is ORG's view that not only was the report contracted to examine Scottish ballot paper designs poorly specified, but that the wrong method of investigation was used. Opinion research is not a suitable methodology for usability testing; a ballot design risks being unusable without usability testing. There exists a significant body of knowledge, primarily from the US, on ballot design and usability testing. As part of the Usability Professionals' Association's 'Voting and Usability' and 'Design for Democracy' projects, Association members have shared these materials with the Electoral Commission, and the DCA's predecessor in managing elections, the Office of the Deputy Prime Minister. The London elections of 2000 and 2004 also offered lessons regarding ballot design that the Scottish design process failed to heed. It is ORG's view that the poor ballot design in Scotland led to Parliamentary elections which were not fair. ORG is also disappointed that the English pilots failed to show evidence of usability testing.

### **In Conclusion**

The technologies used at the May 2007 election—and the processes by which they were implemented—caused significant problems that raise concerns about the accuracy of the results declared. The nature of the technologies and the problems they caused have served to seriously undermine the faith that candidates, agents and voters have in the integrity of British elections. Much of the responsibility for this lies with the Government, which has shown a naïve and insufficiently robust approach to managing technologies and their suppliers.

ORG concludes that, given the problems observed and the questions remaining unanswered, it cannot express confidence in the results declared in areas observed. Given these findings, ORG remains opposed to the introduction of e-voting and e-counting in the United Kingdom.

## Recommendations

ORG's position is that e-voting and e-counting provide considerable risks to the integrity of our democracy. The risks presented far outweigh any benefits the systems might potentially offer. In practice the systems have proved to be more expensive, less robust, and considerably slower than manual methods, so any potential benefits are not felt. ORG received some comments which suggest that e-voting and e-counting are inevitable and that to oppose these technologies would be a Luddite view. ORG disagrees, and it is telling that a significant proportion of those concerned about voting technologies are computer scientists and professionals, who are usually enthusiastic adopters of new technology.

ORG very strongly recommends that no further e-voting or e-counting trials take place until a step change in reliability, integrity and transparency has taken place. There needs to be a general consensus amongst technical experts that the types of problems that were observed will not recur. Given the significant lack of agreement amongst computer scientists over the security and reliability of remote e-voting in particular, whether by telephone or Internet, ORG believes considerable academic research and debate must be pursued before further e-voting trials can be considered.

Nevertheless ORG accepts that trials, particularly with e-counting, may well continue. Thus recommendations for improved practice are highlighted below.

1. Observer rights of access should be clearly defined in Pilot Orders so that the monitoring of servers, counting systems and other pilot-specific technologies do not need to be negotiated on a case-by-case basis. Observers should be able to monitor all systems used to conduct an election, not just those portions suppliers wish to reveal.
2. Far greater emphasis should be put on providing detailed public information on the systems, procedures and processes surrounding the use of technology in an election. This information should be provided sufficiently well in advance of an election to allow stakeholders time to evaluate the information provided.
3. Time should be given for formal consultation—at national and local levels—prior to approval for e-voting or e-counting being used in an election.
4. A clear application and implementation timetable of at least one year should be provided—and adhered to—when procuring election technology.
5. An independent technology certification process, with publicly available reports and ongoing evaluation of technologies, should be implemented for systems used in elections.
6. It should be recognised that local authorities bear the burden of delivering elections but have little or no technical expertise, particularly in relation to specialist election systems. Greater support and resources should be made available to authorities using such systems in elections.
7. Far greater emphasis should be placed on the systematic professional usability testing of elections as experienced by voters, including ballot paper design and interfaces used by election staff.
8. E-voting and e-counting technologies remain unproven, hence greater emphasis should be placed on checking the accuracy of the results provided by such systems. Candidates, agents and observers should be able to inspect votes accepted by systems as valid and e-counting systems should always face a sample manual recount.
9. ORG supports the recommendations of the Committee for Standards in Public Life regarding re-focussing the Electoral Commission's mandate. In particular ORG recommends that, to reinforce its independence from the Government, the Commission's role in undertaking policy development should be eliminated.

# Appendix A:

## Fol Listing

This page provides a listing of the documents made available to ORG through Freedom of Information Requests which are referenced in this report. Fol items are referenced in the main text using numbers in square brackets of the format [F-OrganisationID-DocumentID]

Reference Number	Filename	Source Organisation
F-1-0001	Breckland audit logs.pdf	Breckland Council
F-2-0002	Software Inventory Sth Bucks.pdf	South Bucks District Council
F-3-0003	Sheffield_Sample_Audit.xls	Sheffield City Council
F-4-0004	Shrewsbury_Sample_Audit.xls	Shrewsbury & Atcham Borough Council
F-5-0005	Project Team 2 March.doc	Bedford Borough Council
F-5-0006	Indra_Proposal_Bedford.pdf	Bedford Borough Council
F-5-0015	Extract form Bedford Borough Council's PID.doc	Bedford Borough Council
F-5-0016	Letter - Bedford Borough Council's Electoral Pilot Bid_.doc	Bedford Borough Council

