



**Response to questions from the Speakers Commission on
Digital Democracy regarding electronic voting**

1. *What are the potential benefits and drawbacks of online voting (eg, voting via the internet using a computer or mobile device)?*

Online voting using internet enabled devices has been growing in popularity worldwide as governments look to address the ever changing challenges they face in the running of elections.

In the UK, there has been a dramatic and ongoing decline in the participation of elections over the last 20 years, and with an ever increasing use of online services and the proliferation of internet enabled personal devices, online voting can offer an accessible voting platform with which to stem the decline in turnout, as well as offering additional benefits which can strengthen the democratic process in ways that traditional paper based voting simply cannot achieve.

This is particularly the case when compared to postal voting which is the prevalent method of remote voting in UK elections.

These benefits of online voting are described below:

Increased participation/turnout – Put simply, online voting provides a greater opportunity for voters to participate in the election process by offering a more convenient (yet secure) channel for voting and potentially, an extended voting period.

Online voting can be particularly effective in driving up the levels of participation in traditionally 'hard to reach' voter groups (such as military/overseas voters and voters with disabilities).

The role of online voting in driving participation is discussed later within this document.

Eligibility assurance – The current provisions for checking the voter eligibility in UK elections remain very weak. In the case of polling station voting, voters are not obliged to provide any voter identification when presenting to vote.

In the case of postal voting the provision of the voter signature and date of birth, submitted via the postal vote statement offer little or no assurance that the person who has completed and submitted the ballot is the eligible voter.

Online voting provides the ability to strongly authenticate voters using a variety of robust authentication methods including:

- Electronic ID cards
- Existing sign-on/authentication services (Government Gateway)
- Multi-factor authentication platforms including biometric data (e.g Your.ID)
- 2-Step Verification and One Time Passwords (OTP)
- Banking access systems

Such systems mitigate the risk that ineligible voters are able to access the voting process, and deliver a significantly more robust democratic process.

Fraud prevention – In addition to providing a robust mechanism for mitigating voter ineligibility,

online voting can reduce instances of voter fraud to which the current provisions for voting in the UK are susceptible, in particular postal voting.

There have been numerous prosecutions for postal vote fraud in the UK during recent years. In such instances, elders and senior representatives from certain communities and political candidates have undertaken coordinated collections of blank postal votes and a systematic completion of postal votes in favour of a preferred candidate or party.

While several prosecutions have been successful, the police, Local Authorities and Electoral Commission have to dedicate significant resource to find, investigate and prosecute, and it has been widely recognized that many instances of postal vote fraud may be undetected and therefore unprosecuted.

Online voting not only provides strong authentication processes to ensure that only eligible voters can access, complete and submit their ballots, but advanced system logging can track instances of multiple electronic ballot submission from a single computer (via IP and MAC addresses). Additionally, online voting platforms can provide alerts to pinpoint the geographical location of attempted fraud in real-time, to ensure that the authorities can investigate with immediate effect.

In this respect the fraud reduction capabilities of online voting are significantly greater than postal voting.

User experience – Whilst voting to many is a simple process, there are still a large number of spoiled ballots at UK elections as a result of mistakes made by voters.

This is particularly prevalent in complex (combined elections) such as Scottish Government and Greater London Authority elections in which voters have multiple contests and a mix of straight and preferential voting systems.

In the case of postal voting, voters regularly forget to include their mandatory postal vote statements and frequently place their ballot in the wrong postal vote envelope, which leads to the submission of spoiled and/or ineligible ballots.

Online voting can deliver a significantly more intuitive user experience ensuring that voters cannot mismark or misplace their ballots. The use of clear voter interfaces, intuitive instructions and progress bars provide a frictionless experience to the voter and can eliminate spoiled ballots as well as making the process of voting easier and faster.

Accessibility – Voters with disabilities face a significant challenge when trying to exercise their democratic right (which is why MENCAP's "hear my Voice" campaign has garnered such a high level of attention). Whilst wheelchair access to polling stations has increased in recent years, there are still a large number of voters with disabilities who are unable to visit polling stations and require the use of a proxy or, if visually impaired, an ungainly plastic template to complete their ballot on an independent basis.

Not only is this undermining voter privacy but also directly contravenes the United Nations

Convention on the Rights of Persons with Disabilities¹ that the UK has signed and ratified.

Online voting provides a secure platform for voters with disabilities to cast their vote from home without having to attempt to visit a polling station. Online voting integrates seamlessly with accessibility tools such as braille-keypads, 'sip and puff' tubes and screen readers (eg. JAWS) to ensure that blind/low vision voters and voters with physical disabilities are afforded the same democratic rights as able bodies voters, and the ability to cast their ballot independently and privately.

