An Enabler or Disabler to Strengthening Electoral Democracy?

REPORT ON E-VOTING SEMINAR

11 and 12 March 2013, Cape Town, South Africa

IEC
SOUTH AFRICA

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LIST OF ACRONYMS AND ABBREVIATIONS

ACDP	-	African Christian Democratic Party
ANC	-	African National Congress
DA	-	Democratic Alliance
DoELG (Ireland)	-	Department of the Environment and Local Government
DRE	-	Direct Recording Electronic
EBP	-	Electronic Ballot Printer
EVM	-	Electronic Voting Machine
ICASA	-	Independent Communications Authority of South Africa
ID	-	Independent Democrats
IEC	-	Independent Electoral Commission
PCOS	-	Precinct Count Optical Scanning
PLC	-	Party Liaison Committee
SAHRC	-	South African Human Rights Commission
UDM	-	United Democratic Movement
UN	-	United Nations
VVPAT	-	Voter-Verified Paper Audit Trail

EXECUTIVE SUMMARY

One of the strategic objectives of the Independent Electoral Commission (IEC) is to ensure that the institution remains a pre-eminent election management body that seeks continuous improvement and innovation through the use of technology. To this end, the Commission aims to strengthen electoral democracy in South Africa, and to position itself as a trend-setter in election management in Africa. In an effort to attain these goals the IEC convened a multi-stakeholder seminar on Electronic Voting and Counting Technologies on 11 and 12 March 2013 in Cape Town, South Africa. The seminar, which sought to assess the feasibility of electronic voting (e-voting) in South Africa by drawing on lessons learned from comparative experiences, was the first of its kind in South Africa. It served as a platform for key electoral stakeholders to gain an understanding of e-voting by interrogating its feasibility in South Africa. It was critical for South African electoral stakeholders to engage in a discussion of such an exploratory venture in order to establish the groundwork for future consensus on e-voting.

In light of the country-specific experiences set out during the seminar it was noted that e-voting has produced mixed results, with success in countries such as Brazil, India and the Philippines, while, in others, like Germany and Ireland, the technology has been abandoned for various reasons. The overarching recommendation from those attending the seminar was that should South Africa choose to embark on e-voting, the process should be underpinned by the country's unique socio-political and economic realities. Given that South Africa is considering using election management technology that has been abandoned by others, the delegates also recommended that an expanded, focused research study of the technology should be conducted. This will, in effect, deepen the understanding of the inadequacies of e-voting with a view to instituting remedial measures in South Africa should the technology be adopted.

This report, which documents the proceedings of the seminar, consists of six chapters. The first gives a background to the discourse on e-voting in South Africa, setting out the rationale for the seminar, and proceeds by reviewing the introductory remarks of the IEC leadership. The second and third chapters consist of country cases studies (Brazil, India, Ireland, and Philippines), while chapter four synthesises the international lessons that have been learnt. Chapter five assesses the infrastructural conditions of South Africa and its level of preparedness for a possible e-voting venture. The sixth and final chapter proffers recommendations in view of the foregoing findings by way of critically evaluating the lessons learnt elsewhere and the level of the country's preparedness in juxtaposition to the utility of e-voting.

CHAPTER 1

INTRODUCTION AND OVERVIEW

1.1 CONTEXTUAL BACKGROUND

His Excellency Kgalema Motlanthe, the former President (September 2008-May 2009) and current Deputy President (from May 2009 to date) of South Africa, challenged the country to explore the possibility of e-voting in the aftermath of the 2009 national and provincial elections. Similarly, the South African Parliamentary Portfolio Committee on Home Affairs, to which the Independent Electoral Commission (IEC) reports, has shown an interest in e-voting. The exploration of e-voting corresponds to one of the IEC's Strategic Objectives – ensuring that the institution remains a pre-eminent election management body that seeks continuous improvement and innovation through the use of technology. The use of technology is not unusual in the electoral process in South Africa. Since its inception, on 17 October 1996, as a constitutionally-mandated permanent electoral management body in South Africa, the IEC has sought to be a trend-setter in electoral democracy. From voter and candidate registration to results management and other aspects of the electoral process, the IEC has effectively appropriated technology and has indeed become an institution of reference on election management in Africa and beyond. Thus, employing technology in voting would, for the IEC, be another element in consolidating its experience of the management of technology for elections, albeit in another critical aspect of the electoral process.

E-voting has been adopted in various countries in the world, both developed countries such as the United States of America, Japan, Ireland, Canada, France, Belgium, Austria and Switzerland and developing countries such as Brazil, India, Russia, Paraguay, Philippines, Kazakhstan, Venezuela, and Estonia. Because of the different circumstances pertaining in these countries the practice of e-voting has produced varied results, some successful, others unsuccessful. By 2011 five countries had abandoned e-voting. One of them was the Netherlands, the first country to have introduced e-voting (some 20 years ago). The others were Germany, the United Kingdom, Ireland and Australia. The main reasons for abandoning e-voting were concerns about data security, verifiability and certification and cost. However, e-voting has also produced certain benefits in some geographically vast and populous countries such as India and Brazil by allowing for the speedy processing of election results.

The IEC, conscious of these varied experiences and prompted by the need to gain greater understanding of e-voting and to seek broad-based consensus on this critical venture, convened a multi-stakeholder seminar on Electronic Voting and Counting Technologies on 11 and 12 March 2013 in Cape Town, South Africa. The seminar was the first of its kind in terms of initiating dialogue focusing on e-voting technologies and was the culmination of a study of e-voting conducted by the IEC in December 2011. The seminar was attended by key electoral stakeholders such as political parties, civil society organisations, representatives of the diplomatic corps, National Treasury, the Truth and Reconciliation Commission, the United Nations and the Chapter 9 institutions including the South African Human Rights Commission, the Office of the Public Protector, the Independent Communication Authority of South Africa, the Commission for Gender Equality and relevant Government institutions. The seminar benefited from international experience of e-voting through the participation of electoral practitioners and experts from other countries.

1.1.1 Objectives of the Seminar

The specific objectives of the seminar were to:

- examine the cross-national experience of e-voting technologies by way of country case studies highlighting key lessons learnt;
- afford key electoral stakeholder the opportunity to gain an understanding of e-voting and interrogate its utility in South Africa;
- assess the positions of key electoral stakeholders vis à vis e-voting.

1.2 INAUGURATION

The seminar was inaugurated by the senior leadership of the IEC. Mosotho Moepya, the Chief Electoral Officer, welcomed the delegates and the keynote address was delivered by Advocate Pansy Tlakula, Chairperson of the IEC. Advocate Tlakula expressed appreciation for the participation of all the delegates, particularly mentioning the presence of the Chief Election Commissioner of India, Shri VS Sampath; the Head of the International Foundation for Electoral Systems in the Philippines, Ms Beverly Thakur; Member of the Brazilian National Council of Justice and Member of the Electoral Commission, Judge Paulo Tamburini; Dr Margaret McGaley of the Department of Computer Science at the National University of Maynooth in Ireland, who is also spokesperson for Irish Citizens for Trustworthy E-voting; Peter Wolf from International IDEA and Troy Hector from Telkom.

She highlighted the fact that one of the strategic objectives of the IEC is to ensure that the Commission remains a pre-eminent election management body that seeks continuous improvement and innovation through the use of technology. Further, she stated that the Commission aims to strengthen electoral democracy in South Africa and to position itself as a trend-setter in electoral democracy. The purpose of the seminar was to realise these objectives.

Advocate Tlakula said the IEC has yet to adopt a formal position on e-voting as it is of the view that a thorough examination of the cross-national experience of e-voting is a prerequisite to adopting an informed position. She asserted that although South Africa will review the global experience of e-voting, ultimately the decision whether or not to adopt it should be underpinned by the South African context and be informed by the country's demographics, political culture, social and economic environment, financial capacity and institutional and infrastructural capabilities.

The March 2013 Kenyan general election had been a classic example of failed technology, she said. About 70% of the biometric data machines did not work on election day and election officials had to revert to the paper registers. Further, the short message service (SMS) facility for transmitting results also failed to work, resulting in a delay in the announcement of the results. Similarly, in Ghana, the use of biometric registration and verification machines during the December 2012 presidential and parliamentary elections did not have desirable results. The law did not provide for alternatives in the event of technology failures.

Advocate Tlakula highlighted some findings from the study of e-voting conducted by the IEC:

- Approximately one in every three countries that may be defined as an electoral democracy has implemented or is experimenting with e-voting;
- E-voting is not the preserve of developed countries – both developed and developing countries are involved. For instance, India and Brazil are considered global leaders in e-voting;
- A few African countries, among them Namibia, Kenya, Ghana, Tanzania and Zambia, are beginning to experiment with the use of technology in various aspects of the electoral process such voter registration, transmission of results and candidate registration;
- Some countries, among them Holland, Japan, Germany, the United Kingdom (UK) and Ireland, have abandoned e-voting;
- There are many different types of e-voting technologies but, generally speaking, they may be divided into two main categories, namely:
- Technologies that are used in environments controlled by an election management body (EMB). Such technologies include e-voting machines as used in India, the United States of America (USA) and Brazil, among others.

- Technologies that are made available to the electorate in environments that are not controlled by an EMB. Such technologies include internet voting, fax voting and telephone voting. These are available in Canada, France, Estonia, Japan and some parts of the USA.

The study noted that e-voting has both merits and demerits. One of the advantages is that it allows for speedy and accurate counting of votes. It also reduces the number of spoilt ballots. It is considered to be environment friendly in comparison to paper-based voting. The demerits related to high monitoring costs, the security of the data, a reduction in the transparency of the voting process, and the lack of consistent global standards for the verification and auditing of e-voting systems.

From the foregoing chequered lessons learnt, Advocate Tlakula said, there is no discernible reason either to move towards or away from e-voting. Furthermore, while almost all e-voting technologies have been compromised in one way or another, some democracies are prepared to accept them, while others are not. Another lesson is that context is of paramount importance in deciding on an e-voting technology. Finally, research has shown that the process of introducing e-voting is as important as the product itself. The process must be underpinned by inclusivity and trust, while a failure to manage the process of change from one voting method to another is likely to derail the success of the project.

In her concluding remarks before declaring the seminar open Advocate Tlakula outlined the seminar programme, stating that the sessions would benefit from case studies, global experience and the implications of e-voting for South Africa.

CHAPTER 2

OVERVIEW OF E-VOTING – CROSS-NATIONAL EXPERIENCE

2.1 MR SURENDRA THAKUR, DURBAN UNIVERSITY OF TECHNOLOGY, SOUTH AFRICA.

Article 21 of the United Nations Declaration of Human Rights, said Surendra Thakur, states that everyone has the right to vote, that votes must be conducted in secret and that the votes must be counted.

Genesis

In his brief history of voting and voting methods he said in Greece in 500 BC the vote was negative and had nothing to do with right or wrong or with justice. In India in 750 AD a huge mud pot (Kudam) served as a ballot box. Voters wrote the name of the desired candidate on a palm leaf (Panaiolai) and drop it into the pot. At the end of the process the leaves (votes) were counted and whoever received the highest number of votes was elected. The Italians used a black or white ball to vote people into secret societies. The white ball meant acceptance and the black ball rejection, hence the term to blackball. Paper ballots were first used in Rome in 139 BC and in the USA in the 17th century. However, in The Gambia in 1965, because the illiteracy rate was 75%, white translucent marbles were used for voting.

Ultimately various machines were introduced, among them mechanical lever, punch card systems, a direct recording electronic (DRE) touch screen, jelly button DRE and optical scans, all of which present challenges.

The next form of voting to be introduced was internet voting, which takes many forms and has been derided by those who oppose it as 'voting in your pyjamas'. The different forms include:

- Remote internet voting;
- Kiosk-based internet voting; and
- Poll-site-based internet voting.

Electronic Voting

Thakur defined e-voting as encompassing both electronic means of casting a vote and electronic means of counting votes. E-voting may be conducted in either a controlled or an uncontrolled environment. A controlled environment is a secure area the EMB temporarily sets up by installing equipment and implementing a clearly defined process flow. An uncontrolled environment refers to the situation in which a voter accesses a system remotely from the comfort of his or her own locality (home, office or mobile) and registers a vote.

Reasons for Moving to E-voting

The reasons why e-voting was introduced, said Thakur, included: greater accuracy, "faster democracy", and modernity.

Reasons for not moving to E-voting

Politicians, said Thakur, might object to e-voting because it defers to or 'constructively' abrogates their responsibility to their electorate. Among the reasons why others might oppose e-voting were the fact that at some point almost every machine – laboratory, field-based and experimental – has been compromised and that no technology is insulated from misappropriation. In addition, there is the possibility of changing votes surreptitiously. E-voting makes it difficult to monitor voter patterns and it may deny a voter the opportunity to vote by removing her or him from the roll.

Abandonment

Countries that have abandoned e-voting for various reasons include the Netherlands (2007), Ireland (2004), Germany (2009), Australia (2010), England and Scotland. Countries that have used electronic voting machines (EVMs) include India, Brazil, Estonia, Norway, the Philippines, Australia and Venezuela. However, like any other system, EVMs present their own unique challenges.

Socio-political Context

Thakur outlined some of the socio-political factors that should exist in countries that would like to adopt e-voting. These are:

- A stable non-violent political climate;
- A multiparty democracy with two dominant parties;

- A coalition government (Australia, Germany, India, Philippines, the UK, Japan);
- A large population – six of the 10 most populous countries in the world use e-voting. They are India (1.2-billion), the USA (310-million), Brazil (201-million), Russia (140-million), Japan (127-million) and the Philippines (91-million);
- A level of technical maturity;
- Illiteracy must not be a perceived setback;
- Fragile or transitional democracy;
- A mixed economy.

Factors Critical to the Success of E-voting

If e-voting is to succeed the following factors must be present:

- Vote secrecy – a person's vote must be kept secret, but the amassed votes of various groups must be public;
- Vote security – an eligible person is allowed to vote and the vote is counted;
- Ease of voting – the voting process must be convenient, intuitive and simple;
- Speed and efficiency – the ballots must be counted with a speed that does not compromise accuracy;
- Accuracy of results – the results must be correct to the extent that all stakeholders, particularly the losers, accept them;
- Voter turnout – the goal of an election is to ensure that the maximum number of eligible voters is encouraged to vote, but not at the expense of differential access to the vote;
- Operational support infrastructure is required – this refers to, inter alia, communication, technical support and equipment;
- Cost – the cost of holding an election must be balanced against a country's circumstances;
- Spoilt ballots, under votes and over votes – a spoilt ballot is one that is declared invalid. An under-vote is where the voter makes fewer choices then he or she is entitled to. An over-vote is where the voter makes more choices than he or she is entitled to;
- Observation by stakeholders – political parties, civil society and citizens – is important to build trust in the process.

Recommendations

Thakur said the IEC is recognised as a leader in electoral administration and in executing free and fair elections. It has won five awards for its success, acknowledgement it has achieved through consistently researching and testing different election technologies to determine whether, where, how, and when such technologies might he added.

Having conducted a cross-border analysis of e-voting, he said, the IEC is faced with two options: to further explore e-voting through trials and pilots or not to consider e-voting at this stage.

A set of recommendations in line with each option is presented below:

Should the IEC decide to consider e-voting, the following recommendations were made:

- South Africa should amend its laws to allow for experimentation through trials and pilots to add to the voters' choice;
- An actuarial analysis should be conducted to assess the benefits that may derive from holding "green elections". This may help to earn voter trust;
- An expanded, focused research study should be conducted of countries that have abandoned e-voting. It is strongly recommended that countries embarking on trials or pilots be closely monitored;
- An independent, non-partisan monitoring centre must be established where the experiences of e-voting are documented, catalogued, analysed and disseminated. This centre may be virtual, with a specific mandate to constantly appraise and relate to possible South African experience(s); and
- A trial or pilot, if and when conducted, must be transparent, rigorous, inclusive and consultative.

Should the IEC decide not to consider e-voting at this stage the following recommendations were made:

- The various forms of e-voting that are taking place internationally should be continuously assessed and monitored;
- There should be collaboration and partnerships with local and international EMBs, research institutions and those conducting academic studies that analyse and evaluate e-voting technologies;
- Officials should be encouraged to participate in international observer missions in amenable countries where e-voting is practised; and
- Periodic environmental scans or studies, such as this study, of e-voting experiences, should be commissioned.