# Appendix B: Submissions

The following submitted information, documents or participated in additional interviews with the Open Rights Group as part of its observation mission. Political Parties in areas observed were contacted one or more times before and after the elections, though ORG was disappointed by the low response rate. Their representatives were also interviewed by ORG observers during count proceedings but these interviews are not listed below. ORG is also grateful to the numerous anonymous contributors. Submission documents are referenced in the main text using numbers in square brackets of the format [S-OrganisationID-DocumentID]

Alex Crawford, Labour Party candidate, Rushmoor  
 Breckland Green Party  
 Dover Liberal Democrats  
 Mid Norfolk Labour Party  
 Sheffield Liberal Democrat Party  
 South Bucks Conservative Party  
 South Bucks District Council  
 South Bucks Liberal Democrat Party  
 Stratford-on-Avon Labour Party  
 Warwick & Leamington Green Party

Reference Number	Filename	Source
S-6-0007	Errors in turning away registered voters.doc	Alex Crawford (Labour Party candidate)
S-7-0008	Observations on the electronic counting trial at Warwick.pdf	Warwick & Leamington Green Party
S-8-0009	william hudson.doc	William Hudson
S-9-0010	Electronic Count - Breckland Local Election.pdf	Breckland Green Party
S-9-0011	Manual Count - Breckland Local Election.pdf	Breckland Green Party
S-9-0012	Marked list - Breckland Local Election.pdf	Breckland Green Party
S-10-0013	Labour report for Commission.doc	Mid Norfolk Labour Party
S-6-0014	Errors on Internet ballot paper.doc	Alex Crawford (Labour Party candidate)

# ORG Observers

Observers marked with a \* attended observations at one or more data centres.

## **England**

Richard Clayton—Bedford  
Steven Murdoch —Bedford  
Chris Wilson—Bedford  
Stephen Bridges —Rushmoor  
Richard Cain—Rushmoor  
Marc Hankins\*—Rushmoor  
Glyn Wintle\*—Rushmoor  
Mat Booth—Sheffield  
Neil Holmes—Sheffield  
Tony Kennick—Sheffield  
Philip Nicholls—Sheffield  
Simon Temple—Sheffield  
Anthony Quinn—Shrewsbury  
Alistair Alexander—South Bucks  
Louise Ferguson—South Bucks  
Chris Adams—Stratford  
Felix Cohen— Stratford  
Martin Taylor—Swindon  
Becky Hogge\*—South Bucks & Swindon  
Jason Kitcat\*—South Bucks & Swindon

## **Scotland**

Calum Morrell—East Dunbartonshire  
Jonathan Hogg—Edinburgh  
David Thomson—Edinburgh  
Norman Gray—Glasgow

# Glossary

AEA	Association of Electoral Administrators
AMS	Additional Member System
COTS	Commercial off the Shelf
DCA	Department for Constitutional Affairs (now Ministry of Justice)
DRO	Deputy Returning Officer
DRS	DRS Data Services Limited, UK-based e-counting supplier for Scottish elections May 2007
EML	Election Markup Language, an XML standard for the communication of data between election systems
ES&S	Election Systems and Software, US-based e-voting and e-counting supplier for English pilots May 2007
FoI	Freedom of Information
MIS	Management Information System
ODPM	Office of the Deputy Prime Minister, the department responsible for previous pilots
ORG	Open Rights Group
OSCE	The Organization for Security and Co-operation in Europe
PDF	Portable Document Format, a common file format for distributing electronic documents
PO	Presiding Officer
RO	Returning Officer
SNP	Scottish Nationalist Party
STV	Single Transferable Vote
UIM	Unique Identifying Mark, barcode identifier for scanned ballots in Scotland

# About the Open Rights Group

The Open Rights Group is a fast-growing NGO focused on raising awareness of issues such as privacy, identity, data protection, access to knowledge and copyright reform. Founded in 2005 by a pledge from 1000 members, ORG is funded by small grants and donations from supporters. We aim to improve both understanding and policy in digital rights matters that affect both businesses and the public. Our activities include organising campaigns, lobbying government, and helping journalists find experts and alternative voices for stories.

The Open Rights Group's goals are to raise awareness of digital rights abuses; to provide a media clearinghouse, connecting journalists with experts and activists; to preserve and extend traditional civil liberties in the digital world; to collaborate with other digital rights and related organisations; and to nurture a community of campaigning volunteers, from grassroots activists to technical and legal experts.

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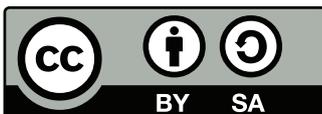
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ORG particularly wishes to thank our volunteer election observers for the hard work and long hours they have contributed in observing elections and writing their reports. ORG are also grateful to mySociety for its help in using an unfinished feature in PledgeBank.com to recruit volunteer observers.

ORG is also grateful to all its supporters and volunteers who make its work possible.



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