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# Electronic Vote Counting Systems

## 1 Introduction

This briefing paper looks at electronic vote counting or e-counting for elections. The paper examines what e-counting is and where it has been used previously. The paper also examines the various issues that arise with the use of electronic counting as well as recommendations the Electoral Commission has made for the future use of e-counting. Finally the paper looks at some of the key issues in the Scottish Local Government elections on the 3<sup>rd</sup> May.

## 2 What is e-Counting?

Under electronic counting, ballot papers are scanned through machines and the votes collated by a computer system, as opposed to a manual vote. Ballot papers that cannot be read by the scanner are referred to electoral staff for adjudication.

## 3 Where has e-Counting been used?

### **England**

The electronic counting of votes has been used on numerous occasions in electoral pilot schemes. It has been piloted at local government elections in England in 2000,

2002, 2003, 2004, 2006 and 2007. Local government elections in England use the first past the post electoral system.

E-counting has also been used during the 2000 and 2004 elections to the London Assembly and the London mayoral elections respectively. Electronic vote counting will be used in the upcoming 2012 Greater London Authority (GLA) election which comprises the London Mayoral election and London Assembly elections. This election is also being held on the 3<sup>rd</sup> May.

### **Scotland**

Electronic vote counting was used for the combined Scottish Parliamentary and Local Government elections in 2007. In 2007 Scotland moved from a First Past the Post system to the Single Transferable Vote System (STV) for its Local Government elections. The change in voting system prompted the move to electronic vote counting:

Due to the added complexity of counting STV compared to the First-Past-the-Post system, the Scottish Executive concluded that the traditional manual counting of the ballot papers would not be effective for the 2007 elections and that electronic counting technology would be required.<sup>1</sup>

Electronic Vote Counting will be used in this year's Scottish Local Government elections on the 3<sup>rd</sup> May.

### **International**

Electronic voting and counting technologies have increasingly been used around the world. India, the world's largest democracy, now uses electronic voting machines exclusively for national and provincial elections. Brazil, Belgium and the Philippines also use electronic voting or counting technologies for all of their national elections. Countries such as Estonia, Indonesia, Kazakhstan, Nepal, Norway, Pakistan, Russia and the United States are at various stages of piloting or partially using electronic voting and counting technologies, including the use of Internet voting.<sup>2</sup>

## **4 Issues arising from the use of electronic vote counting**

### **Project Management**

During the Scottish Local Government Elections in 2007 there were a range of problems with the electronic vote counting system. Many of these stemmed from the

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<sup>1</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P.92 Available at: [http://www.electoralcommission.org.uk/\\_data/assets/electoral\\_commission\\_pdf\\_file/0011/13223/Scottish-Election-Report-A-Final-For-Web.pdf](http://www.electoralcommission.org.uk/_data/assets/electoral_commission_pdf_file/0011/13223/Scottish-Election-Report-A-Final-For-Web.pdf) Accessed: 24/04/2012

<sup>2</sup> International Foundation for Electoral Systems (2011), *Electronic Voting & Counting Technologies: A Guide to Conducting Feasibility Studies* Available at: <http://www.ifes.org/Content/Publications/Books/2011/Electronic-Voting-and-Counting-Technologies-A-Guide-to-Conducting-Feasibility-Studies.aspx> Accessed: 24/04/2012

fact that necessary political decisions about the electronic voting system were made late meaning the necessary preparation for the elections was delayed:

This problem influenced many of the subsequent components of the electoral process including the electronic count, where insufficient time was available to conduct testing on the various ballot paper designs and assemble an adequate contingency plan to deal fully with unforeseen matters.<sup>3</sup>

Ineffective project management was also an issue identified by the Electoral Commission in the Local Government Election pilots in England in 2007:

The level of project management undertaken by the suppliers varied from adequate, given the timescales, to ineffective. The greatest areas of weakness in both local authority and supplier project management related to the degree of contingency planning and quality management undertaken.<sup>4</sup>

The Electoral Commission believed lessons had been learned from previous failures in project management in the 2008 London elections resulting in these elections functioning better than either the 2007 England Local Government pilot or the 2007 Scottish election:

The implementation of electronic counting at the GLA elections was better planned and executed than many previous experiences across England, Scotland and Wales... This experience was reflected in improved planning, management and testing, including significant investment in pre-election auditing.<sup>5</sup>

