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1 Foreword

1.1 Under the Representation of the People Act (RPA) 2000, any local authority in England can submit proposals to the Secretary of State for Justice\(^1\) to carry out an electoral pilot scheme. Electoral pilot schemes can involve changes to when, where and how voting at local elections is to take place, how the votes cast at the elections are to be counted, or candidates sending election communications free of charge for postage. The Electoral Commission has a statutory duty to evaluate and report on any pilot scheme approved by the Secretary of State.

1.2 A total of 312 local authorities in England held elections on 3 May 2007. In October 2006, the Ministry of Justice and the Electoral Commission issued a joint prospectus to local authorities inviting applications for electoral pilot schemes at the May 2007 elections. 14 applications were received in response to the prospectus from a total of 17 local authorities; one application was subsequently withdrawn. In January 2007 the Secretary of State for Justice announced that he had approved 12 of the pilot schemes in a total of 13 local authority areas. A full list of all the authorities which held pilot schemes in May 2007 is available on the Commission’s website at www.electoralcommission.org.uk.

1.3 This report presents Actica’s technical evaluation findings in support of the Electoral Commission’s evaluation of the electoral pilot scheme in the borough of Shrewsbury and Atcham at the elections on 3 May 2007. It provides details of a technical evaluation of various aspects of the scheme, including: the management approach, the technical solution, the security provided, and the value for money.

1.4 The output of this report will be used by the Commission in support of their overarching scheme evaluation, which includes a description of the scheme and an assessment as to:

a. the scheme’s success or otherwise in facilitating voting or the counting of votes, or in encouraging voting or enabling voters to make informed choices at the elections;

b. whether the turnout of voters was higher than it would have been had the scheme not been applied;

c. whether voters found the procedures provided by the scheme for their assistance easy to use;

d. whether the procedures provided by the scheme led to any increase in impersonation or other electoral offences, or in any other malpractice in connection with elections;

e. whether those procedures led to any increase in expenditure, or to any savings, by the Local Authority.

1.5 In addition to these statutory requirements, the Commission’s evaluation also considers, where appropriate:

a. the extent to which the pilot scheme facilitated or otherwise encouraged participation among particular communities, including young people, ethnic minority groups and people with disabilities;

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\(^1\) Prior to 9 May 2007, the Secretary of State for Constitutional Affairs.
b. overall levels of user awareness and comprehension of the voting method being tested, including an assessment of the effectiveness of any literature or other materials used in the promotion of the pilot scheme;

c. the attitudes and opinions of key stakeholders, including voters, with a view to determining overall levels of confidence in the voting method being tested;

d. whether the pilot scheme resulted in measurable improvements, or had any adverse impact, with respect to the provision of more efficient and effective service delivery to voters;

e. whether the pilot scheme resulted in measurable improvements to, or had any adverse impact on, the existing system of electoral administration;

f. whether the pilot scheme represented good ‘value for money’;

g. make recommendations as to whether changes should be made to electoral arrangements more generally through roll-out of the pilot scheme procedures.

1.6 In preparing this technical evaluation report, Actica has drawn on its own observation and assessment of the pilot scheme, as well as on the views expressed to us by a number of other stakeholders. We would particularly like to thank the Returning Officer, the Borough Council’s Electoral Services department and Opt2Vote for their assistance in undertaking this evaluation and for supplying us with the information and data to support it.
2 Introduction

2.1 Shrewsbury & Atcham Borough Council (the Council) has a strong track record of carrying out pilot schemes at local elections, including:
   a. 2003 – No voting in person at polling stations, with electors either voting by post – postal ballots were counted electronically - by internet, telephone or digital television.
   b. 2006 – Advance voting in person, with ballot papers printed on demand in advance voting stations, together with a postal vote tracking service and ballot paper changes.

2.2 The Council maintains this desire for innovation and decided to pilot further e-voting in the May 2007 elections.

2.3 In order to comply with their statutory requirement to evaluate pilots, the Commission appointed Actica to conduct the technical aspects of the electronic voting evaluations. Actica has evaluated the e-voting pilots to provide an:
   a. assessment of the degree to which the suppliers have met the requirements of the pilot;
   b. assessment of the extent to which the desired technical learning outcomes of the pilot were met and whether any other learning points were developed during the pilot;
   c. analysis of how effective the system was in practice, including accuracy, reliability, robustness, security, functionality and usability aspects;
   d. assessment of the risks to the effectiveness of the system;
   e. analysis of the adequacy of the development lifecycle, covering project management, risk management, requirements, design, implementation, deployment and testing;
   f. analysis of the testing process including accuracy, reliability, robustness, security and performance tests;
   g. analysis of the effectiveness of the Quality Assurance (QA) processes performed, together with analysis of the actions taken by suppliers as a result of the QA process commissioned by the Ministry of Justice (MoJ);
   h. assessment of any other technical issues that may have affected the success of the local election;
   i. assessment of the degree to which the potential benefits of the technology have been realised in practice.

2.4 To complete this required analysis and assessment Actica produced an evaluation framework, and agreed its content with the Commission. The framework provides a description of the overall evaluation process and approach that was used as the basis of the technical evaluation for all e-voting pilots. It describes the information sources that were used during the evaluation, the structure of the content of this report and provides comprehensive guidance on questions that should be answered. The full content of the framework can be found on the Commission website.

2.5 Following the guidelines of the framework, the remaining sections of this report for the technical evaluation of the the Council e-voting pilot are structured as follows:
   a. **Section 3 – Pilot objectives**, which describes the overall objectives of the pilot including the measures by which success is judged;
b. **Section 4 – Pilot description**, which provides a high-level description of the pilot;

c. **Section 5 – Management**, which describes the management of the pilot, including project management, relationship management, risk and contingency management and testing approaches;

d. **Section 6 – Technology**, which describes a user-oriented view of how the technology facilitated the election;

e. **Section 7 – Security**, which describes the key security issues and/or countermeasures;

f. **Section 8 – Cost**, which describes the cost of the election and relates to the benefits and overall value for money;

g. **Section 9 – Conclusions**, which summarises the key points identified in the report.
3 Pilot objectives

3.1 Objectives

3.1.1 The Council intended to build on the evidence available and experience gained from electronic voting pilot schemes undertaken in 2003, including the scheme in Shrewsbury. The Council’s 2007 pilot scheme aimed to enable the assessment of a number of key factors, including accessibility (along with evidence about the popularity and convenience of advanced voting facilities in an authority which includes a major destination town and a large rural area), security, patterns of usage and take-up, new innovations and efficiencies.

3.1.2 The Council aimed to achieve this through:

a. Improved accessibility: the Council and Opt2Vote identified this pilot as an opportunity to liaise with accessibility experts (SCOPE) to design suitable “ballot papers” in terms of text size and contrast settings for those with visual impairment.

b. Increased security: the use of randomly requested personal identifiers which are generated by electors aimed to increase security for electronic voting.

c. Fulfilling voter demands and expectations: provision of internet and telephone e-voting channels to meet the perceived demand/expectation that voting methods should keep pace with current technology.

d. Testing new innovations: assess the benefits and capabilities of scanning technology in:
   1. the capture of personal identifiers as part of the pre-registration process;
   2. the verification of postal voter signatures (outside of the scope of the technical evaluation).