Security and privacy protection – Concerns around internet threats and cyber-security are raised publically on a daily basis, so it is critical that any internet voting solution employ specialized security counter measures and protocols on top of standard IT security procedures to maintain the security of the i-voting system.

Whilst the threat-model is arguably greater in the online realm, those companies, which have invested heavily in this area, engineer highly secure online voting platforms, to a set of security protocols that offer greater security measures than online banking systems and indeed many other online industries.

The Smartmatic-Cybernetica Centre for Excellence for Internet Voting has been at the forefront of delivering leading-edge research and development in cyber security methodologies and technologies, which have been integrated into the Estonia i-voting platform and used successfully without any security or privacy breach since 2005.

These include:

- Anti-phishing countermeasures
- Strong asymmetric encryption of ballots
- Digital signing of ballots
- Secure transmission of encrypted ballot
- Digital time stamping
- Immutable logs
- Verifiable mixing and shuffling process
- 'Homomorphic' tallying
- 'Threshold' cryptography/secret sharing
- Cryptographic proofs

The role that these concepts play in terms of ensuring the integrity of the ballot are described later in this submission.

Coercion resistance – Unlike postal voting, online voting affords the ability for voters to undertake multiple voting sessions in which they can cast their ballot multiple times, but only the last ballot cast is included in the counting process.

With this process, if a voter experiences coercion, he/she can cast their ballot again under no coercive circumstances. This process has been used successfully in Estonia since 2005 and was

¹ <http://www.un.org/disabilities/default.asp?id=150>

employed as an anti-coercion measure in the Norway i-voting projects in 2011 and 2013. In addition, the recent Scottish referendum there were numerous cases cited where postal voters expressed regret at having cast a vote prior to the conclusion of the campaign in circumstances where late changes or “vows” offered to the electorate were highly significant. In Estonia, the voter can vote on-line right up to the end of polling and it is the final vote cast that counts.

Accuracy – The reality is that computers are able to perform regular, repetitive functions to a greater degree of accuracy and precision than human beings. As such counting votes electronically delivers greater accuracy, speed and repeatability of results than the corresponding manual process.

This is particularly prevalent in the case of complex and/or combined counting processes such as preferential systems (e.g Weighted Inclusive Gregory Single Transferable Vote).

Online voting can therefore radically increase the accuracy and speed of the counting process.

Transparency - Organisations and individuals who are opposed to online voting regularly challenge the benefits of online voting along the lines of security concerns as well as claiming that electronic systems lack the transparency of traditional election systems.

However they do so, without fully understanding or appreciating the vulnerabilities of the traditional voting processes and in particular postal voting, which is the current method of remote voting in the United Kingdom.

Online voting offers the opportunity to demonstrate mathematical proof through cryptographic processes that no electoral malpractice has occurred at any stage of the vote transmission, storage, counting and results publication process.

End-to end-verifiability processes enable voters and independent auditors to interrogate the process at every stage to prove that the ballots were cast as intended, stored as cast and counted as cast.

The i-voting system in Estonia allows voters to check, through the use of a mobile application that the online voting platform has received their cast ballot in the state that they intended, to prove that it has not been tampered with.

These sort of electronic verifiability processes are simply not achievable with traditional paper based systems where trust is placed in the professionalism and integrity of council election staff and Royal Mail processes and resource, without any auditability measures.

In this respect, online voting offers considerable benefits for enhancing the transparency of the process over traditional paper based election processes.

Impact on councils – Democratic services departments are under increased pressure to achieve more with less resource and financial assistance under increasingly exacting timescales. In particular, the process of the production, proofing and distribution of ballot papers and the production and processing of postal votes puts considerable strain on democratic services.

Online voting would reduce many of these production pain points and also radically reduce the human resource required to count the ballots. In addition, online voting may offer the opportunity to reduce the number of polling stations required during election day, which in turn can reduce the resource and the cost of running elections.

2. What impact, if any, would online voting have on voter turnout?

As discussed previously, there has been a growing decline in turnout in elections in the United Kingdom. In the last European Parliamentary election, turnout in certain locations was as low as 20% in some regions.

Whilst there may be a number of varied reasons for participatory decline, with more citizens travelling greater distances to work, working longer hours and having to balance an increasing number of personal and professional responsibilities, the challenge of voting at a particular location on a particular day is increasing, and has resulted in a large increase of voters opting to vote by post.