## Cost

It has been acknowledged by London Elects, the independent elections arm of the GLA that the cost of an electronic vote counting system for this year's GLA elections will be more than for a manual voting system. However, if the system is used again in 2016 the use of the system overall will cost less than a manual count:

London Elects admits that the cost will be "marginally" more expensive than a manual count, at £3.9m compared with £3.6m. However, it says the contract will include an option to repeat the service in 2016 at an "estimated" cost of £3.2m, which would make [the elections] £100,000 cheaper than manual counts.<sup>6</sup>

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<sup>3</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P. 103

<sup>4</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes*

<sup>5</sup> The Electoral Commission (2008), *The Greater London Authority Elections: Report on the administration of the 1 May 2008 elections* Available at: [http://www.electoralcommission.org.uk/data/assets/pdf\\_file/0005/57857/GLA-Elections-Report-2008-revised.pdf](http://www.electoralcommission.org.uk/data/assets/pdf_file/0005/57857/GLA-Elections-Report-2008-revised.pdf) Accessed: 24/04/2012

<sup>6</sup> Dan Jellinek (2012) "London Authority Defends electronic Vote Counting", *E-Government Bulletin Live*

The higher cost has led to criticism of London Elects for opting for electronic counting in the current economic climate from Open Rights Group, a group that campaigns on digital privacy issues:

In these difficult economic times I think London Elects have been foolhardy to ignore the Electoral Commission's advice and international trends by spending more than necessary.<sup>7</sup>

When tendering for the contract to perform the electronic count in the London 2012 elections the Electoral Commission highlighted how difficult it would be for the Greater London Returning Officer (GLRO) to obtain value for money in an e-counting procedure due to the lack of competition in the market:

There are probably only two companies who could realistically tender for the 2012 e-counting contract. Such a small market may make it more difficult for the GLRO to undertake a competitive tender procedure that secures value for money. This is further exacerbated by there being Scottish local elections on the same day.<sup>8</sup>

### **Technical difficulties**

As with any computer system technical issues are a possibility. During the counting of the votes at the 2007 Scottish Local Government elections there were multiple technical problems with the electronic counting system:

A database malfunction within the DRS electronic counting system occurred at some count centres, and the impact varied from centre to centre. In the most extreme cases, occurring at five count centres, all counting activities had been completed but it was not possible to produce the validated results and therefore the completion of the count had to be suspended until later on Friday. At four additional sites the problem led to a delay in an announcement of results at a number of constituencies, but did not cause such a significant delay to the overall count because scanning and adjudication could still take place for other constituencies.<sup>9</sup>

Another technical issue that arose during the 2007 Scottish Local Government elections was that damaged ballot papers were unable to be read properly by the system:

A small number of ballot papers were scanned but the system did not allow the operators to adjudicate the ballot papers. This was caused by

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<sup>7</sup> Dan Jellinek (2012) "London Authority Defends electronic Vote Counting", E-Government Bulletin Live

<sup>8</sup> Electoral Commission (2009), *Electoral Commission's response to the London Elects document Manual Count-vs-electronic count: A cost benefit exercise* p. 5

<sup>9</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P.101

ballot papers that were damaged in such a way that the system could not determine the 'grid' of voting boxes...The only way of processing these papers was by manually entering them.<sup>10</sup>

Another issue faced in the Scottish elections were postal ballots whose design led to incompatibility with the scanners resulting in delays:

Because of the late design of the 24 candidate contingency ballot paper for the parliamentary elections, a number of folds were located across the candidate box, causing an increase in the number of adjudications.<sup>11</sup>

In the 2007 Local Government elections in England there were technical issues in relation to scanners and also issues with the software systems used to process images:

In all pilots a higher than expected number of ballots were sent for adjudication. While this was appropriate from an integrity point of view (the technology did not count a vote unless there was a high degree of certainty associated with it), the net result was that operators had to adjudicate a large number of ballots that most observers felt were clearly marked and should have been dealt with by technology.<sup>12</sup>

These instances all highlight the operational risk that is associated with electronic vote counting, as it is with any information technology solution. In light of the issues with ballot paper sizes in previous elections, limitations were placed on the size of ballot papers for the 2008 London Elections:

The design of the ballot papers for these elections appears to have improved as a result of testing and research, and electors benefitted from clearer and more accessible design.<sup>13</sup>

## Security

Concerns have been expressed in relation to the security of the upcoming London Assembly and Mayoral Elections electronic voting system as the source code for the software is not being openly published. By making it publicly available London Elects argues:

We believe this would make the system less secure and more vulnerable to potential malpractice.<sup>14</sup>

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<sup>10</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P. 103

<sup>11</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P. 105

<sup>12</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes* p. 3

<sup>13</sup> The Electoral Commission (2008), *The Greater London Authority Elections: Report on the administration of the 1 May 2008 elections* p. 3

<sup>14</sup> Dan Jellinek (2012) "London Authority Defends electronic Vote Counting", E-Government Bulletin Live

In reply to this statement Jason Kitcat, an advisor to the Open Rights Group which campaigns on digital privacy issues, argued:

To suggest that publishing the source code would make the system less secure shows a fundamental misunderstanding of security principles...It is best practice in computer security for the source to be available.<sup>15</sup>

Security issues arose during the pilot in the 2007 Local Government elections in England:

The degree to which the systems were locked to prevent electronic tampering was unclear as no security testing was performed on the final configuration. Security procedures appeared to be less rigorously followed when operational problems occurred and the password procedures used were not always sufficiently stringent.<sup>16</sup>

Another security issue that arose during the 2007 pilot in England was whether the data gathered during the election was sufficiently deleted from systems after the election:

In some cases it is possible that the data was not deleted sufficiently securely-that is, there is a possibility that the data could be recovered using sufficient technology and skills such as would be available in a data recovery laboratory.<sup>17</sup>

## Time

Electronic vote counting normally takes less time to perform than a manual count. London Elects stated that in the case of the London Assembly and Mayoral elections this year:

A traditional manual count would take four days, but an electronic vote can produce a result within 12 hours.<sup>18</sup>

However, it is not certain that electronic vote counting is always quicker. For example in the 2007 Local Government pilot in England three of the six participating local authorities, Stratford, Warwick and Breckland had to resort to a manual count when their e-counting system failed, resulting in the count taking significantly longer. Only one of the participating local authorities had an electronic count take less time than their previous manual count.<sup>19</sup>

The Electoral Commission commented on the decision to use electronic vote counting in the 2012 London elections:

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<sup>15</sup> As above.

<sup>16</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes* p.4

<sup>17</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes* p. 5

<sup>18</sup> Dan Jellinek (2012) "London Authority Defends electronic Vote Counting", E-Government Bulletin Live

<sup>19</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes* p. 3

It is claimed that e-counting is more expensive yet quicker than a manual count. Clearly, however, either method of counting could be made quicker if more resources are available.<sup>20</sup>

### **Accuracy**

When a ballot paper that is scanned through a machine to calculate the votes those which are unclear may be referred to electoral staff for adjudication. Elections to the Greater London Authority has used only e-counting since its inception in 1999, with no recounts so far required.<sup>21</sup>

### **Transparency**

The transparency of the electoral vote counting system has been an issue in previous elections. Following the 2008 London elections the Electoral Commission was unhappy that it had not been given access to the reports on independent testing by the GLRO:

We are extremely concerned that neither the Commission nor our technical advisers have been given access to the full reports of the independent testing commission by the GLRO. One of the principle purposes of undertaking testing and quality assurance is to provide broad public assurance about the effectiveness and integrity of complex technical systems.<sup>22</sup>

Following the various problematic issues that arose during the Scottish election in 2007 election there was an overall loss of confidence in the electronic counting system:

Although this was an innovative process, it was clear that the political parties, the media and the public felt that the process was not transparent enough. Although material had been produced explaining how the count operated and briefings were offered to candidates on the subject, it is clear that many political party agents, candidates and other observers did not fully understand the counting process.<sup>23</sup>

There is evidence to show that stakeholders' perceptions improve with subsequent elections as they get used to the technology.<sup>24</sup>

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<sup>20</sup> Electoral Commission (2009), *Electoral Commission's response to the London Elects document Manual Count-vs-electronic count: A cost benefit exercise* P. 4

<sup>21</sup> As above.