3.2 Success criteria

3.2.1 The Council stated they had three primary success criteria:

a. firstly, that the e-voting solution works and enables electors to cast their votes as intended by the pilot;

b. secondly, that the availability of the e-voting channels results in “lots” of electors using it;

c. thirdly, that all parties involved in the election (the Council election staff, candidates and agents, and electorate) trust the outcome of the pilot.
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4 Pilot description

4.1 Introduction

4.1.1 The Council’s May 2007 pilot offered an increased number of voting channels in an effort to make voting easier and more convenient. It aimed to enable further assessment of the benefits provided by electronic voting to the take up, confidence and efficiency of holding elections. Specifically, it was to include:

a. pre-registration and use of personal identifiers for e-voting;

b. internet and telephone e-voting;

c. e-enabled advance voting;

4.1.2 These innovations are described in detail in the following sub-sections.

4.2 Pre-registration and use of personal identifiers for e-voting

4.2.1 The Council collected personal identifiers generated by the electors themselves to increase security for remote voting. These identifiers included a signature, date of birth, and password and were captured via a separate scanning application and linked to the elector.

4.2.2 Having received the electors’ personal identifiers, the Opt2Vote system randomly and securely generated Voter Identification numbers (VINs), which were then despatched to the electors in the post. On entering the internet or telephone voting systems they were asked to enter their VIN, personal identifier and date of birth.

4.3 Internet and telephone voting

4.3.1 In addition to the advanced voting facilities (as described below) electors were also able to vote via their own internet connections and/or telephones by logging on (using the credentials provided during the pre-registration process) to the Council’s e-voting application. The period these facilities were open was the same as provided for the advanced voting facilities.

4.3.2 If the electors experienced difficulties in casting their votes a call centre was provided; in the case of an elector being locked out from the system they were directed to attend an advanced voting station to resolve the issue.

4.3.3 If the pre-registered electors did not cast their vote during this period they were allow to attend the polling station and use the traditional ballot paper approach.

4.4 E-enabled advance voting

4.4.1 The Council initially intended to offer advance voting between 21 April 2007 and 29 April 2007. MoJ requested this period be extended until the end of 1 May 2007. During the advance voting period electors were able to vote in person using the Council-supplied e-voting machines (through Opt2Vote) with an internet link to the Council’s e-voting application. Advance voting stations were located in a shopping unit in the Pride Hill Centre, Shrewsbury and the Bayston Memorial Hall and Bomere Heath Village Hall.
4.4.2 Electors pre-registered for electronic voting could attend these advanced polling stations and use their pre-supplied credentials to log on to the system. Electors who had not pre-registered were provided with log on credentials, having provided some form of proof of identity, by an administrator with access to the management application; the Opt2Vote project manager fulfilled this role.
5 Management

5.1 Introduction

5.1.1 The pilot was co-run by the Council’s Electoral Services department and their e-voting system technology provider, Opt2Vote.

5.2 Project management

5.2.1 The Council’s May 2007 pilot project has been run following the PRINCE 2 methodology. The Council had a full-time project manager (PM) for the whole election, and Opt2Vote assigned a full-time PM to manage their involvement in the election, including the electronic elements of the pilot. Whilst effectively managed as one project by the Council PM, the Opt2Vote PM had primary control and management responsibility for the delivery of all electronic aspects of the pilot, their role being defined in the Project Initiation Document (PID) to include:

- managing and updating the project plan;
- establishing a clear communications plan;
- establishing clear roles and responsibilities;
- achievement of benefits defined in the PID;
- keeping the project on track and to budget;
- ensuring the e-voting products met the required quality/standard within specified constraints;
- organising training and awareness sessions;
- ensuring risks were identified, recorded, and reviewed.

5.2.2 The Council and Opt2Vote PMs had a good working relationship; the Opt2Vote PM was co-located in the Council offices in Shrewsbury. Given the co-location, communications were effective between the two PMs; monthly board meetings were held (with the frequency increasing to twice monthly nearer polling day) with minutes and updates to the PID being produced.

5.2.3 Whilst communications were effective at the PM level, it is noted that due to the size of the task for the Opt2Vote PM, they were often unable to provide minutes and updates to the PID until immediately before the next board meeting; distribution of these updates was also seen to be inconsistent and slow.

5.2.4 A further observation, also raised by the MoJ QA review, was that on reviewing the PID it was found to be inconsistent in terms of version numbering, dating and consistency with the independently controlled (albeit informally) risk register.

5.2.5 Whilst the Opt2Vote PM achieved the objectives of the role defined in the PID, it could be argued that the delivery of good practice project management has been overlooked in favour of simply getting the solution delivered. Many guidelines on maintaining and having access to adequate project documentation were not followed during the course of the pilot. This can potentially be explained by the effort required for the delivery of the project and the primary reliance on the single on-site Opt2Vote PM resource. However, this should not disguise the fact that such documentation should have been more readily available through the extended
Opt2Vote project team. Whilst the technical solution was delivered on time and functioned as required during the election, such a lack of documentation meant that limited independent assessment of the adequacy of the solution was possible and that the governance of the development and delivery of the solution was restricted.

5.3 Relationship management

5.3.1 Opt2Vote were awarded a place on the MoJ’s e-voting supplier framework. Following this award, and that of a pilot to the Council, Opt2Vote submitted a bid (to the Council) in line with the Council’s pilot application as submitted to the MoJ. Given the subsequent modifications by the MoJ to the pilot awarded, Opt2Vote engaged directly with the Council to understand fully the scope and remit of the e-voting elements of the pilot, rather than being provided with a specific statement of requirements. The resulting bid was well structured, demonstrated a good awareness of the specific requirements and presented a strong team for the project’s delivery.

5.3.2 The Council’s evaluation of the Opt2Vote bid was conducted by the Assistant Chief Executive who has extensive experience in elections and previous pilot schemes run by the Council. The key issue with the Opt2Vote bid involved the high cost, in particular, the costs of hosting and development costs are significantly higher than other suppliers. In the end the cost was reduced to a certain extent by exploiting available savings on shared costs with Sheffield City Council.

5.3.3 The working relationship between the Council and Opt2Vote was seen to be effective and built on a history of past pilots and successful implementation of new innovations.

5.3.4 The primary comments on the relationship between the Council, Opt2Vote and the MoJ during the pilot tended to centre on the timeframes involved in awarding contracts and pilots. These imposed unnecessary constraints on the development period and contributed to the inability of the supplier to maintain good project and quality management practices. It is not unusual for quality and overhead tasks to slip when development timeframes are limited.

5.4 Risk and contingency management

5.4.1 A risk management approach was outlined in the Council’s pilot PID. This defined a typical process whereby the Opt2Vote PM and Project Board identified owners for risks and analysis, contingency planning and regular review processes.

5.4.2 The PID contained a summary of the risks from the risk register and stated that contingency plans existed for all primary risks associated with maintaining the e-voting and advance voting processes and providing e-voting results on polling day. In terms of server contingency plans, these involved the provision of hardware clusters and failover procedures, managed by the third party hosting organisation, Rackspace Managed Hosting Ltd. There was no evidence of backup communications links (for use on polling day to retrieve the e-voting results) as this architecture relied on the Council-supplied network connectivity provided at the Shrewsbury Music Hall count location. However, the presence of multiple Opt2Vote solution² laptops for various tasks on polling day demonstrated sufficient backup for the management aspects of the final stages of the e-voting element of the pilot and dial-up access to the internet could have been used as a backup.