2.2 QUESTION AND ANSWER

To Adopt E-voting or Not

Mervyn Cirota of the Independent Democrats (ID) and a member of the National Party Liaison Committee asked for the researchers' views on e-voting and whether they viewed it as an option for South Africa.

André Gaum, of the African National Congress (ANC) and Acting Chairperson of the Portfolio Committee on Home Affairs, asked whether the factors that made other countries discontinue e-voting could be catered for in the South African context. Thakur responded that he believed in the power of technology to help people and to promote equity and generally help communities. He said he supported e-voting and believed it would be useful in the South African context.

Cost

Jana Warffemius of the United Democratic Movement (UDM) enquired about the cost of each ballot cast in South Africa. She also wanted to know why Australia is going back to e-voting. Peter Smith of the Inkatha Freedom Party (IFP) concurred with this line of questioning and sought clarification on the separation of capital costs and operational costs. He questioned the costs provided in the example that had been given: that each ballot would cost more than R10 000. Thakur said it is difficult to work out the costs. He explained that many factors have to be included such as the cost of printing ballot papers, the cost of transporting the papers from the printing works to the voting districts, the cost of the vote on election day and the cost of restoring the ballot papers to the areas where they must be stored for three to five years, and then the cost of that storage. Those had to be balanced against the costs of deploying a typical EVM, which include the grid or energy requirements and the cost of returning the EVM to its storage facility.

Professor Anthony Mbewu, CEO of the South African Government Printing Works, sought clarity on whether research had been conducted around the globe into the use of ID smartcards in conjunction with e-voting mechanisms, either at polling stations or remotely through automated teller machines (ATMs) or any other way that might facilitate ease and security and reduce the cost of e-voting. Thakur said much research has been done on smartcards and there are numerous instances in Western Europe of countries using smartcards for identification. This would be an opportunity in the South African context, he maintained.

E-voting and the Right to Vote

A delegate asked how e-voting relates to the right to vote. Thakur said e-voting would allow for engagement with youth in a way that they are familiar with. Today's young people, he said, are very connected through the use of smartphones and digital devices, thus the best way to engage with them is through technology. To this effect, Thakur believed that the move to an e-voting system would increase the number of people who vote, particularly in local elections, where, historically, there has been a lower participation rate.

CHAPTER 3

COUNTRY CASE STUDIES

3.1 IRELAND – DR MARGARET MCGALEY, DEPARTMENT OF COMPUTER SCIENCE, NUI MAYNOOTH, IRELAND, AND SPOKESPERSON FOR IRISH CITIZENS FOR TRUSTWORTHY E-VOTING

In a brief political and historical overview of Ireland, Dr McGaley said it is a republic of approximately 4.5-million people, heavily concentrated in the capital city, Dublin. The total area of the state is 70 273 km^2, a little smaller than the Mpumalanga province of South Africa.

Historical and Political Background

Ireland was under British rule from the 1600s, independence was declared in 1916, and the country was recognised by Britain in 1922. The state that was created covers about four-fifths of the island; the remainder, known as Northern Ireland, remains under British rule. The original 1922 Constitution was replaced in 1937, but many of the political structures are still legacies of British rule.

Ireland's head of government is the Taoiseach (Prime Minister) and there is a President, who is head of state, but the role is largely ceremonial. The President signs new legislation but has no power to veto it, though the legislation can be referred to the Supreme Court if there is reason to believe it is unconstitutional.

The legislative branch consists of the Dáil (House of Representatives), the Seanad (Senate) and the President. The executive branch is led by the Taoiseach, who must be a sitting member of the Dáil and is nominated by the members of the Dáil. The Taoiseach then selects a cabinet of 7 to 15 members from the Dáil (up to two members may be from the Seanad). Dr McGaley said that although there is local government in Ireland its powers are limited and the local councils rely almost exclusively on funding from the government.

Election Process

Dr McGaley briefly explained the election process in Ireland, where a general election is held at least every five years. Members of the Dáil (TDs) are elected by proportional representation: single transferrable vote. At the time e-voting was piloted there were 43 constituencies, from which 166 TDs were elected. Each constituency has three to five seats, depending on population density. Constituency boundaries are redrawn by an independent commission after each census.

Once the results of a general election are available the political parties negotiate to form a coalition (there has not been a single-party government since 1977). The leader of the largest party in the coalition is normally nominated as Taoiseach. The Seanad consists of members nominated by the Taoiseach, by certain universities, and by special panels. It has the power to delay, but not to veto, legislation.

The government takes advice from Oireachtas committees, which are made up of members of both houses from across the political parties. These committees discuss specific areas of interest and take evidence from interest groups, witnesses and departmental officials, without being constrained by party policy.

Election System

Explaining the proportional representation: single transferrable vote (PR: STV) system, Dr McGaley said that casting a ballot is relatively intuitive: the voter ranks the available candidates in order of preference, writing the number '1' beside their favourite candidate, '2' beside their second preference and so on. 'X' or similar marks are also acceptable if the voter only wants to indicate his or her first preference. The counting rules err in favour of reading what one can from a ballot rather than only accepting ballots which adhere strictly to the rules.

A quota is calculated from the number of votes cast and the number of seats available. Dr McGaley emphasised that this number is formulated in such a way that it is impossible for more candidates to reach that quota of votes than there are seats available. Candidates are elected (once they have

the requisite quota of votes) or eliminated (when it becomes clear that they cannot reach the quota).

Counting, she said, becomes much simpler when only one seat is available, for example, the presidency. In such cases the counting becomes equivalent to an alternative vote, since most of the complexity of the system becomes irrelevant. This system is also used to vote for Members of the European Parliament (MEPs).

Ireland does not have an independent electoral commission – state elections are run by the Department of the Environment and Local Government, which was responsible for introducing electronic voting.

Technology Piloted in Ireland

The machines that were piloted in Ireland consisted of a panel of fixed buttons and a small LCD screen which could display very limited messages to the voter. A printed sheet attached to the machine indicated which button represented which candidate or option.

Voters would approach the registration desk and, once their identity and eligibility to vote was confirmed, would be given a token. They would then approach the attendant at the voting machine who would take the token and prime the machine to accept the vote. Once all preferences had been indicated the voter would press the "cast vote" button.

Votes were stored within each voting machine on a "ballot module". After polls had closed these modules would be physically transported to the counting centre where the ballots were exported to a Microsoft Access database application for tabulation.

History of E-voting in Ireland

Electronic voting, said McGaley, was first proposed in Ireland in the late 1990s and in 1999 legislation was introduced which enabled the use of real ballots in research into the feasibility of e-voting.

Ireland used a system by Nedap/Powervote, which was piloted in three constituencies in early 2002 and seven constituencies in late 2002. The original plan was to acquire 1 400 machines for the 2004 elections and to expand the pilot to the greater Dublin area.

The pilots had been portrayed as very successful but discrepancies were observed between the number of votes recorded by the returning officer and the number of votes recorded by the voting machines in two constituencies. After research and some deliberation, in February 2004 the system was officially launched in Dublin city centre. In March 2004 the Commission on Electronic Voting (CEV) was set up to examine the secrecy and accuracy of the chosen system. More research was done to effect the significant changes the commission felt were required to make the system suitable for use in Ireland. Three years later the minister responsible declared that the government had decided "not to proceed with the implementation of electronic voting in Ireland".

Reasons for Introducing E-voting

The main reasons for introducing e-voting in Ireland were to:

- Make it easier for the public to vote;
- Provide election results within a few hours after close of poll, depending on the size of constituency;
- Improve the efficiency of electoral administration; and
- Support a positive image of the country in terms of the use of information technology.

Costs

Contrary to early hopes that the system would reduce costs, said Dr McGaley, it was actually quite an expensive way to run an election. While staff numbers at the counting centres would be reduced to very low levels, the number of staff required at the polling stations would be significantly increased.

Storing electronic voting machines create new costs, she said, since computers must be stored in a controlled environment. For the three years before the machines were sold for scrap, the cost of storage was €140 000 per year, reduced from an earlier

figure of €700 000 annually. In addition, a website was developed, at a cost of €52 000, which gave voters an opportunity to practise using the interface through a simulation. Once the decision had been made not to use the system "tens of thousands" of euros were spent on consultants to advise on the disposal or storage of the machines.

Dr McGaley said a detailed calculation of the cost of the system showed that €53 264 335 had been spent and at least a further €57 164 754 could be expected to be spent on staff, storage, and insurance over the projected 20-year lifespan of the machines. This added up to a total spend of €110 429 089 and, calculating on the basis of one election every two years, each election would cost more than €11-million.

Reasons for not Implementing E-voting Technologies in Ireland

- The quality and testing of the count software: the software had a mission critical role in a safety context, yet it had no coherent version control system so changes were constantly being made;
- Access to source code: the source code for both the voting machines and the count software was not made available to the Commission, which was therefore unable to perform an adequate code review;
- Incomplete testing: the CEV was concerned that there had been inadequate testing of the system and there were no independent end-to-end tests of the system as a whole;
- The security of the personal computers (PCs) used at counting centres – the so-called hardened PCs – were deemed to be the weakest link in the security of the system;
- Procedural issues: the report simply states that "attention is required" for this aspect of the system, but this is consistent with reports from the returning officer in the pilots;
- Secrecy of the ballot and special needs: the system failed to improve accessibility for voters who normally need assistance with voting, and even reduced accessibility;
- Difficulty of publishing votes: there is a conflict between the desirability of publishing all votes for verification of results and the potential use of unlikely vote combinations as a signal in cases of corruption or intimidation;
- The system did not have a voter-verifiable audit trail, thus it:
  - → Could not reassure voters that their vote had been correctly recorded;
  - → Created a disincentive to the manipulation of the system by providing an external check on accuracy; and
  - → Enabled recovery from a serious system failure.

Lessons Learnt

E-voting, said Dr McGaley, has the potential to bring some improvements to the electoral process, but it must be introduced carefully and with full cognisance of the safety critical to the nature of the electoral system. Impartial, reliable, informed expertise is vital to the successful introduction of e-voting. Several significant mistakes were made in Ireland that contributed to the failure of e-voting there. Below are some of the lessons that were learnt:

- Response to criticism: the response from the government was to demonise people who opposed the system and to dig in its heels;
- Expertise: the DoELG did not have sufficient in-house expertise to evaluate the quality of the system and ended up relying on the vendor's advice;
- Specifications: a clear set of requirements was never developed;
- Planning: inadequate planning resulted in several oversights (including the purchase of insufficient machines);
- Buy-in: the project did not have buy-in from all stakeholders;
- Responsibilities: the contracts with the vendors of the system appear to have been wholly inadequate. They had no legal responsibility to provide a system that was fit for purpose.

Dr McGaley concluded her presentation by reiterating that a project of this scale and importance must be well-specified, well-planned and supported by impartial advice from sufficiently knowledgeable experts. Above all, it must be undertaken with caution.

3.1.1 Question and Answer

Cost Analysis of E-voting

Mervyn Cirota of the ID said economies of scale seem to be important when deciding whether or not to use e-voting. Ireland, he said, had only a small population and there is a need to determine whether South Africa's population, which is 10 times the size of Ireland's, would provide an ideal setting for e-voting systems. He sought advice as to whether e-voting would be recommended or if it would be too complicated a system for significantly large populations. Dr McGaley said it is hard to draw conclusions about economies of scale. She noted that although many people believe the machines save money this conclusion is not necessarily justified.

Red Haines of Bharat Electronics asked about the cost of the machines used in Ireland and how many were purchased. Dr McGaley said the machines cost about €3 500 each and 7 000 machines had been purchased but that number had proved to be inadequate. She argued that for a small population like that of Ireland e-voting might not be cost-effective. A cost-benefit analysis is required before making a decision to use this system.

Cirota asked about the fundamental reasons why the system of e-voting had failed. He queried whether if it were introduced in South Africa the results might be different. Dr McGaley said she believed that because the system in Ireland was not run by an independent electoral commission there had been no particular control, no analysis of the system and many questions had been left unanswered. While she did not believe there had been corruption, the system had failed because of various incidences of incompetence.

Penny Tainton of the Democratic Alliance (DA), an IT professional, asked for an assessment of the concept of e-voting and whether it could be further investigated, supported and implemented better. Dr McGaley said she had very high standards when it came to EVMs. She would not underestimate the value of e-voting but, if there were a more cost-effective system of voting, she would use it. There were many advantages to e-voting, particularly in countries such as India and Brazil, which have large populations. Her personal preference, she said, is scanned ballots, because they provide a voter-verified audit trail, but she reiterated that she was not opposed to e-voting.

How the Lessons Learnt Can Be Used to Upgrade the System

Raymond Tlaeli of the African Christian Democratic Party (ACDP) sought clarity as to whether the e-voting process was abandoned or aborted because Dr McGaley, together with the International Conference on Technology and Education (ICTE), had set up a group that had campaigned successfully against the system. He further asked whether it was possible that the government would review the lessons learnt and re-apply the system more appropriately. In response, Dr McGaley said the Commission on E-voting and Counting at Elections had outlined the changes it thought were needed to make the system trustworthy. The changes were extensive and it was clear that they would cost a great deal and there was no political will to pursue the project. Further, people like the paper system.

A representative from Nigeria asked whether any other options or technologies had been considered or if the decision had been made based only on one system. Graham McIntosh, Member of Parliament on the Portfolio Committee on Home Affairs, asked whether, if PRSTV was not the stumbling block, the Irish government would consider using a different e-voting system. Dr McGaley replied that the government and the people had over-committed to the system that had been used and the idea of getting a new system was not welcomed. In addition, the way the system had been introduced was inappropriate as there had been no independent tender process. There had also never been a broad analysis or trials of different systems. The Irish

people, she said, are attached to the PRSTV system. Three attempts have been made to replace it but they have failed to convince the electorate.

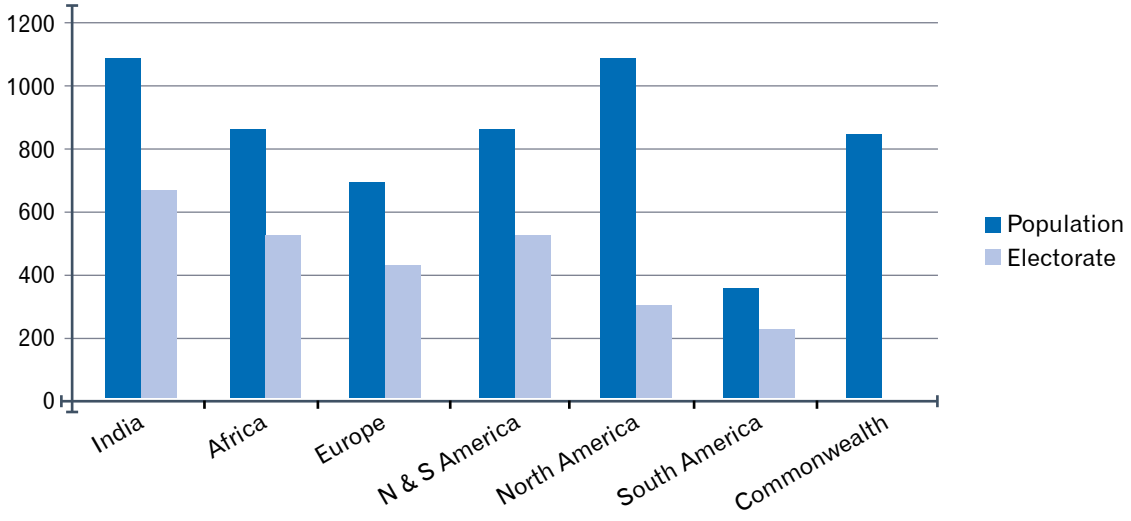
Another speaker said the most important aspect of the presentation had been the indications of what South Africa might learn from the Irish situation to assist in its own voting process. Dr McGaley said South Africa faced many challenges in relation to e-voting. These include infrastructure, the multiparty system and the topography of the country. She said that in planning the way forward South Africa must consider pilot projects, as e-voting is very costly. She believed the IEC should take a cautious, appropriate approach, trying different technologies based on an analysis of its various contexts. She advised the IEC to begin with EVM trials that are not binding.

Moreover, different technologies should be tried and tested.

3.2 INDIA – SHRI VS SAMPATH, CHIEF ELECTION COMMISSIONER OF INDIA

Demographics of India

India has a population of approximately 1.21-billion and an electorate of over 770-million – greater than that of all the countries of Europe combined. There are 543 parliamentary constituencies, 4 120 assembly constituencies and approximately 900 000 polling stations. More than 8 000 candidates contested the 2009 parliamentary elections and approximately 11-million polling personnel and 100 000 personnel from the central police force were deployed in those elections.



