

## Electronic counting

### May 2007 electoral pilot schemes

At the May 2007 local government elections in England, six local authorities held pilot schemes trialling electronic counting. This paper summarises the main findings of the Electoral Commission's evaluation of these pilot schemes.

#### Background

Under the Representation of the People Act 2000, local authorities in England and Wales can submit proposals to the Secretary of State for Justice (prior to 9 May 2007, the Secretary of State for Constitutional Affairs) to carry out electoral pilot schemes. Local authorities in Scotland can apply to the Scottish Executive to carry out pilot schemes. Electoral pilot schemes can involve changes to when, where and how voting at local government elections is to take place, how the votes cast at the elections are to be counted, or candidates sending election communications free of postage charges.

The Electoral Commission is required by law to evaluate every electoral pilot scheme in England and Wales, and may also be asked to evaluate pilot schemes in Scotland. We must consider whether the pilot scheme:

- helped to make voting or counting the votes easier
- helped to improve turnout
- helped to facilitate voting
- led to a reduction or increase in electoral fraud

- led to a reduction or increase in the cost of the elections

The Commission is required to publish evaluation reports on individual pilot schemes within three months of the elections taking place.

#### Electronic counting

The electronic counting of votes (e-counting) has been relatively widely implemented through electoral pilot schemes as well as at other elections. It has been piloted at English local government elections in 2000, 2002, 2003, 2004 and 2006 and was also used under specific legislation at the 2000 and 2004 elections to the London Assembly and for the Mayor of London. Electronic counting was also used at the combined Scottish Parliamentary and local government elections in 2007, which will be the subject of a separate Commission report.

The Commission has previously indicated its support for the use of e-counting where it can improve the accuracy and efficiency of the counting process. However, it has also recommended that further measures are required to

support the routine roll-out of the technology. In particular, we have highlighted the need:

- to ensure that best practice is documented and circulated to ensure that future pilots and implementations of e-counting build on the lessons that have already been learned
- for a centrally managed accreditation and certification process to provide independent assurance of e-counting solutions and to enable local authorities to make an informed choice regarding the use of appropriate technology
- to obtain better value for money by reducing the costs associated with e-counting
- to maximise efficiency to ensure that the potential benefits of reduced effort and timescales associated with e-counting are realised
- to increase the transparency of the solutions adopted to ensure continued stakeholder acceptance of the technology

Announcing approval for a number of pilot schemes in January 2007, the Secretary of State for Constitutional Affairs noted that e-counting pilot schemes 'will build on past work and test how this can be refined to ensure confidence and support future use of technology to gain efficiencies in the administration of elections'.

### [Pilot schemes at the May 2007 elections](#)

In total, seven applications were received in November 2006 to pilot e-counting. The Commission wrote to the

Secretary of State on 1 December 2006 and stated that it was unable to support any of the applications, as they did not provide sufficient evidence that the pilots would add significantly to the current level of knowledge regarding e-counting. Following negotiations between the Department for Constitutional Affairs<sup>1</sup> and the local authorities, the applications were revised, principally to explore the learning around the use of commercially available hardware scanners to reduce the costs associated with e-counting. We were satisfied that these revisions provided sufficient improvement to the learning potential of the schemes that went ahead.

A total of five pilots of e-counting were approved by the Secretary of State:

- Bedford Borough Council conducted a combined count of a Mayoral election, Borough Council elections and a number of parish council elections. The ballot paper for the Mayoral election featured a single column, with voters numbering their first and second preferences '1' and '2', rather than two columns marked with crosses as the existing law provides.
- Breckland District Council conducted a combined count of District Council elections and a number of parish council elections.
- Dover District Council conducted a combined count of District Council elections and a number of parish council elections.

- South Bucks District Council conducted a combined count of District Council elections and a number of parish council elections. South Bucks also operated an electronic voting (e-voting) pilot.
- Stratford-on-Avon District Council and Warwick District Council undertook a joint pilot. Each was counting District Council elections and a number of parish council elections. Two count centres were used.