² These laptops were specific to the Opt2Vote solution and were locked down to allow use of the relevant applications only.
5.4.3 No availability issues manifested themselves during the evaluation period other than the VPN connection to the server being lost during the manual entry of paper ballot totals on count night. Despite this, the on-screen functionality continued to function as expected such that complete totals were captured for all areas included in the pilot.

5.4.4 The risk register for the Council pilot was prepared using an MS Excel based tool and was summarised in the PID each time a project board meeting was held and the PID updated. It was found to have identified all the significant risks to the pilot and countermeasures / contingency plans. The version in the PID was, however, found to be lacking in terms of recording demonstrable actions and updates, and the status of each was blank, up to and including the version prior to the last board meeting before polling day. In addition, the MoJ QA review identified several recommendations on the management of the risk register, several of which related to a difference of opinion on the types of risk being managed (procedural risks rather than the assets impacted by them), but also included some more fundamental recommendations regarding the alignment of the employed risk management process with the actual internal procedures of the Council.

5.4.5 At the final board meeting prior to polling day a full review of the risks was conducted. No documentation has been issued following this activity. As a result there is limited evidence, other than the success of the pilot, to suggest that risks were managed in accordance with the defined procedures. In practice when risks were identified and did manifest themselves (e.g. transfer of data between Opt2Vote and the Pickwick election management system) resolutions were developed within the required timescales. Without proper documentation it is difficult to see how all risks were managed with the degree of diligence required of such a time critical service.

5.5 Quality management and testing

5.5.1 The quality assurance process followed by Opt2Vote during the delivery of the pilot was stated (by Opt2Vote) to be in line with standards and procedures based on the TickIT\(^3\) standard and were to be followed throughout the software development life cycle. The pilot PID contains a minimum level of information on the quality plan and more detail on the key quality target dates and quality review activities. As also noted in the MoJ QA review, there has been little or no update to key elements of the PID, including the quality review activities. As a result there is no formal documented evidence of these quality activities having occurred, although in the majority of cases verbal communication has confirmed their completion and timeframes for these tasks have been deemed adequate.

5.5.2 The Opt2Vote bid documentation clearly states they will undertake a comprehensive set of life cycle testing that would be expected of such a system including User Acceptance, End-to-End process, System verification, Helpdesk, Disaster recovery, Penetration and Security. It was expected that a test strategy and plan would be provided by Opt2Vote for the pilot describing the approach, scope and dates for each of these testing phases. Indeed, one of the identified quality review activities was to review and accept the test plan. No specific documentation has been made available in this regard however, Opt2Vote claim that the project plan included details of all test dates. At a minimum this would be acceptable but the project plan has not been made available to the author so this can not be verified to be the case.

\(^3\) TickIT, established with the support of the Department of Trade and Industry and the British Computer Society, provides for the certification of software developers against ISO 9001.
5.5.3 System verification testing was carried out internally by Opt2Vote following each release of the e-voting system. This followed a detailed set of scripts to test each element of the system. This testing was not witnessed by the author. The scripts and most recent outcome were provided by Opt2Vote for review and demonstrated a level of testing and issue resolution consistent with a development of this nature.

5.5.4 Disaster recovery procedures and testing were under the control of the hosting partner, Rackspace. Evidence of the processes, procedures and environment employed by Rackspace were provided by Opt2Vote in the form of independently audited reports from Rackspace.

5.5.5 User acceptance testing (UAT) was conducted by the Council with support from the Opt2Vote PM; it was also largely witnessed by the author. There were scripts available for the internet and telephone voting and the returning officer application. These were all of good quality; the returning officer application scripts were covered within the other two and the internet voting scripts were seen to be both comprehensive and user friendly. They reflected real-world scenarios expected to be faced during the election period and all covered various aspects of negative testing. In addition, they provided good coverage of end-to-end testing of the system.

5.5.6 The test scripts were used to capture the results of the tests. On a first run through several questions were raised and some areas of telephone voting could not be tested satisfactorily. The Council PM re-tested these areas following subsequent modifications and was satisfied with their completion. All completed test scripts have been retained by the Council for reference. All issues were of a minor nature with minimal direct impact on the pilot and are therefore not discussed in detail within this report.

5.5.7 All sample material and data for the testing was created by Opt2Vote. No information has been made available as to requirements’ traceability and it is assumed that no such exercise took place. However, full pilot requirements would be a combination of the initial MoJ framework ITT, the Council pilot application and verbal clarifications between Opt2Vote and the Council following pilot award; requirements traceability would be a highly complex task in this instance. In addition, the Council were involved in the design and agreement of the internet screens and telephone scripts to ensure that they met the high level requirements of the pilot.

5.5.8 No documentation has been provided on how the final configuration of the system, coming out of the acceptance stage, was implemented on the live environment. However, whilst no formal information has been made available regarding such configuration control, references within other Opt2Vote documentation indicate clear processes and procedures existed. No formal plan existed for testing the live environment in terms of communication links, although since this required simply connecting to the internet it was deemed low risk and, as documented in the risk register, contingency plans were in place.

5.5.9 Opt2Vote stated in their bid document they would engage a third party (Sopra Newell & Budge) to conduct Security and Penetration testing. Whilst the provided documentation states that this activity occurred, the actual results have not been provided for this pilot; they are referenced within an Annex (which has not been supplied) of the Risk Management and Accreditation Documentation Set (RMADS), which has only been supplied in ‘draft’ albeit at version 1.0. It is understood that such documentation exists for the Sheffield City Council pilot but Opt2Vote have not supplied this to the author for this Council’s pilot.

5.5.10 MoJ engaged independent Penetration testers and the results identified no high risks, one medium risk and four low risks, each of which has been responded to by Opt2Vote as necessary.
5.5.11 The MoJ commissioned an independent quality audit from Security and Standards Ltd. The QA involved:

a. an initial meeting with all the pilot technology suppliers to explain the approach to be followed to the QA assessment;

b. a telephone interview with the supplier;

c. review of documentation provided;

d. further face to face discussions with the supplier and local authority representatives at the Council’s offices.

5.5.12 The audit focused on the security elements of the system. It involved a structured set of questions organised around the controls identified in ISO/IEC 17799. While the supplier provided acceptable answers to the main questions, the QA representative was only able to obtain limited confidence that there were no unacceptable residual risks with the pilot due to the limited supporting evidence presented by the supplier.

5.5.13 Although a number of useful recommendations were identified by the QA representatives, the true value of the audit was limited because it was performed so close to the election and therefore provided limited opportunity for corrective action to be taken. There would also have been merit in the audit including a visit to the hosting location.

5.5.14 It is also noted that some of the required QA activities could be performed prior to the start of the pilot project. For example, the detailed quality management, configuration management and testing approaches to be followed could have been defined in the suppliers bid for the pilot and assessed prior to the award of the contract.

5.6 Training

5.6.1 Full training was provided by Opt2Vote to all relevant Council election staff. Training material was provided and practical sessions (approximately 2 days in total shortly before the advanced e-voting period commenced) were provided on all elements of the system, including:

a. Internet voting application (for use in instructing electors);

b. Telephone voting application (for use in instructing electors);

c. Returning officer application.

5.6.2 The Council staff consulted as part of the technical evaluation all rated the training as very good and no issues were identified.