Population and electorate in India compared to the rest of the world (Source: Election Commission of India)

Major Challenges in Elections in India

Sampath said major complexities and diversities make Indian elections challenging and exciting. The country is topographically diverse, incorporating a desert, islands, dense forests and lush green fields. The Indian Constitution recognises 22 languages, however, there are also hundreds of minor languages and dialects.

While elections are conducted on a large scale, he said, the Election Commission of India (ECI) also has an eye for detail in ensuring that every single voter is able to cast her or his vote freely and fairly. An example is that a separate polling station was created in the middle of the Gir National Forest in Gujarat for a single voter so the voter did not have to walk far to cast his vote. The Commission, said Sampath, tracks every polling station on election

day, using mechanisms like SMS-based poll monitoring, video recordings of the polling process and direct web casting from polling stations.

India's voting system has evolved in the past 60 years from a very primitive system to electronic voting. In the first general elections, held in 1951, a separate ballot box was kept for each candidate as voters would not have been able to understand the process of marking ballot papers. The system of marked ballot papers was introduced during the mid-term elections to the legislative assemblies of Kerala and Orissa in 1960-1961 and remained in vogue until the elections for the Lok Sabha in 1999.

Types of E-voting

Sampath described two types of e-voting: 'place of poll electronic voting' and 'internet voting'. Internet voting has been tried on a limited scale in Austria, Canada and the USA and India experimented with it in elections for the Ahmedabad Municipal Corporation in Gujarat. 'Place of poll Electronic Voting' can mean the use of 'direct recording machines' or voting by marking on a paper ballot in the usual manner, with optical scanning for the counting process.

The Journey of Indian EVMs

EVM technology was first mooted in 1977 by Shri S L Shakdhar, then Chief Election Commissioner of India. Two public sector companies, the Electronic Corporation of India (ECIL) and Bharat Electronics Limited (BEL), were asked to develop EVMs.

The machines were extensively tested at locations across the country and the EC conducted seminars with all stakeholders. The machines were then fine-tuned based on the feedback obtained. The decision to use EVMs, said Sampath, was made in July 1981, but they were first used in May 1982 at 50 polling stations in the Parur Assembly Constituency in Kerala. Before the use of these machines could become widespread, however, it was challenged in an election petition and, in 1984, the Supreme Court ruled that EVMs could not be used in elections unless the law was amended and a specific provision made for their use.

After deliberation the government appointed a Technical Experts Committee to examine EVMs and give a report to the Committee on Electoral Reforms. The Technical Experts Committee unanimously recommended that EVMs should be used and, on the recommendations of the Committee on Electoral Reforms, Parliament amended the law in 1988, adding a new section empowering the Commission to use EVMs. The necessary amendments were made to the Conduct of Election Rules in March 1992 and, since 1999 EVMs have been used in every general election and by-election in India.

Main Technical Concerns and Remedies

One of the main concerns raised when EVMs were being developed, said Shri Sampath, was the possibility that data might be tampered with. The remedy was to "burn" a software code into the microprocessor used in the EVM which cannot be changed or even read back from the microprocessor.

In addition, Indian EVMs do not have an operating system, all coding is at the chip level and the EVMs are stand-alone machines which cannot be networked and therefore cannot be accessed or hacked remotely.

Another problem was how the machines could be used in rural areas which had no mains power. The remedy was to use a special power pack, a 7.7-volt battery which is independent of mains power. In these cases, because it is necessary for data to be stored for long enough to be used as evidence in a court of law in case of an electoral dispute, data is recorded on volatile dual redundant memory chips so it can be retained for years even when the power pack battery is removed.

Improvements in EVMs over Time

India's EVMs, said Sampath, have been improved as technology has progressed. The first model, manufactured in 1989/1990, has been declared obsolete. The Commission has fixed the life of EVMs at 15 years. A new improved model, designed in the 2006, includes date and time stamping of all keys pressed, dynamic key coding, and a real-time clock.

Security of EVMs

EVMs, said Sampath, are kept under strict security – stored in lockable rooms under armed guard 24 hours a day. They are also under CCTV camera surveillance. When they are transported from the storage area to the polling stations and back they are always accompanied by an armed police guard.

Transparency and Involvement of Stakeholders

The Commission, said Sampath, ensures complete transparency and involvement of all stakeholders in the use of EVMs. A first-level check is done a few months before every election in the presence of representatives of recognised political parties, after which a mock poll is conducted by casting 1 000 votes in at least 5% of EVMs picked randomly by representatives of political parties. A sequential printout of the result is made and shown to the political party representatives. Thereafter, the control unit of the EVMs is sealed using a uniquely numbered pink paper seal which is manufactured by the security printing press, Nasik.

Sampath emphasised that the control unit cannot be opened without damaging the pink paper seal. After the candidates for election are finalised a similar process of second-level check is done on the ballot unit, after which the unit is sealed using the pink paper seal.

Judicial Scrutiny of EVMs in India

EVMs in India are scrutinised by the courts and satisfaction has been expressed in election petitions about the fact that they cannot be tampered with, said Sampath, with one court observing that "this [ECI-EVM] invention is undoubtedly a great achievement in electronic and computer technology and a national pride". The Madras High Court held that "there is also no question of introducing any virus or bugs". It further observed: "The contention of the learned counsel is that the use of EVMs in Japan and the United States of America proved to be a failure also will not hold any water. In India, we are not following the system prevailing in the United States of America or Japan."

Advantages of Using EVMs

According to Shri Sampath the advantages of using EVMS are:

- They modernise the election process;
- They are user-friendly and can be used by illiterate voters;
- They are simple to operate and can be installed in a short time;
- They preserve voting secrecy;
- There is no scope for invalid votes;
- They facilitate quick and accurate counting and make it possible to declare results instantaneously;
- They are re-usable by simply erasing votes recorded in an earlier poll;
- The huge expenditure involved in printing, storing, transporting and securing ballot papers is avoided. Approximately 12 000-million tons (MT) of paper would be needed at a total cost of Rs. 578 400 000 in each parliamentary election;
- Operating costs are low;
- EVMs are easy to manage, with less demand on manpower;
- They are environmentally friendly. One MT of paper requires that 24 fully grown trees be felled, so there is a saving of 282 240 trees in every election by using EVMs. One MT of paper needs 680 litres of water, so 8 160 000 litres of water are saved in every election.

Way Forward

The ECI, said Sampath, is continuously engaged in the process of further improvement of EVMs. BEL and ECIL have already developed a voter verifiable paper audit trail (VVPAT) system, the design of which has been approved by the Technical Experts Committee. The Commission has now decided to use EVMs with VVPAT in a by-election before they can be used more widely. The Commission is also working on a new EVM model and is considering the following additional features:

- Code verification and unit authentication;
- Public key infrastructure (PKI) authentication;

- Possibility of code in public domain;
- Integrated VVPAT;
- Confirmation of choice of vote by the voter;
- Possibility of a larger number of candidates.

Lessons Learnt

- E-voting and counting makes election processes faster, simpler and tamper-proof;
- Provision must be made in election law before EVMs are used;
- E-voting should be introduced gradually;
- Consultation with all stakeholders is a must to ensure buy-in;
- Voter education in the use of EVMs is desirable to ensure a well informed and better engaged populace;
- Continuous improvement is necessary with changing technology.

3.2.1 Question and Answer

Shortcomings of the EVMs

Jacob Dikobo of the Azanian People's Organization (AZAPO) sought clarity on the disadvantages of e-voting as he believed no system could only have advantages and no demerits. Another speaker concurred with Dikobo and, noting that the system had been portrayed as perfect, asked whether India had experienced any practical problems since it began using the technology and what the challenges were. Sampath explained that the system has its disadvantages, such as instances where machines fail, and recommended that an adequate number of machines should be provided. In remote areas it takes longer to replace machines, so India has had to come up with strategies to ensure that machines remain accessible to people living in these remote areas.

Another perceived disadvantage, he said, is the source code. This should be in the public domain or there should be source code verification. India was examining whether when new voting machines are acquired source codes will be able to be verified and placed in the public domain. Another disadvantage of the EVMs is that, in a minuscule percentage of cases, the machines do not reflect the vote count correctly. In such cases provision is made to attach a printer to the machine and have the results printed. If the margin between the winning and losing candidates is greater than the total number of votes covered by the EVM where the result is not obtainable, the returning officer is permitted to declare the results.

The IEC's Advocate Pansy Tlakula asked why India has decided to experiment with a paper trail system. Sampath said political parties had requested that the paper trail be introduced as a further confidence measure. EVMs are not manipulable, he maintained, and no one has been able to show that they can be manipulated.

Cost Analysis

A representative from Nigeria asked for a comparison of the expenditure on the old voting system and that on e-voting. Sampath said no research to that effect had been done but, on average, India spends less than half a dollar per voter. India does not recruit personnel to conduct elections, instead using government employees who are deputised to the ECI so that no extra cost is incurred. The figures he provided are only the savings made by the absence of paper.

Security of EVMs

Peter Wolf of International IDEA sought clarity on the security of the EVM voting system. He enquired whether political parties are concerned about the fact that votes can be linked to individual voters. He further enquired whether any thought had been given to randomising the storage of the machines so that there is no link between the voter and the vote cast. Sampath responded that e-voting has, to an extent, reduced some malpractices, including mischief at polling stations. The results obtained should be considered an improvement to that extent. Asked by Dr Sylvester Maphosa of the Africa Institute of South Africa, whether e-voting aids in consolidating negative peace, that is, the

absence of direct violence, or in creating positive peace in terms of transforming attitudes and relationships and the capacity and competence of the leadership, Sampath said he was not sure.

3.3 PHILIPPINES – MS BEVERLY THAKUR, HEAD OF THE INTERNATIONAL FOUNDATION FOR ELECTORAL SYSTEMS IN THE PHILIPPINES

Demographics and General Background

The general population of the Philippines in 2010 was 92.3-million and the voting population 48 275 594. In 2013, however, said Ms Thakur, those figures were expected to rise to 103-million and 52 014 648 respectively

Local government units (LGUs), she said, are divided into 80 provinces as the primary unit. Provinces are composed of cities and municipalities, which, in turn, are composed of "barangays" or villages (which are the smallest LGUs). The Philippine government consists of the executive, the legislature and the judiciary and it is the judiciary that has the mandate to oversee elections. The Philippines has a Bicameral Congress consisting of a Senate and a House of Representatives.

Thakur described Filipino voters as showing much resilience and a commitment to democracy, as evidenced by the substantial voter interest and turnout in 2007 under the manual system and in the first automated election, in 2010, when voters had to brave long queues to cast their ballots.

The social characteristics of the electoral process in the Philippines, she said, are based chiefly on patronage politics and poor governance and there is a highly litigious electoral environment, as evidenced by the number of challenges to election results by those who lose elections. However, Thakur said, the introduction of the automated system appears to have wrought some changes – in the 2010 presidential elections, for the first time in the country's history, the losing candidate conceded defeat on election night.

The social context of the Philippines has strong underpinnings of corruption and self-enrichment, leading to election violence by both losing and winning candidates.

The E-voting Technology

The Philippines' journey to e-voting technology began in 1995 with the enactment of the enabling law. In 1996 the first automated election was held. In 1997 Congress enacted another law to automate elections in 1998 and thereafter.

There were, however, some delays. In May 2001 the authority to automate elections was in place but there was no budget and in 2004 the Supreme Court declared related procurement null and void.

By 2008 five pilots had been implemented to test different technologies and these pilots informed the decision about which technology to use.

The International Foundation for Electoral System (IFES) held a vendor fair in November 2008 to introduce the Filipino electorate to e-voting technologies. The fair exposed the stakeholders to the technological options and information about potential pitfalls. The outcome was a recommendation that paper-based precinct count optical scan (PCOS) technology be used for the May 2010 presidential election. In 2009 Congress enacted a law that assigned the equivalent of R2.1-billion to the e-voting technology project.

Type of Technology

In 2009 the contract for an automated election system was awarded to Smartmatic-TIM for the 2010 elections. The contract provided for three components:

- An automated election system comprising an Election Management System, PCOS System, and Canvassing and Consolidation System (CCS);
- The electronic transmission of election results;
- Overall project management.

About 82 000 PCOS machines were leased, requiring precincts to be clustered and increasing

the maximum number of voters per precinct from 200 to 1 000. Thakur argued that it is better to obtain machines based on the needs of the electoral system than to fine-tune the operations according to the number of machines that can be obtained.

Introduction of E-voting Technologies in Philippines

According to the law the objectives of the migration to the e-voting system are to improve the secrecy and sanctity of the ballot and all election, consolidation and transmission documents in order to make the process transparent and credible and for the results to be fast and accurate and reflect the genuine will of the people. Although e-voting technology does not improve the secrecy of the ballot, said Thakur, it does have a positive impact on accuracy.

She argued that the manual system left room for manipulation as well as for honest mistakes. With the electronic system the results are transmitted to a central server and an additional server used by parties, civil society and the media.

Thakur admitted, however, that e-voting made the vote count less transparent as the results are tallied by a machine, while, under the manual system, voters would gather to see the counting and tallying of results.

Monetary Costs of E-voting and Counting

About 70% of the costs were allocated to the leasing of the machines, while about 20% went to the services of the vendor, said Thakur, saying that the question of whether e-voting technologies are worth the costs are best answered contextually in terms of need versus cost.

Transitional Issues: From Traditional Voting Methods to E-voting/Counting Technologies

Some important issues to watch out for in migrating from manual ballot to electronic technology, said Thakur, are the inclusiveness of external stakeholders; patience, perseverance and pilot testing; management and communications within the election management body; capacity-building and change management; quality control and risk management and new skill sets in IT at all levels. There is also a need for random manual audits and the management of winning presidential margins.

Key Lessons Learnt

Most of the problems picked up in the e-voting process, said Thakur, were linked to human error rather than to the machines. Thus it is essential to educate voters in the use of new e-voting or counting technologies.

She also noted that although the review of source code was delayed, it was thorough. While a significant number of “minor” deficiencies were detected, such issues could be reconciled with “appropriate manual processes”. It was recommended that a proper random manual audit be conducted to provide the required security.

The number of printers required had been miscalculated, which led to the ultraviolet (UV) ink not printing properly. This meant that the UV ink reader security level had to be turned off, sacrificing an important ballot security feature.

In addition, an open console port posed a major security problem. Also, the compact flash cards were not read due to late ballot design modification.

The Future of E-voting in the Philippines

A survey revealed that about 75% of Filipinos were satisfied with the general conduct of the May 2010 automated elections as there was a higher percentage of poll workers than there had been before. The survey also found that Filipinos were satisfied with the way the elections were conducted.

Future Gaps

There is a need to increase transparency in the preparations for the next automated electoral exercise. Institutional capacity-building for the election management body is also necessary. There may also be a need to invest in new machines for the 2016 elections.

Key Points when Deciding on E-voting

- Define a core need for targeted implementation of technology;
- Provide for a legal framework, budget, time and political will;
- Ensure clean and transparent procurement processes;
- Conduct pilot testing, hold vendor fairs and have a strong public relations and media strategy;
- Prioritise voter education and poll worker training;
- Invest in capacity building for all election stakeholders, including election management body staff, civil society, judiciary, media, and security agencies;
- Adjust for new timelines as major changes may be required for the previous processes;
- Design plans to mitigate unintended consequences of automation;
- Implement a timely random manual audit on election night.

In her concluding remarks Thakur advised that the IEC's values should underpin the electoral process the IEC selects. These values should be the IEC's guiding principles whether under a manual or electronic system.

3.3.1 Question and Answer

Level of Inclusivity

Ntokozo Ngidi of the Electoral Institute for Sustainable Democracy in Africa asked about the level of inclusivity of stakeholders in the Philippines, seeking clarity as to whether the responsibility of including stakeholders rested only with the election authority.

Thakur said the level of inclusivity had definitely increased since the introduction of the automated system. She stated that there has been collaboration in the formation of inter-agency technical working groups. Among the aspects considered by the stakeholders were the special needs of the disabled and of indigenous peoples, to increase their participation in elections. Through this inclusivity the election process brought greater transparency.

Adjudication Procedures

Thakur emphasised the need to set election adjudication procedures well before the elections. In the Philippines, the adjudication processes were not set prior to the elections and this caused numerous problems with the verification of votes.