A total of four suppliers provided the e-counting solution for the pilots: Indra supplied the technology for Bedford and Breckland, Opt2Vote for Dover, Election Systems and Software (ES&S) for South Bucks, and Software AG for Stratford and Warwick. All the pilots involved the use of commercially available scanners and hardware, with bespoke software solutions.

### [Findings](#)

The overall outcome of the pilots in 2007 varied. A major factor influencing the success, or otherwise, of the pilots was the amount of time available to plan and implement them. By the time suppliers had been chosen, just two to three months remained for implementation, when six months was more realistic. This had a knock-on effect on many of the aspects of the pilots, as described below.

## Management

Given the shortened timescales, the project management undertaken by the local authorities was satisfactory across the pilot schemes. Prior to the elections, some evidence of good practice was observed at most of the local authorities, with documented plans, structured teams and communication and decision mechanisms in place.

However, although the mechanisms for project management were in place, in some cases expectations were over-ambitious and unrealistic. The quality of the project management undertaken by the local authorities was affected by the amount of time available and the relative inexperience of the local authorities undertaking these pilots in e-counting.

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. Quality management aspects are discussed separately from other project management issues under 'Security and confidence' below.

On the whole, however, the overall pilots programme was not well managed, above all because there was insufficient time for planning and implementation (see the Commission's separate summary paper, 'Key issues and conclusions' for more detail on this).

## Impact on counting

Three of the local authorities, Dover, Bedford and South Bucks, successfully operated an e-counting solution to count the ballots. In the other three local authorities, Stratford, Warwick and Breckland, the pilots were not successful and they ultimately resorted to a manual count for some or all of their elections. The failure of the e-counting solution meant that the count took significantly longer than a conventional count without an electronic element.

All counts took longer to undertake than had been envisaged prior to the elections. Only the count at Dover was quicker than a previous manual count. Allowing for the increased complexity and the turnout for the Mayoral election at the Bedford count, it was estimated by Bedford that, despite the problems occurring, the count was also undertaken in a shorter time than it would have been if conducted manually.

Process and technology issues affected the efficiency of the counting process. These issues occurred to some extent at all pilots, although some were affected more than others.

The achieved scanning throughput was significantly lower than the capability specification of the scanners in the majority of the 2007 e-counting pilot schemes. This was principally caused by the fact that the overall solutions used were not very robust in the face of deviations from the expected input conditions and environment. Examples of this related to paper quality and size

issues, the condition of the ballots (e.g. whether they had been folded or damaged, particularly for postal ballots), the use of counterfoils, the print quality of the ballots, the characteristics of the pen or pencil used to mark the ballots and the manner in which voters marked their ballot papers. Some of the technical issues relate to the scanners themselves, while other issues relate to the capability of the software system used to process the 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 the technology.

At most pilots the process of adjudication was split into two stages, with the first stage conducted by council operators and the second stage by the Returning Officers and their deputies. First stage adjudications were the relatively simple judgements to allow clearly acceptable ballot papers into the count. Any further doubt over a ballot paper would go to a second stage for adjudication by the Returning Officer. At one pilot, Stratford and Warwick, all adjudications were dealt with by both Returning Officers and their deputies, resulting in further inefficiencies through lack of delegation of lower level decisions.

Some suppliers did not have significant knowledge of UK electoral law and practice, leading to lack of clarity in communications between suppliers and local authorities and a mismatch of what was expected from and by each. This led to more complex manual processes being adopted to make up for deficiencies in the system.

Although the testing undertaken generally on the e-counting solutions was insufficient, where it was performed it often focused on the accuracy of the technology to count previously prepared ballots so that the result could be compared with the known totals. This testing indicated that the systems used were accurate. The systems were configured to be cautious, referring ballot papers for adjudication unless there was a high degree of certainty as to the voter's intention. Because of the lack of sophistication of the technology used, this resulted in a large number of adjudications.