<sup>22</sup> The Electoral Commission (2008), *The Greater London Authority Elections: Report on the administration of the 1 May 2008 elections* Available at: [http://www.electoralcommission.org.uk/\\_\\_data/assets/pdf\\_file/0005/57857/GLA-Elections-Report-2008-revised.pdf](http://www.electoralcommission.org.uk/__data/assets/pdf_file/0005/57857/GLA-Elections-Report-2008-revised.pdf) Accessed: 24/04/2012

<sup>23</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P. 106

<sup>24</sup> The Electoral Commission (2007), *Scottish Elections 2007: the independent review of the Scottish parliamentary and local government elections 2007* P. 106

## 5 Electoral Commission recommendations for future use of electronic Vote Counting

Following the Electoral Commission's most recent pilot of Electronic Vote Counting in England in 2007 several recommendations were made about the future use of electronic vote counting that would be necessary to support the routine roll out of the technology in future elections. Until these criteria were fulfilled the Electoral Commission questioned whether any further pilot should be undertaken.<sup>25</sup> The criteria are<sup>26</sup>:

1. Substantial testing of e-counting systems must be undertaken, either through an accreditation and certification process or through a detailed and thorough procurement process.
2. Sufficient time must be allowed for the development of e-counting projects. The Commission recommends a period of six months.
3. Measures must be in place to ensure that best practice is adopted. This could be completed through the publication of best practice documentation or by ensuring the involvement of election officials that have the sufficient expertise and experience.

These recommendations were developed further following the joint Scottish Parliamentary and Local Government election in 2007. The Electoral Commission stated that e-counting should not be made available to any further UK elections until<sup>27</sup>:

1. The government conducts a cost benefit analysis for the use of electronic vote counting and consults widely upon the findings.
2. The Government consults on and finalises an implementation strategy for electronic counting, setting clear milestones for establishing procedures for testing, security, and stakeholder assurance.
3. The Government produces an analysis of the modifications required to electoral law to allow for electronic counting to be undertaken with all the transparency and safeguards currently in place for manual counting, including those for adjudicating and rejecting ballot papers and consults widely on the necessary amendments to legislation; the Commission can no longer support the 'patchwork' approach to e-counting legislative development.

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<sup>25</sup> The Electoral Commission (2007), *Electronic Counting: May 2007 Electoral Pilot Schemes* p. 7

<sup>26</sup> As above.

<sup>27</sup> The Electoral Commission (2007), *Taking forward the Electoral Commission's independent review of the 2007 Scottish Parliamentary and local government elections* Available at:  
[http://www.electoralcommission.org.uk/\\_data/assets/pdf\\_file/0007/56095/Final-EC-Response-To-Gould-Report-20071127.pdf](http://www.electoralcommission.org.uk/_data/assets/pdf_file/0007/56095/Final-EC-Response-To-Gould-Report-20071127.pdf)

4. The Commission is able to produce comprehensive best practice guidance on the management of electronic counting processes, including risk assessment, contingency planning, preparation of manual backups and a design for elector and stakeholder consultation.
5. The Government makes the necessary amendments to section 6A-6F of the Political Parties, Elections and Referendums Act 2000, to guarantee full access to all relevant parts of any e-counting system or process.

The Electoral Commission again added further recommendations subsequent to the 2008 London elections specifically on the aspect of the transparency of the elections:<sup>28</sup>

1. The electronic counting system must allow returning Officers or their staff to record the reasons for any verification discrepancies, or to correct the original ballot account figures.
2. Returning officers should be required to provide a verification statement for every ballot box to any candidates, agents or observers present before those ballots are counted.
3. We also recommend that candidates and agents should take the opportunity to review verification statements where provided.

## 6 Differences between voting system in the Scottish Local Elections and the Northern Ireland Assembly Elections

The voting system in the Scottish Local Government Elections is the same system that is used in the Northern Ireland Assembly Elections, the Single Transferable Vote (STV). In Scotland members of the public will vote for three or four councillors to represent their ward in the local council elections. The website *About my Vote* details the process of the Scottish Local Government Election<sup>29</sup>:

### **How to vote in an STV election**

The ballot paper lists the name of each candidate along with their party name, party logo and their address.

Rank the candidates in order of preference. Put a 1 next to your first choice candidate, a 2 next to your second choice, a 3 next to your third choice, and so on. You can rank as few or as many candidates as you like.

### **Who is elected in STV Election?**

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<sup>28</sup> The Electoral Commission (2008), *The Greater London Authority Elections: Report on the administration of the 1 May 2008 elections* p. 10

<sup>29</sup> About my Vote, "Local Government Elections in Scotland" Available at: [http://www.aboutmyvote.co.uk/how\\_do\\_i\\_vote/voting\\_systems/local\\_government\\_elections\\_i2.aspx](http://www.aboutmyvote.co.uk/how_do_i_vote/voting_systems/local_government_elections_i2.aspx) Accessed: 24/04/2012

To be elected a candidate must reach a set amount of votes known as the quota.