Benefits of E-voting for Ordinary Citizens

The question was raised of what benefits ordinary citizens derive from the introduction of the e-voting process since the clustering of precincts may mean voters must travel longer distances.

Thakur said clustering had indeed meant some voters had to travel further and had resulted in longer voting queues. Further, clustering precincts made it easier for 'flying voters' to carry out fraudulent activities.

Voter Turnout

Asked about the impact of the e-voting system on voter turnout, Thakur said the turnout was estimated to have been the same as it was before the introduction of the automated voting system. She attributed this to the optimistic nature of Filipinos. She also argued that voters are more likely to trust a system that they believe has less human involvement.

Benefits of the Automated Voting System

Thakur said the major benefit of the e-voting system was the economic stability it brought to the country as a result of a credible election process. In the past election fraud had led to a lack of trust in government and hence to economic instability.

Impact of E-voting on Violence

Asked whether she believed there was a relationship between the e-voting system and the reduction in election violence, Thakur said there is an opportunity for electoral systems to minimise conflict and consensus-building is more of a

decision-making process than a conflictual, winner-takes-all system. She argued, however, that with the introduction of the automated voting system the risk of violence increased and said that there is need to agree on a definition of what constitutes election violence and to monitor it closely.

Delegates also sought clarification as to whether Thakur believed the system of e-voting used in the Philippines would be suitable for South Africa.

Enhancing Democracy

Asked whether e-voting had enhanced democracy in the Philippines, Thakur said democracy had prevailed in the 2012 elections but pointed out that whether elections are manual or electronic, a number of aspects can derail the process.

Unintended Consequences of E-voting

Delegates asked what measures the Philippines was taking to mitigate the unintended consequences of e-voting.

Thakur said technology could always be compromised and manipulated, so success depended on the local context, on what people choose to trust as well as the security levels that can be put in place to give people a certain level of comfort.

However, she noted that it is always difficult to guard against unintended consequences because nobody knows what they might be. She said the election management body in the Philippines had included a risk management team within the project management team to mitigate some of the unintended consequences.

Transparency

Asked to elaborate on the fact that transparency had been compromised by the e-voting system, Thakur said she did not believe that the automated voting system in the Philippines had necessarily affected transparency, stating that although there were some challenges the electorate also enjoyed a level of security.

Human Resources

Thakur said there is a need to restructure human resources as the manual election make-up may not be suitable for the demands of an automated voting system.

3.4 BRAZIL – JUDGE PAULO TAMBURINI, MEMBER OF THE BRAZILIAN NATIONAL COUNCIL OF JUSTICE AND MEMBER OF THE ELECTORAL COMMISSION

Background

Brazil is a large country, almost two-thirds the size of Africa, with some areas only reachable by helicopter. The country has four time zones, which is a challenge when delivering an election.

Electoral System

The Brazilian electoral justice system is not delivered by an electoral management body but by the electoral court. Elections in Brazil are thus conducted by judges who plan, execute, organise and evaluate the elections. The election system includes a press centre where election officers, the media and police, among others, are trained.

Other important stakeholders are the armed forces, the National Agency of Telecommunications, the National Agency of Electricity, the State Secretaries of Public Security and the Federal Audit Court.

Brazil is a federal state divided into 27 member states with regional electoral courts. It has an estimated 140-million voters, 5 568 municipalities, 3 033 electoral zones, 96 116 polling stations and 437 443 precincts. The country holds elections every two years, leaving only a short turnaround time. The cost of delivering en election is a little over $USD395-million – at least $USD2.81 per voter.

In 2012 there were about half a million election candidates and about 10 000 legal cases were brought relating to the elections. Data has shown that the number of cases has decreased since the introduction of the e-voting system.

Overview of the 2012 Elections

In his overview of the 2012 elections Judge Tamburini said only 0.5% of the machines had been replaced. There was a high rate of absenteeism, though in the states in which there is a full biometric identification system, the absentee rate was only 5%.

The E-voting Machine

One of the strengths of the machines, Judge Tamburini said, is that they have been tested over time. He believed that any credible research into e-voting must include the Brazilian experience since Brazil is one of the largest and oldest electronic democracies in the world.

Judge Tamburini attributed the success of the system in Brazil mainly to the make of the machine, which, he argued, was designed to be simple and suitable for Brazil, which has a high illiteracy rate. Another reason for this success was that the system incorporated aspects of the telephone and the ATM, with which Brazilians were already familiar. Because of its simple design the voters have become so comfortable with the machine that almost 100% of them were not in favour of a more modern design.

Costs

The e-voting machines cost about USD$600 each, said Judge Tamburini.

3.4.1 Question and Answer

Shortcomings

While Judge Tamburini acknowledged that there was need to improve technology continuously by making it safer, more transparent and trustworthy and offer citizens the opportunity to maintain the secrecy of their vote and vote in peace, he said that research conducted in 2012 showed that the system, which had been operating for more than 20 years, was trusted by about 97% of the people, which is one of its most valuable assets. The ordinary justice system, manned by the same judges, is only trusted by 64%.

The machines are publically audited in full view of the media and attorney generals, among others. The Judge emphasised the importance of partnering with the people in order to gain their trust and confidence.

Reduction in Legal Cases

The reason for the reduction in legal cases after the introduction of the e-voting system, Judge Tamburini said, could be attributed to the passage of a law providing that no person who was facing prosecution could stand as candidate – the legislation was instituted at the behest of the people and was adopted by Parliament and confirmed by the Supreme Court.

Transfer of Skills

Another reason for the reduction in the number of court cases, said the Judge, was that people were taught to learn as much as they could about the candidates.

Responding to question about the possibility of international cooperation in developing e-voting machines and the transfer of skills between countries, Judge Tamburini said cooperation was indeed possible and that his duty was not to teach but to share the experience of e-voting. His country, he said, had developed a Brazilian solution to a Brazilian problem within the confines of the country's human and technological resources and its infrastructure, thus Brazil does not depend on any other country for the technology.

Brazil, he said, is prepared to provide information about the successes and shortcomings of its e-voting system so that other democracies contemplating adopting the technology need not reinvent the wheel.

CHAPTER 4

KEY LESSONS LEARNED FROM THE INTERNATIONAL EXPERIENCE

4.1 MR PETER WOLF, INTERNATIONAL IDEA, LEAD AUTHOR OF *INTRODUCING ELECTRONIC VOTING: ESSENTIAL CONSIDERATIONS*

Peter Wolf began his presentation by playing a humerous video made following the recent US presidential election. The clip was from the popular cartoon, The Simpsons, and shows the character Homer Simpson trying cast his vote electronically for Barack Obama, but the e-voting machine continually records his vote for Mitt Romney. This by way of reminding the audience that there is always the possibility of problems with e-voting technology.

Wolf outlined the different types of e-voting, namely the use of voting machines and internet voting. The differences between machine and internet voting are reflected in the table below:

VOTING MACHINES	INTERNET VOTING
• The environment is **controlled** – the election administration can have a high level of control over the equipment that is used. • The election administration has an opportunity to control how the voters are actually casting their vote, and whether they are doing so in secrecy.	• **Uncontrolled** environment – people can vote from anywhere the internet is available. • Nobody can really make any assumption about the computer that the voter uses for casting a vote.
• **Only one voting channel** – once a certain polling station has switched to e-voting people no longer have the choice of going back to paper, they must use the electronic equipment available at the polling station.	• **Additional voting channel** – Internet voting, on the other hand, is usually introduced as an additional voting channel. People can choose either to vote online electronically in the weeks before an election or they can go in person to a polling station and cast a regular vote.

Types of Voting Machines

There are "a lot of quite exotic solutions", said Wolf, but globally the most common technologies are ballot counting machines and direct recording electronic (DRE) equipment.

Ballot Counting

Ballot counting is based on machine-readable paper ballots. Voters shade them in a specific way and feed them into a ballot scanner which captures the ballot, interprets the vote and is then able at the end of the election day to produce the results for that polling station instantaneously. The advantage of this system is that it bridges the gap between traditional paper-based voting and e-voting and adds some of the advantages of e-voting. In addition, a quick count can be implemented. The disadvantages of the system are that the logistics for the election have to be doubled and the paper process cannot be eliminated, so paper ballots still have to be produced and shipped. The paper ballots must also comply with far more stringent specifications because they must be machine-readable. In addition to the entire paper process the voting machines themselves have to be deployed.

TYPES OF E-VOTING SYSTEMS

Direct Recording Electronic (DRE)

With DRE equipment people make their choice on a touch screen and the device records it directly on to a computer and can produce a result at the end of the election day. The advantage of this system is that the interface is user friendly, it is possible to cover multiple languages and complex ballots can be presented better on multiple screens, while there are also audio interfaces for sight impaired voters. The disadvantage of the system is that it does not produce any physical evidence of the votes.

Optical Mark Recognition (OMR)

OMR systems are based on scanners that can recognise the voter's choice on special, machine-readable ballot papers. OMR systems can either be central count systems, where ballot papers are

scanned and counted in special counting centres, or PCOS systems, where scanning and counting takes place in the polling station as voters feed their ballot paper into the voting machine.

Electronic Ballot Printers

Electronic ballot printers are similar to DRE machines, producing a machine-readable paper or electronic token containing the voter's choice. This token is fed into a separate ballot scanner, which does the automatic vote count.

Internet Voting Systems

In this system votes are transferred via the internet to a central counting server. Votes can be cast either from public computers or from voting kiosks in polling stations, or, more commonly, from any internet-connected computer.

E-VOTING SYSTEM OPTIONS

Access to Source Codes

Wolf defined access to source codes as the instructions that determine how a computer system, including all the voting machines, is working. Anybody with the right level of expertise can establish, by looking at the source codes, the quality with which the machine has been built, how secure it is and its potential weaknesses. When it comes to e-voting, he said, people want clarity about the possibility of stakeholders having access to source codes. Most commercial companies are extremely reluctant to provide access to those source codes as they are viewed as intellectual property and might infringe the security of votes. However, over the years there have been other solutions, though in limited forms, to give people access to the information. This is sometimes done by holding a demonstration in a laboratory where interested stakeholders are invited by the vendor, who explains how the system operates.

Voter Authentication – Electronic Poll Books

An internet voting system, said Wolf, requires a voter to sit in front of a computer to verify that he or she is eligible before he or she can vote. Only one valid vote can be cast. For e-voting in polling stations this is more easily achieved with paper-based voter registration as a first step and e-voting as the next step.

Examples of Major E-voting Experiences

E-voting is being used or has been used in:

- Estonia, the most advanced country in the field and which has dramatically increased participation in e-voting over the years. A quarter of Estonia's population votes online;
- The USA, Brazil, Venezuela, India and the Philippines – probably the biggest countries to use e-voting systems;
- Europe, where there are a few small-scale implementations;
- France – in few municipalities;
- About half of Belgium;
- The Netherlands, which used e-voting machines similar to those in Ireland for about 20 years, but stopped a few years ago;
- Germany, where the system was declared unconstitutional because one of the constitutional requirements for elections is that they must be public and the Constitutional Court deemed an election where participants cannot watch how the votes are counted not to be considered a public election;
- Austria, which instituted internet voting pilot projects in student council elections. Initially it seemed that all political parties supporting internet voting, but, during the process, some concerns were raised and some of the parties became more critical of the technology. In the end the system gained very few users.

Potential Benefits of E-voting

According to Wolf these are:

- Faster availability of results;
- Elimination of human error and related inaccuracies;
- Elimination of some types of fraud;

- Confirmation of vote or invalid vote warnings;
- Improved accessibility;
- Increased convenience for voters; and
- Better service for most citizens.

Why the System is Controversial

E-voting is controversial, said Wolf because it does away with the most central rituals of an electoral process, reduces human control and transparency enormously throughout the process, and places system knowledge in the hands of a few.

Challenges of the System

The challenges of e-voting are that it is the most complex of the electoral technology upgrades as it touches the core of the electoral process. It is an opportunity to solve some old electoral problems but also creates new ones, many of which are not of a technical nature.

Recommendations

Wolf made the following recommendations:

- Define clearly the goals of the implementation of e-voting. These goals should be focused on improving the electoral process in some way. Only with these goals in mind will EMBs be able to establish whether e-voting is the solution they are looking for within their context.
- Be aware of the challenges. No e-voting system is perfect, and there is no standard system in use in any given country.
- Get the buy-in of key stakeholders. It will be near impossible to implement e-voting against the will of a significant number of stakeholders in a country.
- Provide for auditing and certification – these aspects are very important to the establishment of trust and transparency.
- Allow enough time for technical implementation and social acceptance.
- Plan for training, professional development and civic education.
- Calculate the real costs of ownership, not just the once-off purchase costs.
- E-voting will not make up for a lack of trust. If there is a problem with the trustworthiness of the existing electoral process the issues are likely to be magnified rather than diminished by the introduction of e-voting.

4.1.2 Question and Answer

Manny de Freitas, a member of Parliament, expressed his concern about the lack of transparency of e-voting systems and the fact that they are left in the hands of only a few people, thus reinforcing a lack of confidence in an electoral system. He maintained that there would be new problems associated with e-voting and suggested that before e-voting is considered, the IEC might, through electronic means, create statistics and reports from results that have been created and developed during various elections.

Asked by Reuben Baatjies, of the South African Local Government Association (SALGA), whether e-voting could make up for a lack of trust in an electoral system, Wolf said he did not believe so. Many European countries saw no reason to move to an e-voting system and indications were that they felt that internet voting was a more exciting opportunity for the future.

Red Haines of Bharti Electronics, convinced of the benefits of e-voting over a manual system, said he believed there was no need to reinvent the wheel, as evidenced by the fact that Brazil and India have been using the system successfully for a number of years. He emphasised how much paper was used every year in South Africa to print ballot papers. All costs related to paper and printing could be channelled towards the capital costs of the equipment, he said. Haines also believed that e-voting would contribute positively to the environmental campaign, a view with which Wolf agreed.

CHAPTER 5

ICT & TELECOMS INFRASTRUCTURE

5.1 INFRASTRUCTURE REQUIRED TO SUPPORT E-VOTING AND COUNTING: MR TROY HECTOR, ACTING MANAGING EXECUTIVE: GOVERNMENT BUSINESS SERVICES AND LARGE BUSINESS SERVICES, TELKOM

Information and communication technology (ICT) is vital in any election as it runs in the background and determines the success or the failure of the election, said Troy Hector.

Definition of ICT

The definition of ICT, he said, is a symbiotic relationship between a stand-alone device and the network, communicating seamlessly and securely across a reliable platform. He argued that this definition gives credence to the argument for exploring and using ICTs for South African elections.

The South African Context

Hector said it is important to know whether South Africa is ready for an e-voting environment. He cited the fact that ICT during the 2010 FIFA World Cup Tournament was up to scratch, with no millisecond of downtime throughout the 64 matches. This, he argued, speaks to the world-class standards of South Africa's ICT infrastructure.

The South African ICT landscape is an interesting one, he said. Research carried out in 2011 revealed that 40% of the population consumed 80% of all ICT services – fixed and mobile as well as internet, in 17 districts that cover 3% of the total land mass. He further estimated that 97% of the population of South Africa is currently covered by ICT services. Data from 2013 has shown that there are currently 69-million subscriber identity module (SIM) cards in the country and it is anticipated that by 2016 there will be 20-million more, reflecting a healthy consumption of ICT services in the country. He also pointed out that 34% of South Africans have internet access.

Utilisation of ICT by the IEC

Telkom had been working closely with the IEC since 1997, said Hector. One of the most important aspects of this relationship was that the ICT employed should be scalable and reliable.

The success of e-voting technology in South Africa is dependent on a seamless link between the IEC and the citizen, he said, arguing that capacitation of the IEC from an ICT standpoint is crucial in showing the Commission's preparedness for an e-voting environment.

The following are the ICT requirements for an enabling e-voting environment:

- Basic voice communication that can be used for confirmation of voter registration, etc;
- A scalable, reliable and flexible network that can collate election information and transfer it reliably to one central point. All information must go across this network in an uninterrupted manner to ensure that it reaches its destination securely and safely;
- There should be no interference in the network transport protocol, thus the highest levels of security standards available on a global scale should be used to ensure that what is transmitted from point A to point B is delivered securely;
- There should be failover system in place, which acts as a back-up in case the main production site is lost.