In this respect, online voting can offer the perfect platform to bring the ballot to the voter in a more accessible and secure way than other remote voting methods (postal voting).

The following empirical evidence of increased turnout from online voting in USA, Estonia and Australia is presented below:

USA

The introduction of electronic means for remote voting by so-called UOCAVA voters (Uniformed and Overseas Citizens Absentee Voting Act) in various US jurisdictions has resulted in significant improvements in turnout.

- In Cook County (one of the largest electoral jurisdictions in the US), the provision of online voting for Uniformed and Overseas Citizens increased turnout from 11% to 53% after the introduction of Internet voting in 2012. Also in Cook County, overall accuracy increased, going from 92% of ballots counted in 2008 to 99% in 2012.
- In the 2010 Primary, General and Special elections in West Virginia, absentee ballot return rates increased from 58% to 92.5%.

Estonia

In the case of Estonia, several studies have provided evidence that as many as 10% of Internet voters would not have voted if they hadn't had the Internet as a voting channel (which results in an approximate 2.5% increase in turnout).

Australia

In the New South Wales State Elections in 2011, online voting (iVote) was made available for voters with disabilities and those who lived more than 20km away from the polling stations.

The post election report summarized that “usage of iVote greatly exceeded expectations by threefold with almost 50,000 electors using it. We estimate that access to iVote enfranchised around 30,000 electors who were unlikely to vote had iVote not been available”.

Switzerland

For many years now, various Cantons in Switzerland have used on-line voting to support their own particular form of representative democracy, using on-line voting methods to supplement polling based voting in referenda.

In this respect, we believe that online voting is able to have a marked positive effect on turnout.

3. Would online voting increase the ‘digital divide’ or increase accessibility in elections?

Given the proliferation and penetration of smartphones and broadband internet access in the United Kingdom, across all demographics, it could be argued that the so called ‘digital divide’ is being decreased on a daily basis.

With projects such as the Rural Broadband Initiative and Barclays Digital Eagles pro-active measures are being taken to ensure that ‘hard-to-reach groups’ that have not traditionally engaged in digital lifestyles, are becoming better connected, and equipped to engage in digital dialogue.

In this respect whilst the digital divide may always be present to some degree, successful efforts are being made to reduce it.

Online voting is unlikely to contribute to widening the digital divide and in fact may offer the incentive for some citizens to start to engage using electronic means and offer enhanced access to the democratic process particularly amongst hard to reach groups, such as voters with disabilities.

Its clear that the introduction of any form of technology into this field can only be successful if it is accessible to an electorate that is both competent and confident in the use of technology. Our experience in deploying voting technology across the world in diverse communities (including communities with very low literacy rates) clearly shows that a combination of voter education and intuitive, trusted technology leads to higher levels of participation and voter engagement-even in the most complex elections.

4. What are the cost implications of online voting?

Democratic Audit has estimated that the cost of running and administering elections at approximately £150 million per annum². This equates to roughly £3.20 per registered elector per year, and with the cost of a single election event rising year upon year, this number will undoubtedly increase as the potential for election events to occur increases with devolution and the increasing desire to promote greater citizen engagement.

Whilst the initial capital outlay to procure, install and test an online voting system can would be significant (although this can be addressed via a number of different operating models, including

² <http://www.democraticaudit.com/?p=3537>

the Leasing of equipment) , the year-on-year operational costs of running election on the platform would be relatively small and significantly less than that of traditional elections.

According to the Electoral Commission report on the costs of the 2011 referendum on the parliamentary voting system³, the greatest cost elements in the running of a nationwide parliamentary election are:

- Polling station management and staffing
- Ballot paper printing
- Postal votes
- Poll cards
- Counting

With an online voting system, the number of polling stations could be radically reduced and the requirement to print ballot papers also reduced, With a hybrid electronic voting system (incorporating touch-screen voting in polling stations and remote internet voting), ballot paper and postal vote production and processing costs could be eliminated totally.

Electronic poll cards delivered through email or SMS could drastically reduce the cost and time taken to produce poll cards.

An electronic counting system would also reduce the need to hiring count centres to count ballots, eliminate transport and other logistical costs associated with the transfer of ballot boxes to central count venues. Staffing costs would also be dramatically reduced to deliver additional cost savings.

There exists the misconception that online voting is more costly than postal voting because of the cost of technology. While some Internet voting experiments have been very costly (such as the case of Norway), the best enduring example in the world of Internet voting is the case of Estonia, a system that has remained in operation for almost 10 years.