Verification checks (i.e. checks matching the number of ballot papers removed from ballot boxes with the number issued) were undertaken at all pilots and sometimes identified deficiencies in the e-counting process or technology. In Breckland, some verification checks did not tally, resulting in a number of votes not being counted for a few of the wards.

Some local authorities made significant use of council resources to conduct the count. For example, Council staff at both Breckland and Dover were responsible for registration, scanning, verification and

adjudication. Other local authorities made greater use of supplier staff: for example, Bedford, South Bucks, Stratford and Warwick all used supplier staff for scanning; South Bucks also used supplier staff for registration.

Some councils trained staff members only on their envisaged role (scanning, or verification, or adjudication, etc.) and did not cross-train them for multiple roles. This led to some inefficiency at the count when staff members were redeployed in roles for which they had not been trained. However, there was no significant impact on the count that can be directly attributed to the use of resources.

### Security and confidence

The level of testing and quality assurance undertaken across the pilots varied. Many local authorities assumed that the Ministry of Justice's (MoJ's) selection process for identifying suitable suppliers of e-counting solutions had entailed a higher level of testing and investigation than it had.

Dover had a comprehensive testing and training programme. This was conducted over several sessions over four weeks and included a test of 14,000 ballots drawn up by supplier and Council staff and user acceptance testing driven by the Council. A further stress test with 53,000 ballots was undertaken, and independent security testing and analysis was undertaken by the supplier.

Stratford and Warwick undertook limited testing, and user acceptance testing did not take place until 2 and 3 May (polling day itself) respectively.

Quality assurance was undertaken through a security audit by the MoJ's contractors. In summary, this was too little too late. The scope of the quality assurance did not cover a number of areas, such as accuracy or compliance with required functionality, and many of the suppliers did not have the required documentation for the audit. The audit was conducted too close to the count itself and there was not enough time to make any significant changes following the audit.

In summary, the overall level of testing and quality assurance was insufficient and it is therefore not possible to state definitively whether the solutions were adequately secure. In general, security countermeasures were in place and no high security risks have been identified. For example, standalone networks were used without connectivity to external networks or the internet, access by operators was controlled and authenticated, physical security measures were in place around the count and 'clean builds' of computers were used to ensure that viruses or other malicious software were not present.

However, some security issues did arise: 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.

Suppliers were required to delete the data from all systems used in the count. However, this process was not always witnessed by the local authorities and in many cases it was not clear how effectively it was performed. 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.

### [Feedback](#)

The problems and delays that occurred with e-counting across the pilots had a negative effect on stakeholder perception. Candidates and agents remain unconvinced concerning the benefits, although there was a greater acceptance of the technology for those pilots that did not have significant problems. Major concerns include the loss of transparency, increased costs, extended timescales associated with the problems that occurred and a reduced ‘sense of excitement’ associated with the count.

Public perception of e-counting is mixed. A total of 37% of the respondents to a public opinion survey carried out by ICM Research on behalf of the Commission thought that it would be more accurate than manual counting, 33% thought it would be less accurate, 24% thought it would make no difference and 6% expressed no opinion. ICM Research has pointed out that this poll was conducted after the high-profile coverage of e-counting at the combined Scottish Parliamentary and local government elections

and so may have been influenced by the press coverage.

### [Cost and value for money](#)

The additional costs associated with e-counting varied from about £1.50 to £2.00 per elector. A range of hardware scanners were used by the pilots. Most of these were high-specification commercial office scanners from major vendors such as Kodak and Canon. South Bucks used a more specialised product. The recommended retail price varied from about £6,000 to £28,000 per scanner, although the actual costs were often difficult to determine from the pricing model used by the suppliers.