Mobile Technologies

In the 2009 elections, Hector said, the IEC started using mobile technologies quite aggressively. He proposed that these technologies be incorporated even more widely in the electoral process.

For e-voting to become a reality in South Africa, Hector argued, four important steps must be taken:

- Integration of a virtual private network, providing connectivity to all the provincial offices of the IEC, all the municipal offices of the IEC, the headquarters and also the

disaster recovery site, providing secure connectivity to every IEC office in the country.

- Building of important partnerships and a demonstration of the core competencies of ICT in elections.
- Provision of the means by which citizens can interface electronically with the IEC.
- Provision of a regulatory and legislative framework to enable citizens to communicate or interface electronically with the IEC.

It is important, Hector said, to find out how citizens connect with the IEC, especially through the use of ICT.

According to Hector one aspect that has not been addressed in terms of the machines used in those countries that have adopted e-voting is that they are not connected to a network, hence there is no assurance that the source code for one machine is the same as that for the other machines.

The E-citizen

He also pointed out that in South Africa citizens would, firstly, expect a very high level of professional support capable of addressing any queries, either electronically or via telephone interface, within the organisation itself. Secondly, citizens would expect real-time information. Thirdly, citizens expect full utilisation of the knowledge economy where information is shared on any platform available.

Hector advocated the use of telephonic e-voting in South Africa, arguing that if a citizen can securely and safely conduct a banking transaction across a mobile platform as well as conduct e-filing of tax returns, the same systems could be adopted for e-voting.

He also argued that social media platforms have been successfully used in other countries for parties and politicians to interface with their constituencies and proposed the use of workable and eco-friendly e-voting solutions that can be used provided the right security standards are put in place, instead of automatically opting for the machines being used in other countries.

ICT Advances – The Poken Device

Innovative devices such as the Poken could be considered, Hector said. This device is used for the electronic exchange of information within seconds. It could, he said, be used by the Department of Home Affairs, allowing citizens to access all constitutional documentation in an electronic format in real time. Such technology, combined with social media, could become a powerful means of communication, he said.

Benefits of Using ICTs

Troy said the use of e-voting methods would significantly reduce South Africa's carbon footprint through paper and fuel savings. There would also be an economic benefit. Funds that had been used to print and transport ballot papers could be used for voter education or investment in additional ICTs to ensure proactive and constructive engagement with citizens. In addition, e-voting, he said, would expand voter participation by allowing people to cast their vote from any enabled electronic device.

Critical Success Factors

Critical to the success of an e-voting environment, Troy said, would be an enabling legislative framework. Another key success factor is ensuring the security of data. There was no need to reinvent the wheel, he said, as such technologies are already being used by bodies such as the South African Revenue Service. The final requirement is a valid audit trail, enabling a vote to be securely and safely traced to the voter.

Is South Africa Ready for E-voting?

Troy argued that South Africa has the ICT capacity for e-voting, saying that it has the most progressive ICT infrastructure on the continent. He recommended that the business benefits of e-voting and the promotion of green voting methods be further investigated.

5.2 QUESTION AND ANSWER

Costs of E-voting

Dr Margaret McGaley said there seems to be a misplaced view that electronic elections are cheaper and more environmentally friendly than manual elections, yet there is no evidence to substantiate this.

Hector responded that there is a need for protocol analysis or research into whether e-voting is cheaper. At face value, however, he argued that it seems as if e-voting is the more cost-effective option, considering that many citizens already own mobile devices.

Audit Trail versus Voter Secrecy

Dr McGaley said that whereas in financial transactions one is able to keep a detailed audit, such an audit would not be ideal in the context of elections as it is important to retain the secrecy of the vote and not link vote to voter. Judge Paulo Tamburini also believed that an audit trail in e-voting would compromise the privacy of the voter.

While there was a vast difference between the security of financial transactions and that of electronic voting, Hector said, the comparison served to demonstrate the security and privacy of electronic technologies.

Capacity and Timeframe of Proposed Solutions

Mervyn Cirota of the ID asked whether Telkom had the technology to do a pilot run of e-voting to get feedback on how the system would work.

Hector said that, with some tweaking or refining of the back-end system to accept electronic data so it can be tabulated and consistently audited before it is actually released, the technology to deliver pilot e-voting is ready. Telkom's ICT infrastructure, he maintained, is world class.

Technological Penetration

Penelope Tainton of the DA argued that while technological connectivity is good in urban areas, the same cannot be said for rural and other less developed areas in the country. Thus, she argued, a high percentage of usage is concentrated in very small areas of the country, raising the question whether the technology will be accessible to the majority of citizens.

Peter Smith of the IFP enquired about the statistics of smartphone coverage in South Africa, saying the technology would be required for the higher level of complexity involved in e-voting.

In response, Hector cited a national broadband paper which promises that by 2022 every citizen will have access to a broadband connection.

Smartphones in South Africa, he said, are becoming progressively cheaper, though he could not quantify how many of the 69-million SIM cards in the country are inserted into smartphones.

Technology as a Campaigning Platform

In response to a query as to whether the technology Telkom proposes offers political parties campaigning platforms, Hector said the platform will allow any political party or any member of Parliament, to engage electronically with users using unified communications.

CHAPTER 6

PLENARY DISCUSSION AND REFLECTIONS ON THE WAY FORWARD FOR SOUTH AFRICA

6.1 PLENARY DISCUSSION

In the last part of the seminar delegates considered whether South Africa is ready to adopt an e-voting system and, if it is ready, which system would be most suitable.

Stakeholder Consultation

Peter Smith, a member of the National Party Liaison Committee, said he did not believe a move to e-voting is desirable as the current system is fairly robust and trusted, but encouraged the Commission to keep discussions on the subject open.

Masizole Mnqasela, DA representative on the parliamentary Portfolio Committee on Home Affairs, and Piet Uys of the Freedom Front agreed that there was a need for further engagement on the subject and thanked the Commission for opening up the debate. Penelope Tainton of the DA gave the Commission credit for being trusted by political parties, stakeholders and by the citizens of the country, saying the discussion about e-voting gave it an opportunity to build further credibility.

Mervyn Cirota of the ID proposed that a team be set up to investigate e-voting in South Africa.

Thomas Mathebula of the African People's Convention argued that while it is important not to rush the process, the Commission must also take into consideration the fact that South Africans are becoming technologically savvy and thus the engagement process cannot take forever. He argued that there must be a timeframe attached to all stages of the process.

Cost of E-voting

One of the delegates raised a concern about the costs of e-voting, stating that a cost-effective method would be more likely to guarantee buy-in from stakeholders.

The Machines

Another argued that in considering the possibility of introducing e-voting in South Africa the Commission should take into consideration the right of voters to choose and to change their minds, as one concern with regard to e-voting is that once a choice has been made the voter cannot change his or her mind.

Some delegates believed South Africa should do as the Philippines did – give vendors an opportunity to showcase their e-voting machines so that communities can become involved in the process.

Turnout and Convenience

Reuben Baatjies of SALGA argued that for e-voting to be an incentive it should provide a correlation between turnout and convenience. He proposed that the testing stage of e-voting should be coupled with manual voting.

Dr McGaley argued that there is no evidence that e-voting systems increase voter turnout, hence the need to investigate further the purpose of implementing e-voting technologies.

Homemade Solutions and Timeframes

Some delegates argued that there is no need to rush the e-voting process, but felt that the IEC and South Africa's electoral stakeholders should come up with a homemade solution to suit the local context.

Kwankwa Nqabayomzi, Deputy Secretary-General of the UDM, said there is need first to consider proper planning and sequencing, not only of the public discourse around e-voting but also of the series of steps South Africa must take as a nation before rolling it out.

Other delegates believed that while other countries have taken longer to implement e-voting this does not necessarily have to be the case with South Africa as this country can learn from the experiences of others.

Hlomani Chauke of the ANC warned against rushing to change the current system and another delegate argued that while it may not be necessary to fix the current system there is a need to plan for the future.

Aims of an E-voting System

Advocate Tlakula said that countries that have implemented e-voting were addressing particular challenges and South Africa should review the current system to establish the challenges and loopholes in order to improve on the system.

Tainton agreed, saying there is a need to examine constantly how the country can improve its systems. She pointed out that in the South African context the e-voting system should take into account multiple languages; whether it provides a better method of dealing with some of our complex ballot papers and the logistical distribution challenges the country faces during election campaigns; whether it simplifies the voting process; is more efficient and produces faster, more credible results. The system, she pointed out, should also provide for improved development in ICT areas as well as improved voter education.

Mawethu Mosery of the IEC summed up the discussion, saying there are many socio-political considerations that require more platforms for exhaustive discussion. Red Haines concurred, saying the IEC should start looking into the technical implications of e-voting.

Dr McGaley reiterated that it is important to note that the people selling the machines do not necessarily have the same motivations as the people who will use them, hence the need to elicit independent views instead of relying wholly on the opinions of the vendors.

6.2 RECOMMENDATIONS

The recommendations emanating from the seminar, as summarised by Mr Terry Tselane, Vice-Chairperson and Commissioner of the IEC, were:

- The IEC should not rush to implement an e-voting system but should consider all aspects of such a system, including the larger population;
- Technology should be created for the e-voting process that will enhance the experience for South African voters; and
- South Africa is a young democracy and the e-voting process should not compete with other important national agendas.

6.3 CLOSING REMARKS – DEPUTY CHAIRPERSON OF THE IEC, COMMISSIONER TERRY TSELANE

Tselane concluded the seminar by thanking all delegates for their attendance and contributions to the discussions, stating that the Commission had been enriched by all the views. He pointed out that the complex part of introducing the e-voting is mostly socio-economic and political, but that there is also an interplay of environmental factors. In particular, such issues include the rural/urban divide and the legality of the system.

He said the point of the seminar had not been to ascertain all the answers to the questions raised, but to begin discussions and interrogate the issue. He said the Commission is confident of the level of democracy in South Africa and of the fact that it has reached a level where relevant stakeholders can enter into a discussion on e-voting processes. He pointed out that whatever system is introduced it must incorporate the IEC's key competencies of independence, impartiality, sustainability, integrity, transparency and credibility.

Tselane concluded the proceedings by thanking the IEC commissioners, presenters and representatives of various organisations from within and outside South Africa.

6.4 CONCLUSION

E-voting does not produce straightforward outcomes in terms of performance. This was the overriding conclusion drawn from the seminar. From the presentations made by various experts and electoral practitioners and the attendant discussions, it was noted that, clearly, there is no perfect e-voting system. Experiences in countries such as India and Brazil have shown that e-voting can speed up the processing of election results. However, in none of the cases presented is there clear evidence that e-voting reduces the costs of

elections. In addition, the question of transparency of the process of voting using various technologies remains critical but unattended. None of the countries practising e-voting has managed to circumvent the problem of transparency, which is a central aspect of any electoral process – on it hinges the credibility of the electoral outcome.

As with other aspects of the electoral process the application of technology can produce mixed results. Most of the countries that have benefited from the positive aspects of e-voting, for example, India, Brazil and the Philippines, are large and have very large populations. Countries like Germany, the Netherlands, the United Kingdom and Ireland, all long-standing democracies, have abandoned e-voting because of various inherent inadequacies.

Drawing on the comparative experiences of those countries and the lessons that have been learnt, it is imperative that South Africa assess its current electoral needs and whether and how e-voting might serve them.

Taking the foregoing into consideration there is, therefore, no straightforward answer to whether e-voting is an enabler or disabler of electoral democracy. The seminar thus served a very useful purpose in enlightening the key electoral stakeholders in South Africa about the practice of e-voting by enabling them to learn from international experience. This initiative, under the auspices of the IEC, is indeed important, as it set in motion the centrality of dialogue on an e-voting venture with a view to ensuring broad-based consensus should South Africa wish to pursue it in future.

CHAPTER 7

APPENDICES

APPENDICES

APPENDIX 1

e-Voting Seminar

Convened by the Electoral Commission

of South Africa

11-12 March 2013

Cape Town International Convention Centre

Contents

1. WELCOME MESSAGE

On behalf of the Electoral Commission of South Africa (Commission), I wish to welcome all delegates to the seminar on e-voting and counting technologies. This seminar is the first of its kind to be convened in South Africa under the auspices of the Electoral Commission.

One of the strategic objectives of the Commission is to ensure that the organisation remains a pre-eminent election management body that seeks continuous improvement and innovation through the use of technology. Furthermore, the Commission aims to strengthen electoral democracy in South Africa, and position itself as a thought leader in electoral democracy. Accordingly, the primary objective of convening this seminar is to actualise this objective.

This seminar aims to examine the cross-national experience of e-voting technologies by way of country case studies and highlighting key lessons learnt. The seminar also affords us an opportunity to discuss your views on e-voting – as key domestic stakeholders.

At the announcement of the national and provincial election results in 2009 in South Africa, the President of the Republic of South Africa challenged the Electoral Commission to examine the concept of electronic voting technologies. Subsequently, the Commission commissioned secondary research into the international experience of e-voting. This seminar aims to further broaden our understanding of the subject so as to obtain a deeper and more nuanced understanding of e-voting from global practitioners and experts.

Presently, no formal position or view on e-voting has been adopted by the Electoral Commission. The Commission is of the view that a thorough examination of the cross-national experience is a prerequisite to adopting an informed position on the subject. Evidently, there are advantages, disadvantages, costs and benefits to e-voting. Whilst we as South Africans need to be cognisant of the global experience of e-voting, ultimately a decision on whether to adopt e-voting will need to be underpinned by, and be sensitive to, the South African context – informed by our demographics, political culture, socio-economic environment, financial capacity, institutional and infrastructural capabilities, and so forth.

I am certain that delegates will find the proceedings and debates in the next two days inspiring and thought-provoking. We have done everything possible to ensure your comfort at the seminar venue. We therefore call on you to enjoy our hospitality.

We once more welcome you and wish you a successful and stimulating seminar!

Adv. Pansy Tlakula

Chairperson: Electoral Commission of South Africa

2. ABOUT THE ELECTORAL COMMISSION OF SOUTH AFRICA

The Electoral Commission is established by the Constitution of the Republic of South Africa. The Commission is independent, and subject only to the constitution and the law. It must be impartial in exercising its powers and perform its functions without fear, favour or prejudice. The Commission is accountable to the National Assembly.

Commissioners are appointed for a seven-year term, which is renewable only once through a public process, culminating in an appointment by the President of the Republic of South Africa. The Commission consists of five members, one of whom must be a judge.

The current Commission was constituted on 4 November 2011. The **Commissioners are Advocate Pansy Tlakula (Chairperson), Mr Terry Tselane (Vice-Chairperson), Reverend Bongani Finca, Judge Thami Makhanya and Ms Raenette Taljaard**.

Strategic priorities of the Commission

To give effect to its vision and the quest for continuous development and improvements in its actions and operations, the Commission has prioritised the following strategic objectives:

1. Achieving pre-eminence in the area of managing elections and referenda

- Increasing innovation
- Leveraging cutting-edge technology
- Ensuring accessibility and suitability of voting facilities and processes
- Increasing voter participation
- Identifying and incorporating best practice in the area of elections (including electoral justice)
- Enhancing the credibility of the voters' roll
- Improving compliance with legal prescripts
- Continuously improving the legislative framework

2. Strengthening electoral democracy

- Encouraging citizen participation
- Providing strategic and thought leadership
- Broadening our research agenda and issuing publications
- Increasing visibility through proactive consultation, effective communication and presence
- Providing continuous education
- Facilitating platforms for political dialogue
- Cultivating an environment for free and fair elections
- Constantly engaging the media

3. Strengthening a cooperative relationship with political parties

- Deepening interactions with represented political parties
- Convening consultative forums with registered political parties

4. Strengthening institutional excellence and professionalism at all levels of the organisation

- Striving for excellence at voting station level
- Building institutional capacity
- Strengthening our presence and effectiveness at local level
- Expanding human capital development
- Adhering to performance standards
- Becoming people-centred
- Managing financial and human resources well and strengthening risk management
- Maintaining sound industrial relations
- Striving to comply with national climate change policies
- Building institutional memory

5. Strengthening institutional governance

- Refining institutional governance arrangements
- Delineating the powers, roles and functions between the Commissioners and the Administration
- Exercising oversight: monitoring, evaluation and support

3. E-VOTING: AN ENABLER OR DISABLER TO STRENGTHENING ELECTORAL DEMOCRACY?

A strategic objective of the Electoral Commission of South Africa is to ensure that it remains a pre-eminent election management body, which seeks to improve and innovate continuously. Further, the Electoral Commission aims to strengthen electoral democracy in South Africa, and position itself as a thought leader in the subject of electoral democracy.