5.6.3 Training for the pre-registration scanning application is understood to have occurred ‘on the fly’.

ISO/IEC 17799 is an international standard that provides a code of practice for information security management.
6 Technology

6.1 Registration process

6.1.1 Election information was pre-loaded into the Opt2Vote e-voting system and maintained via the returning officer application:

a. key dates (such as time and date of the election) were manually entered into the system, through amendable parameters;

b. candidate details along with unique four digit codes (that were used to select candidates when casting votes) were loaded through a semi-automated text file upload process;

c. voting guidance was provided via on-site support at advance voting stations and via a helpdesk for internet and telephone voters;

d. all voter and contest details were pre-loaded into the Opt2Vote system from Pickwick and the pre-registration capture process using a combination of automated export and import routines and manual manipulation.

6.1.2 No formal verification of the election information, once in the Opt2Vote system, was conducted by the Council other than proof checking of printed documents. Whilst Opt2Vote claim that internal verification occurred, no documentation has been provided to back this up. Whilst no issues actually occurred due to this during the Council pilot, it would be beneficial to have such documentation in place, not least to enhance confidence in the accuracy of the e-vote.

6.1.3 Key voter details, the voter ID (elector number) and elector reference, were extracted from the Pickwick system print file (Excel format) to create a ‘csv’ format file for import into the Opt2Vote system. No verification of the uploaded information was undertaken by the Council and no information has been provided by Opt2Vote to suggest this activity occurred. Whilst no issues occurred and the physical running of the advanced voting acted as a test of completeness of the data set, such an approach poses some risk and does little to enhance confidence in the accuracy of the e-vote.

6.1.4 All electors were sent pre-registration forms including the elector reference. The form required electors to provide a 6 digit numerical password\(^5\) and date of birth. When returned these forms were then scanned to capture the elector reference, password and date of birth. Random unique VINs were then created (by the system) for all electors who had registered for e-voting; these were sent to all electors by post (no provision was made for checking on the success or security of the postal distribution process). The e-voting elector credentials and the filtered Pickwick output were then merged and uploaded to the live e-voting database to allow the election to be carried out.

6.1.5 When electors forgot their supplied credentials, did not receive or lost their VINs they were able to attend the advance voting stations in person to obtain new credentials (following presentation of sufficient identification material) and cast their votes using the supplied kiosks. In the case of an electors’ details being fraudulently used (following loss), the elector would again be able to

\(^5\) The use of the term ‘password’ for a numeric code was opposed by Opt2Vote but this was deemed necessary in terms of accessibility. Opt2Vote would have preferred the use of the term ‘PIN’.
attend an advance voting station to cast a tendered e-vote which would be recorded and made available during the count if required.

6.1.6 The key issue identified during the creation and capture of voter credentials involved the pre-registration form scanning process. During January to February 2007 the Council identified an issue with the scanning of postal vote identifiers (which Opt2Vote were also undertaking for the Council) such that dates of birth were often incorrectly recorded. This case example, and Opt2Vote’s general experience in the issues surrounding scanning technology, resulted in the inclusion of extra checks for the e-voting pre-registration form. Manual verification of the password and date of birth on each form was introduced and, whilst not required, operators also checked the barcode capture from each form.

6.1.7 These additional steps significantly increased the time taken and effort required to process the forms. There were significant volumes of errors identified (of each element checked) that required manual correction but statistics were not captured as part of the process. It is noted that the additional checks on the barcodes carried out by the operators capture several cases where the system was not able to recognise the printed barcode image and the manual numeric code had to be entered. Given the common place usage of barcodes such issues raises concern over the suitability of the scanning technology employed.

6.1.8 In addition, the delivery and installation of the scanning application was delayed which compounded the pressure on completing the scanning activity in time to send out the VINs. The installation issue again reflects the risk of relying on the Opt2Vote PM resource as the single onsite representative. Dedicated onsite technical support for the installation of the scanning application would have reduced this risk substantially.

6.2 Voting process

6.2.1 General process

6.2.1.1 The initial stage of the voting process is for the election to be initiated. This is done (using the returning officer application) by the Returning Officer creating the key pair which is used by the encryption routine to store votes securely and is required to close the e-voting capability and to view and print results reports. Once created, access to the private key is controlled via a strong password known only to the Returning Officer. It is not possible, by any means, to bypass this password to view and print the results. To mitigate any risk associated with loss of the password, it was typed into a text document, printed out and saved to a memory stick. Both paper copy and memory stick were then stored in the Council safe. Once the election is initiated, electors are able to cast their votes using either of the e-voting channels.

6.2.1.2 As part of the initiation process the Returning Officer produces a report to confirm that no votes have been cast, the zero tally report. At time of production, the secure PC being used was locked down to such an extent that viewing of the report was not permitted and took around 1 hour to resolve. This demonstrates the need for testing of the live environment to ensure full operability prior to the election.

6.2.1.3 The login procedures are common to both the internet and telephone voting channels, the kiosk channel is simply a Council-provided (supplied by Opt2Vote) internet access terminal. Electors would enter the internet site (using a standard internet browser over a dial-up or broadband connection) or dial the telephone voting number and be requested to enter their three credentials; VIN, date of birth and password. If any of the three credentials was incorrect the login would fail; if three incorrect logins occurred for one VIN this ‘account’ would be locked...
out and would require the person to attend in person at the advance voting station to remedy the situation.

6.2.1.4 Issues identified with the login process included:

a. Date of birth:
   1. Several electors entered different dates of birth from those entered on and captured from their pre-registration forms. This was simply down to elector inconsistency and no mitigation can be recommended;
   2. The date of birth field was defined as DD MM YYYY. Electors were found to have failed login due to entry single digit days or months without a leading zero or due to entry of two digit years. It would be beneficial for the system to prompt users to enter correctly formatted dates of birth in these cases.

b. Password:
   1. The use of the term ‘password’ to define a 6 digit (numeric) code was seen as misleading by Opt2Vote but required by the accessibility design advisors, SCOPE. During the election several electors clearly forgot their passwords (as provided on the pre-registration form) and attempted to enter characters and numbers. Given this confusion, and the current level of use of ‘PIN’s’ in general financial transactions, Opt2Vote would recommend this terminology be used;
   2. As characters were not permitted in the password field, it would potentially have been beneficial for the system to prompt electors to enter only numbers in the event of attempted character entry.

6.2.1.5 There were 283 electors who failed to log in at the first attempt, 163 who failed on their second attempt and 92 who failed three times.

6.2.1.6 Having successfully logged into the system (by internet or telephone), the elector is directed to select the contest they wish to cast their vote in (if they are eligible for both district and parish contests), enters the candidate’s four digit code (which they have been advised of when sent their VIN) via either typing the code in or selecting from a list, and then confirms their selection. Where the contest allows multiple candidates to be selected, the elector is presented with as many options to enter their preferred candidates as permitted by the contest. It is permissible for the elector to select less than the maximum number of candidates. Once confirmed, the vote is encrypted on the server, using the election initiation key, and stored on the e-voting database.

6.2.1.7 Whilst no system design issues were identified it was noted that the configuration of the kiosks was such that users had to scroll down on each page to see all the details and data entry fields. Whilst this ‘feature’ did not prove problematic (the Council election staff were on hand to guide advanced voters through the process at the kiosks) it could presumably have been addressed before the advance voting period began. In addition, it is recommended that any future kiosk configuration is ‘locked down’ such that electors can only access the e-voting site and not have access to general internet use via the kiosk or be directed to ‘spoof’ sites. The physical configuration of the kiosks was sufficient with all hardware being contained within individual locked cabinets.