The votes are counted in stages. In the first stage only first preferences are counted. Anyone who reaches the quota is elected. Any votes received over the quota are not needed by the elected candidate and so are transferred to the second preference. If not enough candidates have then reached the quota, the candidate with the lowest number of votes is eliminated and all of their votes are passed to the next preference on the ballot papers.

This process is repeated until three or four candidates have been elected.

## 7 Key issues arising in the upcoming Scottish local government elections

Highlighted in this section are a few of the important issues arising from the Scottish Local Government elections. As these are local elections many of the issues are localised but some issues spread across multiple councils.

### **The Green Vote**

Green issues are high on the agenda for Scottish local council candidates in this year's election:

Looking after the environment is a big feature on many of the parties' manifestos for the 2012 elections, from how they can drastically cut carbon emissions to making sure the streets are clear of dog mess. Local authorities are under pressure to raise recycling levels, improve energy efficiency in their buildings, clean up the air their residents breathe and protect valuable areas of green space.<sup>30</sup>

### **Road repairs**

Political parties have also promised in the election to repair roads, in particular to tackle "potholes":

An AA survey in October last year found that Scottish roads had on average one third more potholes than were found in England; figures also revealed last year showed that the backlog in repairs is rising by £200m in repair work to £2.6bn, as of June 2011. Repairs aren't the only way the potholes cost local authorities – they can seriously harm motorists, and in the five years leading up to 2011, local authorities across Scotland spent £1.7m on compensation claims for incidents involving potholes.

As a result, party groups in Scotland's cities are making road repairs a key element of their transport policies. The SNP in Edinburgh is promising an

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<sup>30</sup> Neil Evans (2012), "Going for the green vote" *Holyrood* Available at: <http://www.holyrood.com/articles/2012/04/23/going-for-the-green-vote/> Accessed: 24/04/2012

extra £20m injection into the road repairs budget, while in Glasgow it is pledging to crack down on faulty repair jobs. Glasgow Labour has also promised an increased repair budget targeted at potholes, while in Dundee the party has promised an audit of the city's roads.<sup>31</sup>

## **Carers**

Supporting the work of carers is also a topic that features prominently on the manifestos of parties running in the elections:

Supporting carers to manage their caring responsibilities with confidence and in good health features prominently in many of the party manifestos... In its manifesto for the city of Glasgow, Scottish Labour pledges to appoint a carers' champion to ensure the voices of the 60,000 carers in Glasgow are heard. Support for kinship carers – grandparents and relatives who look after a child because the parents are unable to – will see payments rise by 25 per cent, it says, while the party also proposes the introduction of a new carers' discount card for council-run and private services. Meanwhile, an SNP-led council in the same city would take steps to repay the debt owed to carers by establishing a Carers' Council, and will also introduce a Disabilities and Carers' Champion to ensure decisions reflect the needs of these groups. In addition, the party said it would introduce a "Caring for Carers" kitemark for employers in the city to recognise those employers offering the best support and flexibility for carers, and it would also work with schools to ensure that child carers are given the support and understanding they need to successfully combine caring and learning.<sup>32</sup>

## **Policing reform**

The upcoming elections have seen a rise in interest about reforms of policing in Scotland. This has arisen from the merging of the regions eight police units into one national force:

While the political debate is focusing on police reform, much of the electorate will be looking at the bread-and-butter issues of local safety – like provisions for street lighting, community wardens, youth services and attempts to control antisocial behaviour. Across all party manifestos, there is a clear acknowledgement that justice services will need to be provided with fewer resources over the next four years... Law and order is always a major battleground at election time, but with the make-up of Scotland's local

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<sup>31</sup> "Going to pot" (2012) *Holyrood*. Available at: <http://www.holyrood.com/articles/2012/04/23/going-to-pot/> Accessed: 24/04/2012

<sup>32</sup> Katie Mackintosh (2012), "Great Expectations" *Holyrood*. Available at: <http://www.holyrood.com/articles/2012/04/23/great-expectations/> Accessed: 24/04/2012

authority areas so diverse, it is the issue of police reform and the impact it will have on bobbies on the beat that will be the key player across the country.<sup>33</sup>

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<sup>33</sup> Ross Reid (2012), "Debating Justice" *Holyrood*. Available at: <http://www.holyrood.com/articles/2012/04/23/debating-justice/>  
Accessed: 24/04/2012