For this reason, the Electoral Commission of South Africa is convening a seminar on e-voting on 11-12 March 2013 in Cape Town. The theme of this seminar is 'e-Voting – an enabler or disabler to strengthening electoral democracy?'

At present, the Electoral Commission of South Africa has not adopted a position on whether or not to explore or adopt e-voting technologies.

Accordingly, **the objectives of this seminar are twofold**:

- To obtain a deeper understanding of e-voting from international and local experts, including a more nuanced, country-specific comprehension of the subject; and
- To begin to test the views on e-voting of key local stakeholders.

The presentations and discussions at the seminar will revolve around the following elements:

- The advantages, disadvantages, costs and benefits of the predominant types of e-voting technologies.
- Country-specific case studies on the experience of e-voting. Cases have been selected from developing world democracies with considerable experience of e-voting (India and Brazil) through to a relatively recent convert to e-voting (Philippines) as well as a country that abandoned e-voting before implementing the technology (Ireland).
- In addition, key lessons from the international experience will be highlighted and discussed.

The Electoral Commission of South Africa recently commissioned secondary research into the cross-national experience of e-voting. This seminar seeks to gain a deeper understanding of the subject and invites local stakeholders to discuss the subject.

Some of the highlights from the Electoral Commission of South Africa's research into e-voting include the following:

- Typically, e-voting occurs in an environment that is controlled by an EMB (election management body), such as a voting station, and an environment that is not controlled by an EMB (remote voting).
- Types of e-voting in controlled environments, such as voting stations, include electronic voting machines (EVMs) and optical ballot scanners (electronic counting machines).
- Types of e-voting in environments that are not controlled by the EMB include internet voting and telephone voting – where voters vote from any location with access to the internet and telephone network.

- By 2011, approximately one out of every three of the countries that may be defined as electoral democracies had either introduced, or were testing/piloting, a form of e-voting.

- Developed countries (the USA, Japan, Canada, France, Belgium, Austria, Switzerland) and developing countries (Brazil, India, Russia, Paraguay, Philippines, Kazakhstan, Venezuela, Estonia) have introduced e-voting.

- By 2011, approximately five countries had abandoned e-voting, including the first country to introduce e-voting some 20 years ago being the Netherlands, as well as Germany, United Kingdom, Ireland and Australia. The main reasons for abandoning e-voting include data security concerns, verifiability and certification concerns of e-voting technology, and cost.

- Some of the key advantages of electronic voting machines (used at voting stations) include the fast and accurate count of ballots; a reduction in spoilt votes; multi-language presentation of the ballot; and the environmental advantage (reduced paper use and transportation of paper ballots).

- Key disadvantages of electronic voting machines (at voting stations) include the high cost and limited shelf life; a reduction of voting transparency to the public; needs extensive voter education; possible to manipulate technology through hidden code of hardware; lack of consistent standards to certify hardware and software; most systems are closed to protect IP (intellectual property) making audits difficult; remote manipulation of technology is possible; and success depends on public trust of EMB.

- Key advantages of remote internet voting include fast and accurate count of votes; improved voter access to the vote; reduced spoilt ballots; longer term cost savings after high up-front costs; green or environmental advantage; and the technology may increase voter turnout.

- Key disadvantages of internet voting include voters being unduly influenced or coerced when voting in private; easier for vote selling when voting in private; hackers may trace votes to voters; security of data; vote re-counts are difficult without paper ballot trail; high set-up costs; reduced public transparency of voting process; and the lack of consistent and agreed standards for certification.

Some of the key lessons from the cross-national experience include:

- International experience on e-voting is mixed, with no discernible move towards, or away from, e-voting.
- Almost every e-voting technology has been technically compromised at some point. Certain countries are prepared to live with these risks (India, Brazil, the USA, Canada and Japan), while others are not (Netherlands, Germany, the UK, Australia and Ireland).
- The decision to adopt e-voting is context-specific – influenced by political-legal culture, level of tolerance for risk, size of country, and demographics.
- Critical success factors should an EMB decide to test e-voting: transparency (open source software); inclusivity (stakeholder buy-in); and trust, to allow for independent certification and audit of technology.
- The political process of introducing e-voting technology is as important as the technological product: great technology can be de-railed if the process of politically managing the technology is flawed.

4. PROGRAMME OF EVENTS

DAY ONE – 11 March 2013

08:30-09:30 Delegate registration & tea

Session one: Overview of e-voting *Programme director: Mr Masotho Moepya*

09:30-10:00 ***Welcome address*** *Adv. Tlakula*, Chairperson: Electoral Commission

10:00-11:15 ***Overview of e-voting – cross-national experience*** *Dr Surendra Thakur*, Durban University of Technology, South Africa

11:15-11:30 Questions & Discussion

11:30-12:00 Tea

Session two: Country case studies *Programme director: Mr Sy Mamaboio*

12:00-12:45 ***Country case study: Ireland*** *Dr Margaret McGaley*, Department of Computer Science, NUI Maynooth, Ireland, and spokesperson, Irish Citizens for Trustworthy e-Voting

12:45-13:00 Questions & Discussion

13:00-14:00 Lunch

14:00-14:45 ***Country case study: India*** *Shri VS Sampath*, Chief Election Commissioner of India

14:45-15:00 Questions & Discussion

15:00-15:30 Tea

15:30-16:15 ***Country case study: Philippines*** *Ms Beverly Thakur*, Head of the International Foundation for Electoral Systems in Philippines

16:15-16:30 Questions & Discussion

19:30-21:00 Gala Dinner hosted by the Chairperson of Electoral Commission

DAY TWO – 12 March 2013

08:00-08:30 Tea

Session three: Country case study and lessons learnt *Programme director: Rev. Courtney Sampson*

08:30-09:15 ***Country case study: Brazil*** *Judge Paulo Tamburini, Member of Brazilian National Council of Justice & Member of the Electoral Commission*

09:15-09:30 Questions & Discussion

09:30-10:15 ***Key lessons from the international experience of e-voting*** *Mr Peter Wolf, International IDEA, lead author of "Introducing E-Voting: essential considerations"*

10:15-10:30 Questions & Discussion

10:30-11:00 Tea

Session four: Implications for South Africa *Programme director: Mr Mawetho Mosery*

11:00-11:45 ***ICT & telecoms infrastructure required to support e-voting & counting*** *Mr Troy Hector*, Acting Managing Executive: Government Business Services, Telkom Business

11:45-12:00 Questions & Discussion

12:00-13:00 ***Plenary discussion & reflection on way forward for South Africa*** Facilitated by the programme director

13:00-14:00 Lunch

14:00 Departure

5. MORE ABOUT THE PRESENTERS

Dr Surendra Thakur

Head: Enterprise Development Unit, Durban University of Technology

Dr Surendra (Colin) Thakur has served in a variety of capacities in the ICT landscape in South Africa. He was the Vice-Chairman of the Computer Society of South Africa's (CSSA) KwaZulu-Natal Chapter for two years, then Chairman for five years, and served as National Treasurer in 2011. He has served on the inaugural Complaints and Compliance Committee of the National regulator Independent Communications Authority of South Africa (ICASA) for three years.

Dr Thakur is currently is a founding director of innovation incubator Inv oTech, which is based at the Durban University of Technology. He is a director of the KwaZulu-Natal e-Skills hub which has a mandate to undertake research in e-government. It is in this capacity that Dr Thakur has undertaken research for the Electoral Commission on e-voting; for the Electoral Institute for Sustainable Democracy in Africa as an observer and methodology to observe technology in elections; and the United Nations Development Programme on voter registration technology.

Dr Thakur considers himself a digital activist and assists in the installation of over 200 computers a year in at least 10 schools. He holds a Master's degree in ICT and is reading his PhD in e-voting.

Contact: thakurs@dut.ac.za

Dr Margaret McGaley

Founder and spokesperson, Irish Citizens for Trustworthy Evoting

Dr McGaley has a PhD from Department of Computer Science NUI Maynooth, titled "E-voting: an immature technology in a critical context".

She has presented her findings at a cross-party committee of the Oireachtas (the Irish parliament) and at a European Union seminar on eDemocracy in Brussels, as well as presenting academic papers in Europe and Canada. She has also appeared on Irish and international television and radio.

In 2003 Dr McGaley founded Irish Citizens for Trustworthy Evoting, or ICTE, an organisation which successfully campaigned against the use of an untrustworthy evoting system in Ireland. Plans to use the system in 2004 were scrapped, and the machines were finally destroyed in 2012.

Contact: margaret.aymcg@gmail.com

Shri VS Sampath

Chief Election Commissioner of India

Shri VS Sampath joined the Indian Administrative Service in 1973 and held important positions in the State Government of Andhra Pradesh as well as the Union Government of India.

In the past few years Shri Sampath held several important postings in Central Government, beginning with a stint in the Union Ministry of Rural Development, then as the Director General for the National Institute of Rural Development. Subsequently, he held the post of Secretary, Chemicals and

Petrochemicals where he was pivotal in conceptualising and implementing policy to facilitate the growth of India's petrochemical sector. Later, he also served as Secretary, in the Central Power Ministry, where he was instrumental in implementing several forward-thinking policies to aid the sector.

Sampath joined as Election Commissioner in the Election Commission of India in April 2009. Apart from conducting Parliamentary Elections in 2009 as part of the three-member Election Commission of India, he was also instrumental in conducting important State Elections in the Major States of Maharashtra, Bihar, Tamil Nadu, West Bengal and Uttar Pradesh during the last three years.

He assumed charge of Chief Election Commissioner of India on 11 June 2012.

Contact: [redacted]

Ms Beverly Thakur

Head of the International Foundation for Electoral Systems in Philippines

Beverly Hagerdon Thakur has 15 years of experience working in international development, with over 12 years in the election field. As Chief of Party for IFES Philippines, she coordinates with the Commission on Elections (COMELEC) and civil society stakeholders to implement electoral modernisation and reform programmes. Ms Thakur was an original member of the Consortium for Electoral and Political Process Strengthening (CEPPS) Philippines Election Observation Mission which produced an assessment report recommending technical improvements to the Philippine electoral process.

She previously held positions with IFES as a consultant and training specialist for a poll worker training project in Azerbaijan for the 2003 elections and as Chief of Party in IFES' former Sarajevo, Bosnia and Herzegovina office. Ms Thakur has also served as Head of Operations for the International Organization for Migration's Out-of-Country Registration and Voting Program for the Afghanistan Presidential Elections in 2004, as well as Senior Operations Officer for the Out-of-Country Voting Program for the Iraqi National Elections in 2005. She has observed elections in other countries, including Armenia, Croatia and the United States. Most recently she has served IFES in various capacities in Thailand, Indonesia, Korea, Taiwan and Papua New Guinea.

Ms Thakur earned a bachelor's degree in government from Dartmouth and a master's degree in international affairs from the George Washington University.

Contact: [redacted]

Judge Paulo Tamburini

Member of Brazilian National Council of Justice, Member of the Electoral Commission

Currently the Assistant Judge to the Presidency of the Superior Electoral Court of Brazil (TSE), Judge Paulo de Tarso Tamburini has been a Brazilian State Judge since 1992. Beside the role of senior advisor to the Chief Justice, he also participates in the commission for the implementation of biometry and electronic process in the Brazilian Electoral Justice and was head of the National Commission for the Federal Security in the 2012 Brazilian Elections.

He graduated in law from the Catholic University of Rio de Janeiro and has a Juris Doctor degree in international law from the Federal University of Minas Gerais. He has been a professor of

constitutional and international law for 20 years at the University of Athenas, and has taught Criminal Law at both the Military and Civil Police Academies.

During the last two decades, he was Director of International Affairs of the Brazilian Association of Judges, Executive Director of the Electoral Judicial School of the Federal Regional Electoral Court of the State of Minas Gerais, Assistant Judge to the Chief Judge of the Brazilian Supreme Court and the National Council of Justice, worked on the project of development and implementation of the Brazilian Electronic Voting System as Senior advisor to the Chief Judge of the Superior Electoral Court and was finally appointed by the Supreme Court to be a member of the National Council of Justice in 2009/2011.

On the international scene, he was a Brazilian representative at the International Judge's Union and has worked as international observer in the elections in Puerto Rico, Mexico, Palestine Territories, Haiti and the Democratic Republic of Congo.

Contact: [redacted]

Mr Peter Wolf

Technical Services Manager: ACE Electoral Knowledge Network, International IDEA

Mr Peter Wolf has more than 10 years of experience in elections and technology, mainly in voter registration and electronic voting. He focused on ICT applications in electoral processes within the Elections Department of the Organization for Security and Co-operation in Europe (OSCE) mission to Bosnia and Herzegovina in 1999 where he worked on voter registration and results databases. He was consultant and advisor in several voter registration projects for the OSCE, EU and IFES in Albania, DR Congo and Iraq. Wolf served in various European Union (EU), OSCE and Office for Democratic Institutions and Human Rights (ODIHR), and Carter Center Election Observation Missions, among others, as electronic voting expert in France, Kazakhstan, Kyrgyzstan, Venezuela and the Philippines. He developed technology training modules for EU election observers and contributed to several publications on elections and technology. At the International Institute for Democracy and Electoral Assistance (International IDEA) he currently works for the ACE Electoral Knowledge Network. As part of his work on elections and technology for International IDEA he authored policy paper "Introducing Electronic Voting: Essential Considerations". Wolf holds a master's degree in Telematik/Computer Engineering from Graz University of Technology, Austria.

Contact: [redacted]

Mr Troy Hector

Acting Managing Executive: Government Business Services, Telkom Business

Mr Troy Hector is currently the Acting Managing Executive for the Government Business Services portfolio within the Telkom Business organisation. Mr Hector has more than 20 years' experience in the information and communication technology (ICT) market in South Africa and brings along business and thought leadership in the road to convergence in both the public and private sector. During his tenure at Telkom, Mr Hector has gained significant experience and has had the privilege of fulfilling leadership roles in a number of projects of both national and international significance, including:

Petrochemicals where he was pivotal in conceptualising and implementing policy to facilitate the growth of India's petrochemical sector. Later, he also served as Secretary, in the Central Power Ministry, where he was instrumental in implementing several forward-thinking policies to aid the sector.

Sampath joined as Election Commissioner in the Election Commission of India in April 2009. Apart from conducting Parliamentary Elections in 2009 as part of the three-member Election Commission of India, he was also instrumental in conducting important State Elections in the Major States of Maharashtra, Bihar, Tamil Nadu, West Bengal and Uttar Pradesh during the last three years.

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He graduated in law from the Catholic University of Rio de Janeiro and has a Juris Doctor degree in international law from the Federal University of Minas Gerais. He has been a professor of

APPENDIX 2

WELCOME ADDRESS - E-VOTING SEMINAR

Adv. Pansy Tlakula

On behalf of the Electoral Commission of South Africa, I wish to welcome all delegates and presenters – especially the presenters from outside of South Africa – to this seminar on electronic voting, or e-voting, and counting technologies. This seminar is the first of its kind to be convened in South Africa under the auspices of the Electoral Commission.

One of the strategic objectives of the Commission is to ensure that the organisation remains a pre-eminent election management body that seeks continuous improvement and innovation through the use of technology. Furthermore, the Commission aims to strengthen electoral democracy in South Africa, and position itself as a thought leader in electoral democracy. Accordingly, the primary objective of convening this seminar is to actualise this objective.

This seminar aims to examine the cross-national experience of e-voting technologies by way of country case studies and highlighting key lessons learnt. The seminar also affords us an opportunity to discuss your views on e-voting – as key domestic stakeholders.

1

At the announcement of the national and provincial election results in 2009 in South Africa, the then President of the Republic of South Africa challenged the Electoral Commission to examine the concept of e-voting technologies. The South African Parliamentary Committee on Home Affairs, to which the Commission reports on its work, has also shown an interest in the subject of e-voting. Subsequently, the Commission commissioned secondary research into the international experience of e-voting. This seminar aims to further broaden our understanding of the subject so as to obtain a deeper and more nuanced understanding of e-voting from global practitioners and experts.