6.2.1.8 Once the elector has completed their vote for that contest they are either automatically logged off, or, should they be eligible for another contest, presented with the option to vote in that contest or log off. If the elector chooses to log off they will be permitted to logon to vote for the subsequent contest at any time, and via any channel, during the e-voting period. Once the elector has cast votes in all of the contests for which they are eligible, they are not permitted to
enter the system again. Should the elector decide not to cast all their votes for which they are eligible via the e-voting channels, the reporting back to the Pickwick system, and subsequent production of polling station registers, will be conducted in such a manner as to ensure that the elector is able to attend the polling station and vote via the traditional ballot paper.

6.2.1.9 Should the elector wish to spoil their vote they can cast a blank vote or enter an incorrect candidate code. On confirming their vote they are presented with a warning that they are about to spoil their vote and have to agree to do so or cancel and enter a valid vote. The provision of candidate lists allows electors to select their preferred candidate rather than having to type in their code which gives some assurance against inadvertently spoiling a vote. To ensure that electors intend to enter invalid candidate codes, and therefore cast a spoilt vote, data entry could be introduced to prompt electors immediately if they input an invalid entry, rather than waiting until the vote is submitted.

6.2.1.10 In addition the spoilt vote confirmation warning message could be made clearer. Currently the elector clicks the submit button and then, having been warned they are spoiling their vote had to click yes to continue. This is inline with typical computer system usage involving a confirmation step after a submit action, with the user selecting ‘yes’ to confirm. Given that an elector may have inadvertently cast a spoilt vote they may ignore the warning message and simply click the yes button.

6.2.1.11 There is however no evidence to suggest electors, in this pilot, inadvertently cast spoilt votes. The fallback position is that electors can cast tendered votes in person, either electronically at advance voting stations, or manually on polling day should they be unsure.

6.2.1.12 Once electors have confirmed their cast vote they receive no confirmation receipt. If an elector attempts to login to the e-voting system and once they have cast their vote they will either not be able to login or only be able to vote in further contests for which they are eligible. Once the vote is confirmed it is not possible to cancel or modify it other than by casting a tendered vote in person. Back button functionality on the e-voting site returns the elector to the login page; last number redial on the telephone channel returns the elector to the login prompt.

6.2.1.13 Whilst held on separate databases, encrypted votes cast data could only be linked to an elector for audit purposes following a court order. Should verification of the action of casting a vote be required this can be achieved via the audit log which shows details of actions taken by each VIN, but not who a vote was cast for.

6.2.1.14 The audit log captures all actions on the e-voting system including administration actions (initiation, report generation, etc.) and elector actions (login attempts and fails and confirmation of vote cast). For each record, key information captured includes user (admin or elector VIN), action, date and time, and channel (if appropriate). During acceptance testing it was noted that on selecting a record in the audit log and pressing delete on the keyboard, the record would be removed. However, when the screen is refreshed, or the audit log logged back into, all records remained in the system and were not deleted.

6.2.1.15 Opt2Vote engaged a third party company (SQS-UK) to conduct load testing on the system. The results from this activity were made available and show that for up to around 170 concurrent users (electors) the system response times remained within an acceptable 2.5 seconds. However once this number of user was exceeded, performance deteriorated. The cause of this bottleneck was not identified by SQS-UK and closer analysis of the hosting partner environment is recommended. It is not known if this further analysis was undertaken by Opt2Vote. For the purposes of this pilot (and that of Sheffield’s) the identified loading constraint was potentially acceptable, but given the stated scalability of the Opt2Vote system (in the region of 14 million
electors) such bottleneck issues will have to be addressed if future larger scale pilots are to be held.

6.2.1.16 Only one issue occurred during the advance voting period where an elector attended the advance voting station to cast their vote. As part of this process the returning officer application is used to assign the elector a VIN and password and enter their data of birth. In addition, the system operator must assign a ward to the elector relating to the ward in which they are eligible to vote. On this occasion, the operator omitted to assign a ward to the elector which resulted in a subsequent lockout of the elector’s account. There was no suitable functionality available to unlock the account or allow them a tendered e-vote. This elector was directed to cast a tendered vote in person on polling day.

6.2.1.17 Given the cause of this issue was operator error, it would have been beneficial if the system did not allow such a situation to occur, e.g. required a ward to be assigned prior to saving the elector record. In addition, given that the elector data is imported from the Pickwick system, it would have been beneficial if the import had included details of the elector’s ward.

6.2.2 Multi-channel

6.2.2.1 The design of the Opt2Vote system is such that all e-voting channels (internet (including kiosk) and telephone) are based on one core application. As described above, the voting processes are the same across both channels and once a vote has been cast the elector is no longer able to log in or vote in that contest, on either channel.

6.2.2.2 No testing was witnessed to simulate one elector attempting to login via both channels simultaneously. However atomic transactional database processes were implemented to ensure that it would not be possible to vote simultaneously using the two electronic channels. The audit log would record any such attempts and could be used to identify these potentially fraudulent activities.

6.2.3 Proxy votes

6.2.3.1 Proxy voting is supported by the system. The processes followed are the same as for conventional voting channels. A proxy application form, which requires a signature and date of birth, needs to be filled in and returned to the Electoral Services department. The proxy can then apply to vote by Internet or telephone as a proxy. Subject to time constraints, it would be possible for an elector to cancel a proxy vote request and obtain their own credentials; this would be before the commencement of the voting period so the proxy’s credentials, if ever issued, would never be valid. The credentials used to vote would identify whether a vote was cast by a voter or their proxy.

6.2.4 Tendered votes

6.2.4.1 Tendered voting functionality was provided on the e-voting system. To take advantage of this, electors would have to attend the advance voting polling station in person and provide some form of identity. Once their issue had been explained and agreed a tender vote could be provided to that elector through the returning officer application. Once awarded the elector would log in as usual and cast their tendered vote. This would then be encrypted and stored separately from the regular votes and used by the Returning Officer should the need arise.
6.2.5 Counting

6.2.5.1 Candidates and agents were sent information letters to inform them of the count process. This detailed how:

   a. details of the total e-votes for each ward would be circulated following closure of the e-voting period;
   b. the actual e-vote candidate totals would be produced at close of polling but would not be distributed;
   c. postal ballots would be added to the polling station ballot papers;
   d. paper ballot totals would be added to the e-voting totals;
   e. results would be announced as total votes.

6.2.5.2 Records of votes cast are stored in the e-count database, which is physically separate from the elector details database in which seal data identifying the voter and a digitally signed hash value based on both encrypted data elements is stored. The latter provides additional evidence of vote integrity because the hash value can be recalculated before decrypting and counting a vote to confirm that neither the vote nor seal data has been tampered with. Both the vote data (contest name, seal reference and candidate code) and associated seal data (date, time, Voter ID and count reference) are encrypted using the Returning Officer public key generated when the election process was initialised; this is also used to decrypt the data.

6.2.5.3 Once decrypted the vote totals for each contest are presented to the user through the returning officer application. Following the end of the e-voting period, the report generated from the Opt2Vote system (containing the ward totals only) was circulated to all candidates and agents concerned with the Council May 2007 elections.