Even after going through two generations of the system in 7 national elections over the past 10 years, the government of Estonia has only invested around €1,000,000 in total. This amounts to less than €2 per participating voter for a total of 7 elections (or less than €0.30 per voter per election on average).

In this regard, with the appropriate solution, efficient procurement process and long term vision and commitment, online voting offers governments the opportunity to radically reduce the cost of elections as well as delivering the previously described benefits.

5. What are the advantages and disadvantages to using electronic voting machines in polling stations instead of paper ballots?

Electronic voting in the polling stations, using touch screen machines offers a significant number of advantages as follows:

Improved authentication and identity management – The current provisions in the UK do not

³ http://www.electoralcommission.org.uk/_data/assets/pdf_file/0009/153000/Costs-of-UK-May-2011-UKPVS-referendum.pdf

require that voters present any identifying information to vote. In this respect, it is probable that numerous instances of voter impersonation occur at each election. This could be eliminated through the use of electronic voting machines in polling stations.

Voting machines in polling stations can be integrated with advanced identity management solutions to ensure that only eligible voters can participate in the electoral process. Identity checking can be enhanced through the use of voter photographs, signature verification and/or biometric information to radically reduce instances of voter impersonation and fraud.

Increased accessibility – Electronic voting machines offer a wide range of capabilities increase the accessibility of the voting process. These include the following:

- Tactile peripheral devices such as braille-key pads and sip/puff tubes for physically impaired voters
- High contrast and audio ballots for blind and visually impaired voters.
- Multi-language ballots for voters who are not native English language speakers – This would eliminate the need for translators at polling stations who may be subject to influencing voter preferences (eg. Tower Hamlets)

Enhanced security – Electronic voting machines offer significant benefits in terms of security of the votes. Smartmatic voting machines store the votes in encrypted states in multiple logical locations on the device to ensure that no votes can be lost or tampered with.

Ballots are encrypted to the highest security standards AES-256 and digitally signed to protect the integrity of the votes.

After the election has closed, transmission of the votes is undertaken over a secure connection and collected votes are stored in an encrypted and anonymised state in physically and logically hardened environments to ensure ballot integrity, privacy and secrecy.

Increased speed and accuracy of count – As mentioned previously, computers are able to perform regular, repetitive functions to a greater degree of accuracy and precision than human beings. As such counting votes electronically delivers greater accuracy, speed and repeatability of results than the corresponding manual process.

Accurate election results can be delivered in minutes rather than hours, which help create trust in the robustness of the electoral process.

Greater auditability – Transparency is a critical component of a free and fair democratic process and the polling station technologies developed by Smartmatic support this principle.

Verifiable voter paper audit trails (VVPAT) are printed-paper receipts that can be provided to voters at the end of the voting session to prove that the machine has correctly captured the voter intent. Smartmatic was the first company in the world to voluntarily introduce printed-paper receipts, now widely accepted as a “de-facto” requirement for voter trust. A system incorporating such receipts has been effectively deployed in Belgium.

The System source code can be “hashed” and provided to independent auditors to provide an assurance that the voting machine has correctly applied the underlying systems, methods and processes built into the particular Election event. This is further assurance that “the system” has truly captured voter intent and that the results of the vote counting process follow the appropriate rules and guidelines

Increased participation – Electronic voting machines can be configured to enable voters to cast their ballot in any polling station within their local authority to offer “Anywhere Voting”. This means that voters are given greater flexibility in terms of where they cast their ballots on Election Day.

The compact and portable nature of electronic voting machines mean that they can be easily transported and set-up in ‘pop-up’ locations to offer greater convenience to voters and capture the foot-fall of voters outside of the static, traditional polling station environment.

Rushmoor Borough Council conducted a pilot election in 2006 in which technology based ‘Anywhere Voting’ was offered in two shopping centre ‘pop-up’ polling stations. From the voters who participated, a significant percentage of voters confirmed that they would not normally have voted in the traditional polling environment.

6. Would electronic voting at the ballot box be a useful step towards online voting?

Electronic voting in polling stations offers a number of potential advantages over the traditional paper based processes, which are highlighted above.

The proliferation and penetration of personal tablets devices (eg. iPads) on a global scale mean that touch-screen voting using gesture based interactions with a voting machine are increasingly intuitive to voters of all ages and backgrounds.

In this respect electronic voting in polling stations is unlikely to feel threatening to voters and may provide an excellent introduction to the use of technology in the voting process.

7. What can be learned from e-voting experiences in other countries?

As mentioned previously many governments across the globe are looking to modernize their democratic process through the use of election technologies.