Presently, no formal position or view on e-voting has been adopted by the Electoral Commission. The Commission is of the view that a thorough examination of the cross-national experience is a prerequisite to adopting an informed position on the subject. Evidently, there are advantages, disadvantages, costs and benefits to e-voting. Whilst we as South Africans need to be cognisant of the global experience of e-voting, ultimately a decision on whether to adopt e-voting will need to be underpinned by, and be sensitive to, the South African context – informed by our demographics, political culture, socio-economic environment, financial capacity, institutional and infrastructural capabilities, and so forth.

By way of setting the scene for this seminar, please allow me to share with you some of the highlights from our study into the global experience of e-voting.

- Approximately one out of every three, or one third, of countries that may be defined as electoral democracies have either implemented some form of e-voting or are currently experimenting with e-voting.
- Both developed and developing countries have implemented some form of e-voting. E-Voting is not simply the preserve of developed countries. Indeed, India and Brazil are considered global leaders in the use of e-voting. We are privileged to be joined at this seminar by representatives from India and Brazil who will be sharing with us their experience of e-voting. Also joining us is an expert from the Philippines – a country that relatively recently introduced e-voting with much success.
- A very small number of African countries are starting to experiment with e-voting, including Namibia and Kenya.
- Whilst approximately one third of the world's electoral democracies have implemented or are currently experimenting with e-voting, a small number of countries have recently abandoned the use of e-voting. Included in this group are Holland, Germany, the United Kingdom and Ireland. We are privileged to have with us at this seminar a representative from Ireland who was involved in the Irish experience of e-voting, and who offers a perspective from a civil society organisation.

3

- There are many different types of e-voting technologies. Broadly speaking, e-voting may be grouped into two main types: e-voting technologies that are used in an *environment that is controlled* by an election management body; and e-voting technologies that are made available to voters in *environments that are not in the control* of an election management body.
- Examples of e-voting technologies used in the control of an election management body include electronic voting machines as used in India, Brazil, Russia, Venezuela, the Philippines and the USA.
- Examples of e-voting technologies used in environments outside of the control of an election management body on a remote basis include internet voting, fax voting and telephone voting. Remote e-voting technologies are available in Canada, France, Estonia, Japan and the USA.
- There are many strengths and weaknesses associated with the various types of e-voting technologies. A key advantage of e-voting is the fast and accurate counting of votes, together with a reduction in the number of spoilt ballots cast. The green factor linked to e-voting technologies is also a key advantage – a decrease in the use of paper ballots, as well as the need to transport and store paper ballots.
- Some of the disadvantages associated with e-voting include the high monetary costs; concerns around the security of the data; a reduction in the transparency of the voting process; and the lack of consistent global standards to certify and audit e-voting technologies.

- Some of the key lessons learnt from the international experience on e-voting include the following:
    - One, the global experience on e-voting appears to be mixed, with no discernible move towards, or away from, e-voting.
    - Two, whilst almost all e-voting technology has been compromised in one way or another, it would appear that certain electoral democracies are prepared to accept these risks, whilst others are not.
    - Three, the importance of context-specificity cannot be over-emphasised when deciding on an appropriate method of voting. Accordingly, the decision on an optimal voting method must be informed by the demographics, political culture, socio-economic environment, economic and financial capacity, and institutional and infrastructural capabilities of the country.
    - And finally, a near-perfect e-voting solution may be available. However, the process of introducing a new technology in a country is as important as the product itself. This process needs to be underpinned by transparency, inclusivity and trust. Failure to manage the process of change from one voting method to another is likely to derail the success of the project.

We have a fascinating line-up of presenters over the next two days.

5

Our first presenter will provide us with a macro-level overview of the international experience of e-voting.

We then move into several country case studies, including India and Brazil which are considered world leaders in the use of e-voting; a recent convert to e-voting being the Philippines; and a country that invested considerable money and effort in e-voting before abandoning the project – Ireland.

At the conclusion of the case studies, we will explore some of the key lessons learnt and global best practices related to e-voting, before turning our attention to the final session which will examine the implications for South Africa.

I am certain that delegates will find the proceedings and debates in the next two days inspiring and thought-provoking. We have done everything possible to ensure your comfort at the seminar venue. We therefore call on you to enjoy our hospitality.

We once more welcome you and wish you a successful and stimulating seminar!

I thank you

6

APPENDIX 3


Electronic voting – the cross-national experience

By Surendra Thakur

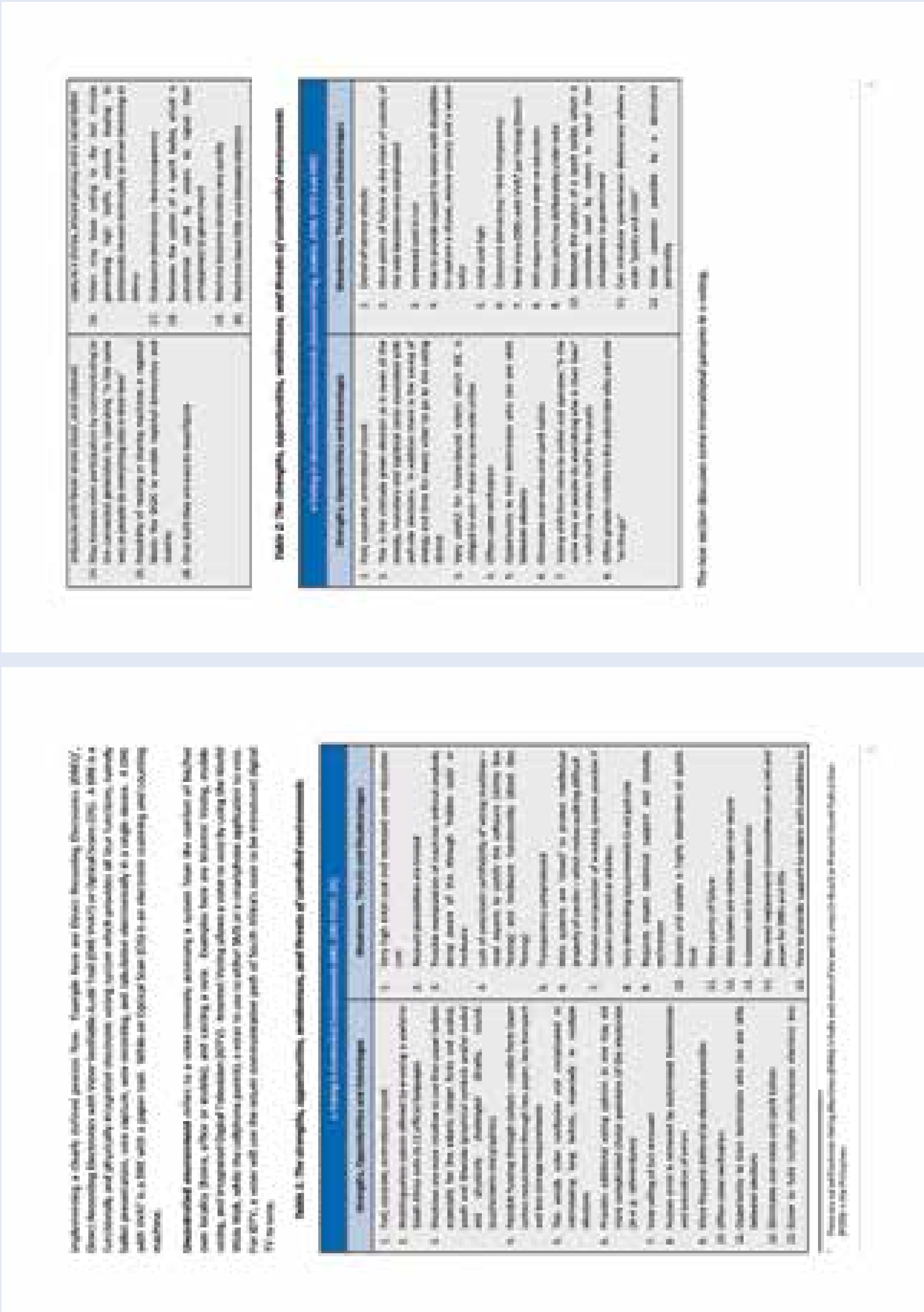
for Electoral Commission of South Africa

September 2012

ABSTRACT

APPENDIX 4


EXECUTIVE SUMMARY
Introduction
Methodology
Electronic Voting –
The Cross National Experience
Compiled by Surendra Thakur
For Electoral Commission of South Africa
September 2012



International Trends in e-Voting

There are a few noticeable trends in the adoption, abandonment, and piloting of e-voting, presented here (not in rank order):

1. **The largest group of e-voting adopters were democracies that are mature and stable political economies** such as Belgium and the USA, although the interesting aberration is Estonia which is a small, new, modern democracy.
2. E-voting appears likely to succeed in contexts characterised by **high levels of trust between the electorate and their governments.** This is evident in the relatively unconditional transition to electronic voting in Switzerland and Sweden, which have introduced moderate Internet voting.
3. Countries that successfully adopted e-voting did so through phased transparent trials, pilots, followed by full implementation. **All steps were coupled with massive simultaneous voter education drives.**
4. Adopters of e-voting typically seem to have two major dominant political parties, with a significant number of these self-same countries having coalition governments such as the UK and Germany, as well as India.
5. **Adopters, typically, are large countries or have a large population.** Some of these adopters are very large with regard to electorate size (India and Brazil) or adopts very large geographic entities (Russia, Canada). In addition, some of these countries' populations are distributed between a **developed grid-connected urban area with a small or undeveloped off-grid rural area** (with similar literacy distributions). Examples here are Brazil and India.
6. **Developing democracies appear to have a more pragmatic approach to e-voting.** They tolerate the errors without too much fanfare or public display. This is not to say that these countries are indifferent, it is just that they accept the deviations as tolerable consequences of e-voting, while continuing to improve e-voting in general. Most countries that have adopted e-voting have had high levels of public trust in the election management body (EMB).
7. Nations that have enjoyed success with e-voting have typically geo-used the services of a local technology partner, which had the added effect of giving the electoral process credibility in the eyes of the electorate. The cumulative effect of this approach is that democracy is not seen to be outsourced. Examples here are India and Brazil.
8. **There is evidence of regional sharing of e-voting systems, technologies, and expertise.** Brazil has established an e-voting programme and is loaning e-voting equipment to other countries such as Argentina, Mexico, and Uruguay for pilots and trials. The United Arab Emirates has also offered its solution to any country wishing to use it.
9. Adopter countries in fragile, transitional, or post-conflict democracies with a history of election related violence seem to have been able to mitigate the levels of violence through e-voting. In these cases, the advent of e-voting removed suspicions of ballot stuffing and government collusion, drastically or completely reducing fatalities. Examples here are the Philippines and Venezuela.

10. E-voting adoption is not a sudden or irreversible switchover[1] to a technology. Rather, the vision is one of a phased move to multi-channel elections in which voters are offered an increasing range of means to register their vote.

The next section presents some key findings.

Key Findings

1. The worldwide experience of implementing e-voting is mixed with respect to adoption, non-adoption or adoption followed by abandonment.

Table 3: Data on Elections and e-Voting (December 2011)

Voting type	Country
Twelve countries with legally binding poll-site electronic voting	Belgium, Brazil, Estonia, India, Japan, Kazakhstan, Namibia, United States of America, United Arab Emirates, Philippines, Portugal, Venezuela
Six countries with legally binding Internet voting	Austria, Canada, Estonia, France, Japan, Switzerland
Twenty countries piloting online and non-legally binding e-voting	Argentina, Azerbaijan, Moldova, Chile, Czech Republic, Costa Rica, Finland, Greece, Italy, Kyrgyzstan, Lithuania, Mexico, Nepal, Norway, Poland, Portugal, Romania, Slovenia, South Korea, Sweden
Five countries with pilots	Peru, Ecuador, Slovenia, and Spain
One country with a trial suspended and one pilot suspended	Bulgaria (Pilot) and Latvia (Trial)
Five countries with e-voting projects dropped	Australia (Cost, 2007); Germany (Security and trustworthy of vote, 2009); Ireland (concerns/skeptical and lack of public trust, 2006); Netherlands (Security and verifiability, 2008); and England (Unsafe and insecure, 2008)

Five significant adopting countries have stopped e-voting in the last five years. One further country suspended a trial – while another abandoned a pilot.

There is no observable international trend towards or away from e-voting. The total number of current poll site e-voting countries is twelve, with six countries using overseas site Internet Voting. Five countries have started, and have since stopped adopting e-voting. Twenty countries have started trials, with four countries in the pilot stage. Furthermore, one country suspended a trial, while another abandoned a pilot. This does not yet reflect any clear move towards or away from adoption. It does however indicate a growing interest in countries wishing to experiment through trials.

2. Most election management bodies (EMBs) around the world use some form of computer-aided technology to improve the electoral process. These technologies range from the use of basic

[1] Literature refers to a condition or transition preference for countries to use as a disruptive change.

office automation tools such as word processing and spread sheets to more sophisticated data processing tools, such as database management systems, biometric systems for voter registration, optical scanning, full electronic recording (at polls or remotely) of results, transmission of results, and geographic information systems for boundary demarcation.

3. **There is no compelling research which shows a correlation between increased voter turnout and electronic voting.** This may or may not apply to Internet voting for which there is little empirical data. This should not be a main driver for the adoption of e-voting.

4. **Empirical literature on e-voting is gradually increasing as research in this field grows, but there remains a dearth of literature.** There are few peer reviewed academic papers and published books on e-voting. This reflects its infancy having only started in the 1990s. Much of the existing literature concerns non-adoption and why e-voting should not be used. There is significantly less literature on why e-voting should be used. This might be a function of perception because of the relative infancy of the technology or because of its perceived vulnerability and cost. The decisions by Ireland, the United Kingdom, Australia, and Germany to suspend e-voting lend credence to this point.

5. **Almost every e-voting technology used in elections around the world have over time, been compromised.** Despite the diversity of methodologies – some laboratory, some field-based, some experimental – no e-voting technology has been insulated from misappropriation. **This is a key finding.** Yet many countries continue to explore e-voting, which demonstrates its relative attraction as a viable alternative to the traditional approach.

6. **Mistakes have occurred in every single e-voting election.** The critical observation here is that although hacking is very probable in all machines, **the researcher found no report of a hack materially influencing an election** by adding (or altering) votes, stopping, or stalling the operability of e-voting machines or any other voting operation. **This does not diminish the threat of hacking.**

7. E-voting technologies have also caused the "altering" of election results due to hardware or software failure. The Scottish 2007 election results were declared null and void after 140,000 votes were invalidated due to an Optical Scan failure.

8. Most e-voting companies try to protect their intellectual property by limiting access to the hardware and software. This, they argue, is to prevent unauthorised duplication of software. It is also true as soon as researchers had "access", they hacked the machine potentially embarrassing vendors and countries. India is one example. It is worth noting that many of these breaches are very difficult during an election as one needs sustained access which is practically difficult.

9. Limiting access to e-voting technologies does not improve security. The available evidence challenges the notion that the electorates' acceptance of the results may be achieved through obfuscation and restricted access to a voting machine on the grounds that it will improve security. The Australian model of open source, far from compromising security, actually improved it.

10. **E-voting is context-sensitive.** Countries, populations, electoral systems, public attitudes, and political and administrative arrangements differ widely, and all these factors play a role with regard to how Internet voting[1] (or e-voting) may be adopted. This means that in different countries with different circumstances, the decision on whether or not to introduce a particular kind of Internet voting (or e-voting) is deeply embedded in the contextual realities of that particular country. Some countries are persuaded by the sheer size of their democracy to adopt e-voting (India and Brazil), others by the resilience of the country (Canada and Philippines), by the frequency of use (Switzerland), by election-related violence (the Philippines), or by modernity (Estonia an United Arab Emirates), and by countries with coalition governments in power (India), perhaps due to mutual political party mistrust.

11. **E-voting enhances the possibility of green elections.** This is due to the possible savings derived from funding the large amounts of paper ballots manufactured, transported, securely stored, used, and restored to safe depots for audit and dispute. The carbon credits gained from this exercise may even co-fund an e-voting election. In addition, e-voting machines may be re-used with increased frequency.

12. **There appear to be two passionate and articulate camps advocating or opposing e-voting.** The arguments may typically be categorised as socio-political (digital divide, economic divide, urban and rural access, reflexive voting, disabled access transparency); at a technical level (software bugs, hardware hacks, errors, secrecy, security, outsourcing democracy); at a legal level (auditability, verifiability, authentication), and at a practical level (cost, ease of voting, infrastructure, impact on turnout, youth and elderly). There is still much uncertainty about the validity of claims of both proponents and opponents of most forms of e-voting as in some instances their positions often reflect initial beliefs and fears, and lack an empirical basis. In general, **the lack of empirical data is a challenge to presenting a more definitive evaluation of the technology.** What is apparent, however, is that more and more countries are experimenting, and piloting e-voting in a legally-binding manner or commissioning feasibility studies or pilots of e-voting.