### [Learning and issues](#)

#### [Best practice dissemination](#)

The Commission has highlighted on a number of occasions the need for development and dissemination of best practice in the use of e-counting technology. It is clear that this is now a critical issue. Key failings that occurred during the 2007 pilots could have been avoided if knowledge that has been developed in the past had been taken into account. This includes issues such as the potential high number of adjudications, the adjudication process, paper quality issues, workflow issues and the need for contingency planning and resource reallocation.

The pilots have highlighted a number of additional points of best practice that should be incorporated into this documentation, such as issues related to the use of commercial office scanners and print quality issues.

This best practice should include a checklist for Returning Officers and their staff to facilitate their conduct of the e-count and to ensure that key elements related to the integrity and efficiency of the count do not get overlooked due to unfamiliarity or because of unforeseen circumstances.

### [Accreditation and certification](#)

Previous evaluations by the Commission have concluded that e-counting can be used to increase the efficiency and accuracy of the counting process. Despite the failures this year, this conclusion remains valid. However, the experiences of 2007 have once again highlighted the fact that the implementation needs to be carried out in an appropriate fashion, with fully tested solutions and sufficient time to implement them. We have previously recommended that an accreditation and certification scheme is required to provide independent quality assurance of e-counting solutions before they are made available for general use at local government elections, and in 2006 we stated that this was critical.

It is now essential that an accreditation and certification scheme is put in place before any further piloting of e-counting is undertaken. Indeed, it is the Commission’s view that such an accreditation and certification scheme would in any case be highly desirable to support the use of e-counting outside the piloting framework.

It will be important to ensure that any accreditation and certification scheme has appropriate characteristics.

It should incorporate a set of requirements for e-counting systems to be used at all elections in the UK, including usability, availability, security and transparency requirements. The current statement of requirement for suppliers on the MoJ's framework can be used as a starting point for these requirements; however, these should be augmented with a number of requirements that have arisen out of these pilots. It is important that the accreditation and certification process is open to all eligible suppliers and that it does not unduly constrain the market.

The certification process should involve an evaluation of technology, and further investigation is required to identify the optimum approach and level of detail to be undertaken in this area. Extensive testing is required, including the conduct of a mock-election count, security penetration testing of the standard configuration, and volume and stress testing, including issues related to excessive numbers of spoilt ballots, damaged paper and varying print quality.

Certification should include the identification of a clearly defined configuration of the system being tested, together with the envisaged processes with which it will be used. Quality assurance activities associated with individual elections should be based on this certification configuration and any departures from this should be strictly controlled and assessed.

In order to gain stakeholder buy-in, it will be important for any accreditation and certification scheme to be suitably transparent. This will include the publication of the e-counting requirements and of the certification process that will be undertaken as well as some form of report for each certified product outlining the results of the certification process.

### [Cost and value for money](#)

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The costs in 2007 were greater than those incurred in 2006, despite the use of commodity hardware. The two main factors associated with this are that the nature of the procurement using the MoJ's framework of suitable suppliers meant that any possible savings from using commodity hardware were not realised and that there were substantial development and professional services costs associated with the technical solutions. These development costs arose due to the current immaturity of the marketplace and outweighed any potential savings from reduced scanner costs at this time.

One of the principal aims of these pilots was to investigate whether commercial office scanners could be used in an e-counting solution. While this learning has been hampered by the management of the piloting process, as noted elsewhere, there is some indication that it is possible to use these scanners in an effective solution.

It was notable that the overall count efficiency was influenced more by print quality, software design and process issues than

by scanner performance and that therefore it is possible that standard office scanners that are suitable for other electoral tasks such as annual canvass form scanning, or scanners that can be hired cost effectively, could be used in future. It was also notable that the overall scanning efficiency was influenced more by scanner robustness and reliability issues and ballot paper quality rather than by the raw scanner speed.

### [Efficiency](#)

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The 2007 pilots did not contribute greatly to learning how the efficiency of e-counting solutions can be maximised, although they have highlighted instances of poor practice.