6.2.5.4 Following closure of the full election, the Returning Officer entered their unique password and obtained the detailed e-voting results report. This provided details, for ward and parish, of the numbers of votes cast for each candidate. This report was not made available to the candidates and agents. It was used to record the total paper votes cast, by the Returning Officer, and calculate the final results (total of e-votes and paper votes) for each ward. These totals were then announced in the normal manner for elections.

6.2.5.5 The e-voting system allowed the paper ballot totals to be entered alongside the e-voting totals and automatically calculated the total votes for each candidate. During this processes it was noted that the VPN connection with the server had been terminated. This did not result in any issue since the functionality was provided purely as a calculation aid and resided entirely on the local client PC. The Returning Officer also recorded these numbers manually on the printed copy of the e-vote results which provided adequate back up.

6.2.5.6 The breakdown of the votes cast was as follows:

   a. Electorate – 40,098;
   b. Pre-registered e-voters – 4,915;
   c. Total e-votes cast – 1,737;
   d. Internet e-voters – 1068;
   e. Telephone e-voters – 403;
   f. Kiosk e-voters – 266.

6.2.5.7 On the night of the count the PC being used to access and print the results needed to be set up to connect to the correct printer. Such last minute configuration issues are inconvenient and should
have been resolved well in advance of the election. Further, the ward totals from the end of e-voting were not used to verify the totals used on the night of the count. Such an action could have been used to enhance the confidence in the e-voting facility.

6.2.5.8 The presented results also list the number of rejected votes, per contest. Tendered vote totals are available via a separate report.

6.2.5.9 Acceptance testing demonstrated that votes cast in specific contests to specific candidates were recorded accurately and reflected in the results. As described above, authorised users would be able to analyse the data further to allow confirmation of an elector’s specific vote to confirm that it was correctly recorded and counted; this would occur under court order only. No documented procedures have been identified on how votes found to be fraudulent or incorrectly captured would be handled.

6.3 Technical architecture

6.3.1 The technical architecture of the Opt2Vote electronic voting system consisted of three tiers, separating the solution into presentation, application and data layers providing the user interface, data processing and information storage functions respectively. This is consistent with industry standards for enterprise level applications and is intended to enable modular development with clearly defined interfaces between the layers and scalability to support large elections (anecdotal, the Opt2Vote system is said to be capable of supporting up to 14 million electors in a single shared election). The presentation layer was developed using Microsoft ASP .NET technology, the application layer consists of web services developed in Microsoft C# .NET and the data layer consisted of two Microsoft SQL Server 2005 Enterprise clusters. All layers were hosted on Windows Server 2003, Microsoft’s current server operating system. The server based applications were developed and maintained exclusively by Opt2Vote.

6.3.2 The components of the system are illustrated in the figure below. Note that Opt2Vote also supported the parallel electoral pilot conducted by Sheffield. The two elections shared network infrastructure and interfaces to reduce costs but maintained separate databases and were managed independently.
6.3.3 The core application infrastructure, comprising load balancers, application servers and database servers, was hosted at Rackspace Managed Hosting at their dedicated secure datacentre in London. This provides a secure operating environment with redundant connectivity, power and environmental control. Redundant HVAC units maintain consistent temperature and humidity, multiple lines of communication to telecommunication providers enable network failover, the datacentre is equipped with a fire detection system, nitrogen suppression system and fire extinguishers, UPSs and a standby generator provide backup power supply and technical personnel are on duty at all times. Physical security measures include closed circuit video surveillance of all entry points, two factor authentication to gain access and a requirement to display identity badges at all times. This description is based on an independent audit of the facility by Ernst & Young, and provides reassurance that a suitable environment was used.

6.3.4 Access to the core application from the internet is protected by a single layer of clustered EAL4 certified Cisco Pix firewalls. Access to the application servers and onwards to the database servers is controlled by DMZ segmentation using access control rules and separate physical interfaces on the firewall.

6.3.5 Other elements of the election infrastructure communicated with the core application over the internet. This included the Telephone Voting service, which was provided by X-On and hosted by Telehouse, the PCs used by the Electoral Officers to administer the election and the web clients used by internet voters. All communications were encrypted: those from the telephone platform and electors’ web browsers used the HTTPS protocol, and development and support connections used IPSec VPN connections. More detail regarding the information security aspects of the pilot is provided in Section 7.

6.3.6 All the server based applications and databases were developed and maintained exclusively by Opt2Vote through the course of the election. The returning officer application (to manage the election) was operated by the Returning Officer and the Opt2Vote PM. This was accessed from dedicated laptops over the Internet using IPSec VPN connections. This application was also used to manage the advance voting process. The Opt2Vote PM had full management responsibility for this aspect of the pilot using the application to assign log in details to electors attending advanced polling stations and resolving any issues pre-registered e-electors had. They were supported in the advanced polling stations by Council staff to ensure any elector queries and issues with using the kiosks were accommodated.

6.3.7 Access to the system was password protected with limited individuals being provided with login details. The stated process for user access control was for the Returning Officer to login to the application, change their password and create alternate deputy user accounts with varying privileges for differing roles during the election. In practice the Opt2Vote PM was the only person to use the application throughout the election, other than the Returning Officer to initiate and terminate the election and conduct the count under the guidance of the Opt2Vote PM. As a result there was no evidence of alternate accounts being created and the Opt2Vote PM gained access to the system through the default ‘rofficer’ username.

6.3.8 In terms of audit requirements for this pilot the lack of individual accounts is deemed low risk as there was effectively only one user, the Opt2Vote PM. However, the specific actions taken by the Council’s Returning Officer can not be explicitly identified in the audit log as being conducted by a different user in the system. Were there to have been more than one user, such a lack of individual user accounts would have been a much high risk, in terms of determining accountability, and is something that should be enforced for audit purposes, particularly on larger elections.
6.3.9  The Opt2Vote solution developed for the Council pilot provided all electors in the region with the opportunity to pre-register for e-voting. Once they had done this, these electors were provided with login details for use on either the internet or telephone channels. In addition, electors who had not pre-registered could attend advance voting stations in person and request similar login details. Once logged in, electors were able to cast their votes which were captured in the secure e-count database. Atomic transactional database processes ensured that it was not possible to vote simultaneously using the two electronic channels.

6.3.10  Following closure of the e-voting period, Opt2Vote provided details of those electors who had voted back to the Council’s Pickwick election management system to facilitate the production of the marked registers for use in the polling stations. Once polling day was over and the count under way, the Returning Officer requested a results report for the e-voting element of the election. The paper ballot results were then added to e-voting results and the final total provided for each contest.

6.3.11  The Council staff were complimentary about all aspects of the system. They regarded it as user friendly for voters and, with constant Opt2Vote support, the returning officer application did not cause any issues.

6.3.12  All elector, voting and audit data held on the Opt2Vote system is archived after the election and transferred to the custody of Sheffield City Council Electoral Services for secure storage for 6 or 12 months as required by electoral law. This is the sole copy retained.

6.4  Use of Electoral Markup Language (EML)

6.4.1  No EML was used during the Council pilot; however the software is capable of producing EML files 470 and 510.

6.4.2  The technology by which data was taken from the Pickwick system, loaded into Opt2Vote, sent to printers and returned to Pickwick was based on Excel and csv format files, each of which required elements of manual manipulation prior to use.