Some governments have had greater success than others and it is recommended that a detailed analysis of these previous experiences be undertaken through direct dialog with the Election Management Body or government ministry in charge of delivering electronic voting. It should be stressed that there is also increasing co-operation between International Election authorities as they look to build on best practice, and harmonise the essential characteristics and legal rules required to oversee and implement an electoral process that is conducted with the assistance of technology-from voter registration, through to voting, vote tabulation and consolidation and the promulgation of results.

Not every electronic voting experience is successful and care must be applied to the vendor

selection process; the specific technical requirements of the system need to be carefully laid out and the Procurement Body must be wholly independent and entirely capable when it comes to making technical assessments of the capabilities and requirements of each prospective vendor.

Rigorous vendor selection by a capable Election authority will radically reduce exposure to risk and is essential to ensure the successful deployment of e-voting technologies. Selection of an established trusted and leading practitioner in the development of secure election solutions should be a baseline requirement.

Risk can be further reduced by the use of a proven electronic voting system that has been used to deliver successful, binding governmental elections.

Vendors with a track record of high-profile election failures (including service outages, denial-of-service attacks, system compromises, failure to decrypt or publish results on time) can seriously increased exposure to risk and should not be considered.

Smartmatic have been at the forefront of developing secure, verifiable electronic voting technologies and are proud to have delivered some of the most technologically and logistically complex election technology projects ever undertaken.

We have included additional material with this submission regarding those experiences and would be happy to provide further information and insight as required by the Speakers Commission.

8. What safeguards would be needed to reassure the public that their digital vote was secure?

The introduction of new voting technologies can raise a range of questions from various stakeholder groups regarding the security of the voting process. In this respect, it is critical to ensure that specific attention is paid to educate all stakeholder groups about the benefits of electronic voting and in particular the security advantages that can be offered via secure, verifiable digital voting, compared to the traditional paper based processes.

Education, outreach and marketing campaigns need to be undertaken to explain the truths and expel the myths of electronic voting, and to be able to respond to any potential negative press and misinformation which may appear as a result of activity by anti e-voting lobbyist and protagonists.

Public demonstrations of the proposed solution should be offered to all interested parties along with Q & A sessions with security experts.

As mentioned previously, a rigorous assessment of vendor systems should be built into the procurement process undertaken along with a critical analysis of potential vendors success rate.

9. Would it be possible to guarantee the integrity of the ballot?

Our answer to this question is most definitely “Yes” - Concerns around internet threats and cyber-security are raised publically on a daily basis, so it is critical that any internet voting solution employs specialized security counter measures and protocols on top of standard IT security procedures to maintain the security of the i-voting system.

As mentioned, The Smartmatic-Cybernetica Centre for Excellence for Internet Voting has been at the forefront of delivering leading-edge research and solutions' development in the realm of online voting since 2005 and has developed the world's only permanent online voting platform for the Estonian Electoral Committee (VVK).

Measures included to guarantee the integrity of the ballot include:

- **Anti-phishing countermeasures** – Provides verification of the origin and integrity of the voting application.
- **Strong asymmetric encryption of ballots** – Encrypts ballot preferences throughout the entire voting and storage process using the strongest encryption standards and mitigates the risk of vote tampering.
- **Digital signing of ballots** – Provides proof of eligibility and mitigates the threat of insertion of bogus votes and or/vote tampering.
- **Secure transmission of encrypted ballot** – Provides additional secure transport channel of encrypted ballot
- **Digital time stamping** – Mitigates the risk of insertion and/or deletion of votes
- **Immutable logs** – Provides a tamper-proof audit trail of every single voting and administrative system transaction.
- **Verifiable mixing and shuffling process** – Breaks correlation of the vote from the identity of the voter in a manner, which is demonstrable to auditors.
- **'Homomorphic' tallying** – Provides protection of all the voters until the entire tally process is complete mitigates the risk of partial results.
- **'Threshold' cryptography/secret sharing** – Ensure that no single person has access to decrypted ballots.
- **Cryptographic proofs** – Provides mathematic proof that no ballots were changed, tampered with, inserted or deleted – Demonstrates absolute integrity of the election.

However, it is important to understand that election security and integrity relies on more than just secure election technology. Election security is a holistic process, which is assured through secure products, process and personnel.

When new voting methods are being considered, it is critical to ensure that time is invested in consulting with and educating all stakeholders (EMB's, Election Officials, Voters, Academics etc.) to fully understand security concerns and to demonstrate how potential risks with alternative voting technologies are identified, managed and successfully mitigated.