The Bedford pilot has demonstrated that it is possible to count marked numerals rather than simply crosses on the ballot papers, although further research is required to determine whether the use of numerals can reduce the number of spoilt ballots at Mayoral elections.

### [Transparency](#)

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The pilots have highlighted a number of issues concerning the transparency of the e-counting solutions deployed, some of which have been highlighted in previous Commission reports.

More effort needs to be spent in communicating the process and progress to candidates, agents and other observers. Display technologies need more development: none of the progress screens was satisfactory and they appeared

to be considered desirable rather than a necessary or mandatory feature by the suppliers.

More effective reporting and accounting is required and best practice should be produced to define what is allowed and expected in this area.

There is significant scope for innovations in increasing the transparency of e-counting solutions. For example, large screens could be used to show briefly all ballot papers to candidates and agents, as undertaken in the Swindon local government by-election in 2004 to replicate a manual count, or a manual or other system could be used to count a subset of the ballot papers to act as a cross-check. Consideration could be given to publishing an audit report showing the actions and decisions taken during the count, including any verification discrepancies and the reasons for them. Peer-review and other checks could be implemented to ensure that the source data that is entered into the e-counting system, such as Presiding Officer accounts, is double-checked to ensure it is correct.

## Recommendations

A good deal of experience has already been gained from previous e-counting experiments, from the 2002 and 2004 elections to the London Assembly and for the Mayor of London and from the 2007 combined Scottish Parliamentary and local government elections (the report on which will contain further lessons). The lessons learned in the May 2007 pilots do not differ greatly from previous rounds.

The circumstances and practices that lead to successful e-counting are therefore clear, although many of these were not applied this year. Any further e-counting projects – both pilots and others – need to take full account of these:

- Substantial testing must be undertaken, either through an accreditation and certification process or through a detailed and thorough procurement process. This procurement process will need to be substantially more detailed than that undertaken for the framework agreement put in place by the MoJ for these pilots.
- Sufficient time must be allowed for the development of e-counting projects. The amount of time needed will depend on a number of factors, including the experience of the local authority and the suppliers, whether there is an accreditation scheme in place and the nature of any procurement. But the Commission recommends a minimum of six months.
- Measures must be in place to ensure that current best practice is adopted. This could be achieved through the development of best practice documentation or by ensuring the involvement of election officials within the local authorities with sufficient expertise and experience.

Unless these conditions can be met, the Commission questions the value of undertaking further small-scale pilots of the kind that were run at the May 2007 elections and would not

recommend their further implementation.

The current review of the combined Scottish Parliamentary and local government elections may indicate further conditions for the implementation of e-counting. The Commission also notes that for elections to the London Assembly and for the Mayor of London, which are next due to take place in 2008, there is already provision in law for an e-count to be carried out without the need for a pilot scheme. It is strongly recommended that the implementation of e-counting at these elections should also provide for substantial testing and the incorporation of best practice along the lines set out in this paper.

Issues related to the transparency of the e-counting process continue to be important. While some of the concerns raised can be addressed through the deployment of best practice, there is nevertheless a need for further measures to increase transparency.

Various observer groups at these elections have questioned the fundamental basis under which electronic processes are used at elections. The Commission recommends that further public debate on this issue should be initiated by the publication of a government strategy on the modernisation of elections. The Commission's separate summary paper, 'Key issues and conclusions', also addresses this issue.

<sup>1</sup> Hereafter referred to as the Ministry of Justice following the machinery of government changes on 9 May 2007.

## Further information

All evaluation reports for individual electoral pilot schemes are available from our website.

In preparing the evaluation of the 2007 electoral pilot schemes, the Commission has drawn on findings from work undertaken by a number of contractors, including technical and accessibility experts. Their reports are available from our website.

Further information on electoral pilot schemes is available from the Ministry of Justice website, [www.justice.gov.uk](http://www.justice.gov.uk).

## Feedback

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