6.4.3  Whilst the approach ultimately worked, issues arose relating to those electors who had registered for postal voting:

   a.  The print file to produce the postal voting packs did not identify those electors who had previously registered for postal voting and then pre-registered for e-voting. As a result, Opt2Vote had to remove these electors manually at the printers to ensure they did not receive postal votes as well as e-votes;

   b.  When providing the marked register back to Pickwick, following the advanced voting period, it was not possible to identify those postal voters who had actually e-voted.

6.4.4  A more robust and considered approach was required to the planning and designing of the data exchange interfaces for all aspects of the pilot.
7 Security

7.1 Introduction

7.1.1 This section identifies key security issues and countermeasures, and notes the security events logged during the election period. It focuses on the draft Risk Management Accreditation Document Set (RMADS) provided for the Council’s pilot.

7.2 Security of the voting system

7.2.1 All suppliers on the MoJ framework were required to provide a security risk assessment for their solutions in the form of a RMADS. Opt2Vote did not make this documentation available until a week after the election. A number of observations can be made about the RMADS:

a. The RMADS provided, though clearly developed by someone that knew about information security in general, did not display an understanding of the specific risks relating to an e-voting system. As such it does not give confidence that the e-voting specific risks have been understood and that appropriate mechanisms have been put in place to counter these risks.

b. The RMADS provided was clearly a draft, and included a number of questions that had not been resolved. It is national policy that public sector information systems that hold sensitive information should not be brought into use until the RMADS for the system has been prepared and accepted by an Accrreditor. It is difficult to understand why the same approach was not adopted for the e-voting pilots, since the impact of a security breach that led the result of the election to be questioned would be significant.

c. The RMADS was intended to be a key input to the MoJ QA activity. The fact that it was not made available to the MoJ QA assessor in advance of the elections would seem to significantly devalue the MoJ QA activity and must mean that the risk was higher than necessary.

7.2.2 Within the constraints of the e-voting pilot, no fraud or attempted fraud was reported or detected. Several cases (92) of electors locking their accounts due to repeated entry of incorrect credentials were recorded. As described above, these were found to be due to user error rather than perceived deliberate attempted fraud.

7.2.3 Where such account lock outs occurred, electors were required to attend an advance voting station in person and produce identification to have their account re-set.

7.3 Evidence of fraud

7.3.1 The Commission has not been made aware of any allegations of fraud or malpractice arising from the pilot scheme at this election. At present, therefore, there is no substantiated evidence to suggest that the procedures provided for by the scheme led to any increase in electoral offences, or in any other malpractice in connection with elections. We note that the period in which a prosecution can be launched is one year and so such evidence may still come to light.
8 Cost

8.1 The final costs for the pilot were made available six weeks after the election. Initial cost estimates were submitted as part of the Opt2Vote proposal to run the Council’s e-voting pilot; these were £1,117,850, prior to consideration of ancillary costs (e.g. printing). The actual costs for the pilot were £1,085,795; comprising a pilot cost of £1,097,850, ancillary costs of £24,041 (at 10 pence per item) and a £36,096 discount (due to shared infrastructure with Sheffield City Council). The following costs and analysis are based on these actual costs and the voter totals provided above.

8.2 The average cost for the provision of the e-voting pilot was £27 per elector, £64 per voter and £625 per e-voter. Whilst these costs are high, they reflect the fact this was a stand alone pilot in a council with a relatively small electorate. Limited shared benefits were available through the utilisation of common infrastructure across multiple councils to increase the numbers of electors using the e-voting channels.

8.3 The design of the Opt2Vote system was such that all e-voting channels were based on a common core application. High level analysis of the costs for the pilot, as shown in the table below, shows that the total cost per elector who voted using the advance voting facility are approximately twice those for the internet and telephone channels. This provides a clear indication of the relative value for money of each of these channels.

<table>
<thead>
<tr>
<th>Pilot cost element</th>
<th>Pilot cost</th>
<th>e-voters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Cost / e-vote</td>
</tr>
<tr>
<td>Total pilot</td>
<td>£1,085,795</td>
<td>1737</td>
</tr>
<tr>
<td>Common elements</td>
<td>£347,495</td>
<td>1737</td>
</tr>
<tr>
<td>Advance voting</td>
<td>£225,350</td>
<td>266</td>
</tr>
<tr>
<td>Internet and telephone</td>
<td>£512,950</td>
<td>1471</td>
</tr>
</tbody>
</table>

8.4 Key elements of the total costs were (prior to the £36,096 discount):

<table>
<thead>
<tr>
<th>Product/service</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Management</td>
<td>£83,000</td>
</tr>
<tr>
<td>Call Centre</td>
<td>£11,500</td>
</tr>
<tr>
<td>Training</td>
<td>£15,050</td>
</tr>
<tr>
<td>Advance voting</td>
<td>£225,350</td>
</tr>
<tr>
<td>Internet and telephone (IVR)</td>
<td>£422,950</td>
</tr>
<tr>
<td>Hosting</td>
<td>£250,000</td>
</tr>
<tr>
<td>IVR hosting</td>
<td>£90,000</td>
</tr>
<tr>
<td>Printing for collection of identifiers</td>
<td>£24,041</td>
</tr>
</tbody>
</table>

8.5 The high software and hardware costs of the overall e-voting capability (approximately £650,000) are assumed to be due to the one off nature of the pilot, as discussed above. Were this pilot the beginning of a programme of pilots for the Council and Opt2Vote to progressively conduct, such costs would be expected to be significantly lower for each pilot.
8.6 Advanced voting was provided by simply providing PCs in secure kiosks to provide internet access to the same capability provided by the internet voting channel. Given the simplicity of this additional capability (several PCs, kiosks and internet connectivity) the costs associated specifically with this element of the pilot are considered high.

8.7 The hosting costs for the Opt2Vote solution were very high. Given that the e-voting period was for a period of less than 2 weeks, and the server space would have been required for a limited period prior to this following development, such hosting requirements would be expected to incur significantly lower costs. However Opt2Vote have stated that they engaged their hosting service several months prior to the pilot to allow for penetration and other security checking, and that their requirements included a high level of availability.

8.8 Should the system be reused and/or shared across linked councils then all cost would be expected to be substantially reduced.
9 Conclusions

9.1 Technical evaluation criteria

9.1.1 Summary

9.1.1.1 The Council’s pilot was successful in terms of delivering an e-voting platform that operated as required and did not experience lack of availability or other technical issues.

9.1.1.2 Election night and the count demonstrated a good awareness of all parties on the process to be followed for obtaining the e-voting count totals, combining the postal votes with the ballot box votes, completing the paper count and combining all vote totals (using e-voting system functionality). No issues occurred and no objections were raised with the process or the e-voting aspect of the elections.

9.1.1.3 The key issues identified during the technical evaluation of the pilot can be summarised as follows:

a. project management of the pilot by Opt2Vote, whilst achieving a successful delivery and execution of the pilot, did not meet high quality levels in terms of maintaining adequate documentation in a timely manner;

b. more suitable Opt2Vote resources should have been made available for specific tasks, e.g. the installation of the pre-registration form scanning application was done by the Opt2Vote PM despite their lack of technical knowledge of the product;

c. closer management of third party suppliers was required by Opt2Vote to ensure that printing occurred on time;

d. greater attention to the exchange of data between systems (Opt2Vote and Pickwick) should be shown to ensure that technology is exploited to the full and manual overheads are kept to a minimum;

e. the limited time for the implementation of the pilot scheme was a significant contributing factor to the reduced adherence to good project and quality management practices.

9.1.2 Detailed conclusions

9.1.2.1 Paragraph 2.3 defines the criteria as the basis of the technical evaluation, namely:

a. assessment of the degree to which the suppliers have met the requirements of the pilot;

b. analysis of how effective the system was in practice, including accuracy, reliability, robustness, security and functionality aspects;

c. assessment of the risks to the effectiveness of the system;

d. analysis of the adequacy of the development lifecycle, covering project management, risk management, requirements, design, implementation, deployment and testing;

e. analysis of the testing process including accuracy, reliability, robustness, security and performance tests;
f. analysis of the effectiveness of the Quality Assurance (QA) processes performed, together with analysis of the actions taken by suppliers as a result of the QA process commissioned by the Ministry of Justice (MoJ);

g. assessment of any other technical issues that may have affected the success of the local election;

h. assessment of the extent to which the desired technical learning outcomes of the pilot were met and whether any other learning points were developed during the pilot.

9.1.2.2 The conclusions drawn against each of these criteria are provided in the following sub-sections.

9.1.3 Requirements

9.1.3.1 The internet, telephone and advanced voting channels were available to voters as advertised, and were used to cast votes by approximately 1,737 electors. The pilot functionality provided electors with a simple method of casting their votes at their own convenience.

9.1.3.2 The supplier met the high level requirements of the pilot. At a detailed level it is not possible to confirm that all the requirements of the pilot were achieved by the supplier. This is because of the lack of detailed documentation and resulting lack of requirements traceability. Acceptance testing was conducted against a comprehensive script, but this was not cross referenced to either the MoJ framework requirements or the Council’s pilot bid document.

9.1.4 System effectiveness

9.1.4.1 The system was used by 1,737 electors. No major issues associated with the effectiveness of the system were identified. It is noted that of the 4,915 people who pre-registered for e-voting approximately 1,780 (36%) attempted to vote and only 30% of the pre-registered voters eventually cast their ballot. The reason for the lower percentage of actual voters is not known. It is noted however that:

a. several users had to contact the call centre or call in at the advanced voting station because they forgot their username or password, or had locked themselves out;

b. of the those who attempted to vote using the e-voting channels, 1,471 (83%) successfully cast their vote; around 300 electors failed to cast a vote and did not contact the help desk to resolve their issue;

c. some of these electors have logged on to the system and then decided not to continue with the e-voting process;

d. some of these electors may not have been legitimate electors but were simply testing the system;

e. anecdotal information suggested that some of the users, having initially failed to vote, could not be bothered to continue trying.

9.1.4.2 No significant reliability or robustness issues have been identified with the vote casting system and the Evaluator has not been made aware of any allegations of fraud or malpractice arising from the pilot scheme at this election.

9.1.5 Risks

9.1.5.1 The most significant risk to the effectiveness of the system arose from the short timescale available for the design, development and implementation. The supplier indicated that a realistic
timescale for the pilot would have been 6 months. The supplier was required to complete the work in less than 3 months. Insufficient time was allowed for project documentation to be produced and reviewed, the system to be thoroughly tested, remedial work to be performed and required regression testing to be completed.

9.1.5.2 While no unexpected security risks to the system were identified by the Evaluator, the late delivery of the draft Risk Management and Accreditation Document Set undermined overall confidence in the security of the system. A final version of this document has still not been provided.

9.1.6 Development lifecycle

9.1.6.1 A number of shortfalls in the development lifecycle have been identified. These include:
   a. poor procurement practise;
   b. adequate project documentation was not maintained;
   c. quality, testing and acceptance procedures were undertaken but without the expected level of comprehensiveness.

9.1.6.2 There are opportunities for improvement and these are summarised in section 9.1.9.

9.1.7 Testing

9.1.7.1 The approach to testing during the development lifecycle was outlined in the Opt2Vote bid documentation. No further test plan or schedule was produced. System testing scripts and evidence of completion was not provided until after the election. UAT was conducted against a comprehensive script but this was not cross referenced against any statement of requirement.

9.1.7.2 Insufficient time was available to address testing with adequate due diligence and to allow for remedial action, should it have been required.

9.1.8 Quality assurance

9.1.8.1 The quality assurance activities performed by Opt2Vote were of a minimum level. The issues identified with the quality assurance activities identified are typical of those associated with a project run to very tight timescales.

9.1.8.2 The independent quality assurance activity performed by the MoJ had a low level of resource associated with it, was focused on the security aspects of the system and was performed just prior to the election starting. A more comprehensive approach to Quality Assurance should be adopted. The independent QA / technical assurance activities should be performed throughout the pilot project to enable potential problems to be identified much earlier and appropriate remedial action taken.

9.1.9 Other issues

9.1.9.1 While not directly affecting the success of the local election it is noted that, due to the short timescales associated with the pilot implementation, a tight approach to contract management was not adopted.
9.1.10 Learning points

9.1.10.1 A significant number of lessons can be learnt from this pilot. These include the need to:

a. provide overall strategic direction to the electoral modernisation programme, ensure lessons highlighted in previous evaluations are learnt, that the strategic direction is communicated to the organisations involved in the piloting and that these organisations can take a longer term view during the piloting programme;

b. ensure that the timescales associated with a piloting exercise are adequate without the need for suppliers to ‘cut corners’ and with time for full quality assurance and for testing activities to be performed and any subsequent required remedial work to be undertaken prior to the election starting;

c. ensure adequate documentation is produced during a pilot and that this documentation is available at an early enough stage for any deficiencies identified as part of review activities to be addressed;

d. ensure that a systematic and comprehensive risk assessment is performed as part of the pilot and that the Returning Officer is made aware of the residual risks he is accepting and explicitly signs to confirm that he is prepared to accept them;

e. ensure that a comprehensive and systematic approach to acceptance testing is put in place. Requirements must be traceable through to acceptance tests; verification and validation activities should occur, involving all parties, throughout the pilot and should not be limited to acceptance testing of the final system a few days before the election;

f. ensure that independent quality assurance activities are undertaken throughout the pilot activity, not just at the end of the pilot and that sufficient time is allowed for remedial action to be taken. This includes performing adequate quality assurance of potential suppliers as part of the bidding process.

9.1.10.2 It is recommended that there would be significant value in introducing an accreditation scheme for e-voting systems to provide greater confidence in their correct implementation.

9.1.10.3 It is also recommended that the current procurement approach is reviewed to determine if there is a way in which better value for money can be achieved and that full benefit of the investment made in the development and integration activities is achieved.

9.2 The Council’s criteria

9.2.1 The e-voting solution provided by Opt2Vote provided electors with simple to use and readily available channels. The system worked as required and no issues were identified during the course of the e-voting period or count. In this regard the pilot can be considered to have been a success.

9.2.2 The take up of the e-voting channels was lower than in previous elections and may be considered to be of limited success for this pilot. However, it is difficult to draw direct comparisons due to differing pre-registration processes and locations of the primary advance voting station.

9.2.3 No concerns were voiced regarding confidence with the methods and technology used in the pilot. The pilot can be considered to have been a success in this regard.