13. **Transparency and trust in implementing e-voting is critical for success.** The Irish and the Venezuelans found that implementing e-voting without sufficient consultation and inclusivity may lead to voter distrust. The Australians **embraced[2] it due to the use of open source software**, openness, and transparency and even volunteers assisted to make the source code more robust. Australia also independently audited the solution. It would appear that **propriety systems struggle to gain acceptance** as the USA, Irish, Filipino and Dutch have demonstrated. **A certain amount of trust in the government is a prerequisite for social acceptance of e-voting, regardless of the country's e-readiness level.**

14. **International monitoring bodies have committed funds and instituted processes to monitor e-voting elections.** This has been achieved by sponsoring the development of appropriate tools to undertake such activities. They, while not giving an unequivocal endorsement to e-voting, accept that it is a reality, which therefore needs to be monitored. This may be perceived as a tipping point for adoption.

15. **Adopting e-voting is a disruptive experience** that requires a great deal of civic education of the public, politicians, and other stakeholders.

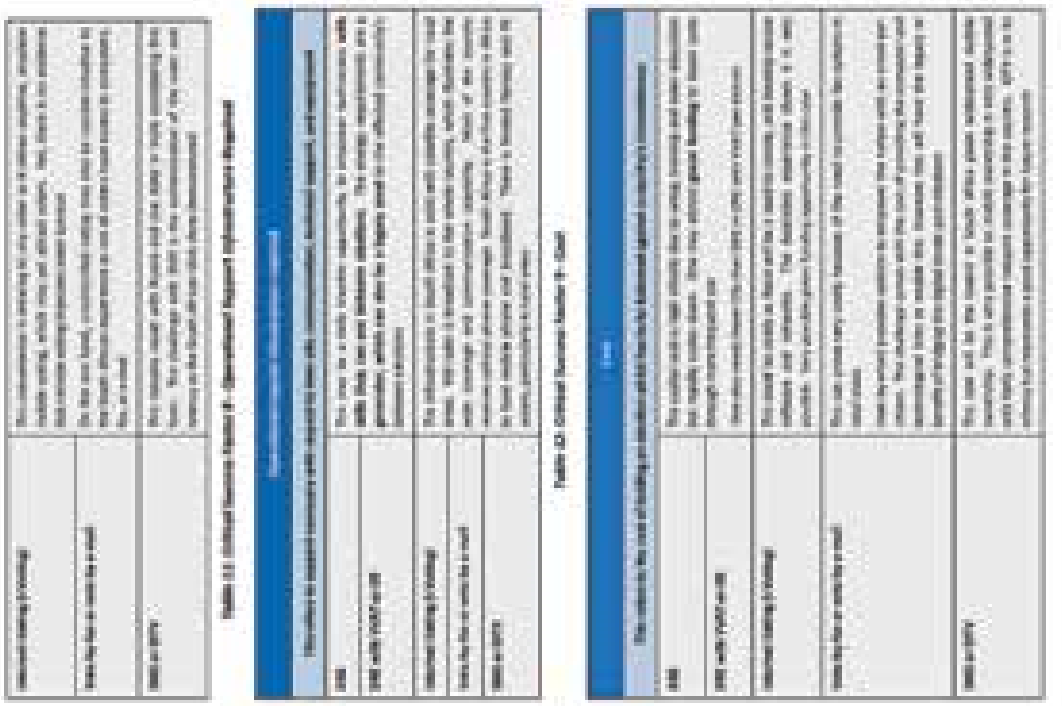
16. **Both of IdI's IBSA partners, India and Brazil use e-voting.** The partners will add value by sharing information and supply experience and informed intelligence.

17. Almost all countries, except India, had a register or a voters' roll, either centrally or at a decentralised level before adopting e-voting.

1 The research was on Internet voting. No Italian models e-voting. It was added by the author.

2 Australia did eventually abandon the project due to cost. The issue was never voter distrust.


Critical Success Factors to e-voting
Table 4: Critical Success Factor 1 - Vote Secrecy
Table 5: Critical Success Factor 2 - Vote Security
Table 6: Critical Success Factor 3 - Ease of Voting
Table 7: Critical Success Factor 4 - Transparency and Trust



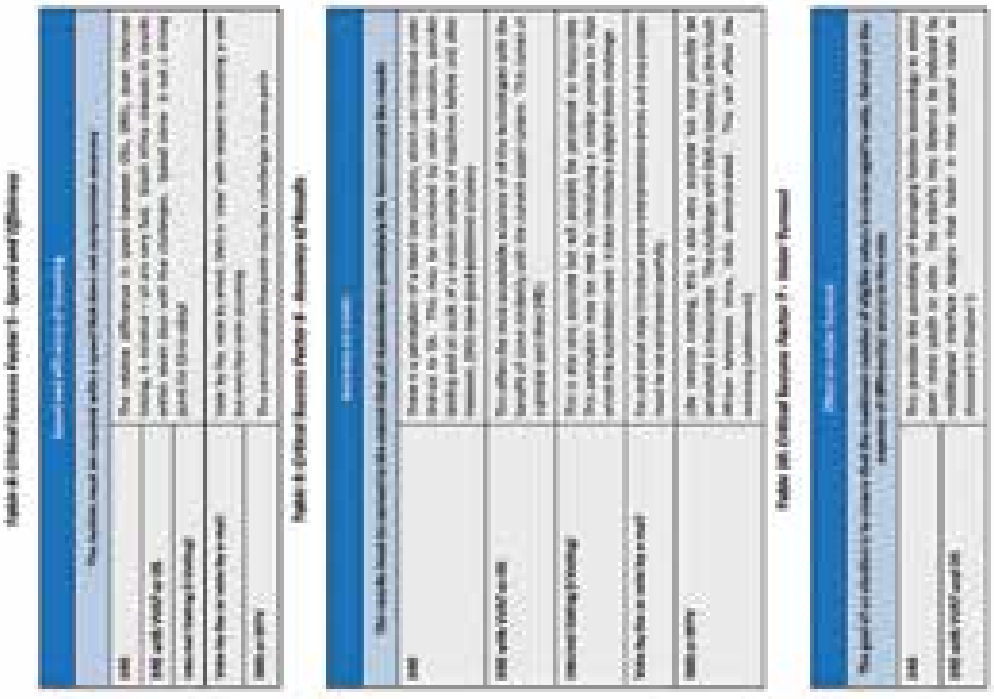


Table 13: Critical Success Factor 14 - Spoilt Ballots, Under-votes and Over-votes

Spoilt Ballots, Under-votes and Over-votes	
A spoilt ballot is a vote that is deemed invalid. An under-vote is where the voter votes fewer times than he/she is entitled to. An over-vote is where the voter votes more times than he/she is entitled to.	
EVM with VVPAT	Only under-votes are possible
BSO	Under-votes and spoilt ballots are possible due to voter selecting the wrong box
Internet Voting (i-Voting)	Only under-votes possible
Vote-by-fax or vote-by-e-mail	Spoilt ballots possible with fax
SMS or IPTV	Only under-votes possible

Table 14: Critical Success Factor 15 – Observation by Stakeholders

Observation by Stakeholders	
Observation by stakeholders - political parties, civic society, and citizens is important to build trust in the process	
EVM and EVM with VVPAT	The extent to observe and check the outcomes live on paper trail
BSO	
Internet Voting (i-Voting)	It is very difficult to observe live to paper trail
Vote-by-fax or vote-by-e-mail	
SMS or IPTV	

The following section presents some recommendations.

Recommendations

The IEC is recognised as a leader in electoral administration and in executing free and fair elections. It has won five awards in this process. It achieved this by consistently researching and testing different election technologies to determine whether, where, how, and when such technologies may be integrated in South Africa to further enhance the transparency of the election process.

Having conducted a cross-border analysis of e-voting, the IEC is faced with two options namely:

1. Further explore e-voting through trials and pilots; or
2. Not consider e-voting at this stage.

A set of recommendations is tied with each alternative to ease government

Should the IEC decide to consider e-voting, the following recommendations are advanced:

1. It is submitted South Africa should amend its laws to allow for experimentation through trials and pilots to add to the voter's choice. Moreover, it should not, at this stage, migrate from paper ballots. Paper ballots remain the gold standard of elections.

2. **An actuarial analysis should be conducted to assess the benefits that may derive from holding "green elections".** The study should include establishing the likelihood of generating carbon credits, which may in turn lower the cost of elections. The analysis must predict what, if any, savings will accumulate on the verification usage of paper, transport, and storage. The assumption here is that a well-designed, secure green e-voting system will endear itself to the electorate if it is carbon-friendly, particularly considering the recent international focus on climate change and green solutions. This may even help to avert voter trust.

3. **An expansive, focussed research study should be conducted of countries that have abandoned e-voting.** The adoption of e-voting is a significant political decision with considerable economic consequences. **The abandonment of e-voting is an even more significant economic decision that carries a huge political risk.** It is recommended these countries be engaged to gather first-hand knowledge of the difficulties that led to this decision. If South Africa adopts e-voting, this findings will help to fortify our product against these difficulties.

It is a strong recommendation that countries embarking on trials or pilots be closely monitored:

4. **An independent, non-partisan monitoring centre must be established** where the experiences of e-voting are documented, catalogued, analysed and disseminated. This monitoring entity should provide the empirical basis for further developments, prototyping, piloting, and implementation and where relevant, form the basis of decisions for phase-downs. While this exploratory report is an important problem step, the information gathering process must be continued by an independent, non-partisan monitoring centre. This centre may be virtual with a specific mandate to constantly appraise and relook at possible South African experiences.

5. **A trial or pilot, if and when conducted, must be transparent, rigorous, inclusive and remediative.** The purpose will be to gather relevant, focussed, contextualised empirical data. Voter perception about the value or otherwise of a system is as important as reading any trial or pilot results:

    5.1. Be focused to develop an efficient system for a special category of South African voters, such as voters abroad or the defence force.

        5.1.1. Have an auditing component that assists to satisfy the conditions of openness, transparency, and voter trust.

        5.1.2. Include a local partner for improved voter acceptance, inclusivity, and to build a sense of nationalism.

    5.2. At the same time build the electorates' trust in the system through extensive education. The use of a catchy term similar to the one used for the voter registration "slip-slip" scan device may help endear the product to the electorate.

    5.3 The system must take into account limited rural access, communication footprint of internet, and other methodology, multi-lingual literate and illiterate voters, the special needs of the disabled (blind, deaf, paraplegic, etc.).

APPENDIX 5

Country case study: Ireland

By

Dr Margaret McGinty

February 2013

ABSTRACT

Electronic voting was proposed in Ireland in the late 1990s and piloted in 2002. The technology that was piloted was a modified version of the technology in use at the time in The Netherlands. However, before the technology was implemented across Ireland in the 2004 elections, a decision was taken to abandon the use of e-voting technology. When e-voting was initially proposed in Ireland, it was argued that it would make it easier for the public to vote, election results would be available more quickly, the technology would improve the efficiency of electoral administration, and e-voting would support a positive image of Ireland as the user of innovative technology. In this paper it is argued that there were several reasons for Ireland abandoning its e-voting project, which included poor planning, the inability of the electronic body to perform in adequate access code system, inadequate testing of the technology, inadequate hardware security at count centres, a failure to consult interest groups, such as the disability sector, when planning the technology, and the absence of a voter verified audit trail. The Irish case study underscores that e-voting has the potential to offer improvements to the electoral process, but needs to be introduced carefully and with full cognisance of the safety critical nature of the electoral system. Furthermore, impartial, reliable, and informed expertise is vital to the successful introduction of e-voting.

Country case study - Ireland

Margaret McGaley

Historical and political background

Ireland is a Republic of approximately 4½ million people. The population is heavily concentrated in the capital city, Dublin. The total area of the state is 70,273 km^2, a little smaller than the Mpumalanga province of South Africa.

The island was under British rule from the 1600's, independence was declared in 1916, and recognised by the United Kingdom in 1922. The state that was created covers about four fifths of the island; the remainder, known as Northern Ireland, remains in the United Kingdom. The original constitution from 1922 was completely replaced in 1937, but many of the government structures are still legacies from British rule.

Ireland is a parliamentary democracy. Our head of government is the Taoiseach (Prime Minister). We also have a President who is head of state, but the role is largely ceremonial. The President signs new legislation, but does not have the power to veto it. She can refer it to the Supreme Court if she has reason to believe it is unconstitutional.

The legislative branch consists of the Dáil (house of representatives), Seanad (senate) and President. The executive branch is led by the Taoiseach, who must be a sitting member of the Dáil, and is nominated by the members of the Dáil. The Taoiseach then selects a cabinet of 7 to 15 members from the Dáil (up to two members may be from the Seanad).

Local government does exist in Ireland, but its powers are limited. Local councils rely almost exclusively on funding from the Government.

A General Election is held at least every 5 years. Members of the Dáil (TDs) are elected by Proportional Representation: Single Transferrable Vote (described below). At the time e-voting was piloted there were 43 constituencies from which 166 TDs were elected. Each constituency has 3 to 5 seats, depending on population density. Constituency boundaries are redrawn by an independent commission after each census.

In practice, once the results of a General Election are available, the political parties negotiate to form a coalition (there has not been a single party government since 1977). The leader of the largest party in the coalition is normally nominated Taoiseach.

The Seanad is formed of members nominated by the Taoiseach, by certain universities, and by special panels. It has the power to delay, but not veto, legislation.

In an effort to mitigate some of the negative effects of an adversarial political process, the government takes advice from Oireachtas committees[1] which are made up of members from both houses from across the political parties. These committees are set up to discuss specific areas of interest, and to take evidence from interest groups, witnesses and departmental officials, without being constrained by party policy. The committee meetings are mostly public, so members of the public and media may attend, but the meetings can be held in closed session.

All elections in Ireland use a system called Proportional Representation: Single Transferrable Vote (PR:STV). Casting a ballot is relatively intuitive: the voter ranks the available candidates in order of preference, writing the number '1' beside their favourite candidate, '2' beside their second preference and so on. 'X' or similar marks are also acceptable if the voter

[1] Official website of the Oireachtas committees
[2] http://www.oireachtas.ie/viewdoc.asp?DocID=[illegible]&&CatID=[illegible]

only wants to indicate their first preference. The counting rules err in favour of reading what one can from a ballot rather than only accepting ballots which adhere strictly to the rules. For example, if a ballot had a clear '1' beside one candidate, but two candidates were marked with the number '2', the first preference would be counted. Ballots cannot, of course, bear any identifying marks.

The counting system, however, is complex. The rules are laid out in legislation, but the implementation requires some expertise. The basic idea is that a quota is calculated from the number of votes cast and the number of seats available. This number is formulated such that it is impossible for more candidates to reach that quota of votes than there are seats available. Candidates are elected (once they have the requisite quota of votes) or eliminated (when it becomes clear that they cannot reach the quota). Their votes are redistributed amongst the remaining candidates according to the 'next available preference'. (In the case of elected candidates it is actually a subset of their votes which are redistributed). This continues until all the seats have been filled.

Counting becomes much simpler when only one seat is available (eg the Presidency) and in that case the counting becomes equivalent to Alternative Vote (also known as Instant Runoff Voting) since most of the complexity of the system becomes irrelevant in that case.

Ireland became a member of the EU (then called the EEC) in 1973. MEPs (Members of European Parliament) are elected using the same PR STV system.

Ireland does not have an independent electoral commission. All state elections are run by the franchise section of a government department, and it was they who had responsibility for the introduction of electronic voting. The department was known as the Department of the Environment and Local Government – DoELG – at the time electronic voting was being introduced.

The Technology Piloted in Ireland

The machines consisted of a panel of fixed buttons, and a small LCD screen[2] which could display very limited messages to the voter. A printed sheet attached to the machine indicated which button represented which candidate or option.

The Irish machines (named the ESI2) were altered from the machines then in use in The Netherlands (pictured[3]). A voter's panel screen was developed for the Irish system to display voter preferences. As the voter selected a candidate, the LEDs next to the button would display the appropriate preference number. A diagram is available in section 1.3.2 of the functional specification[4].

[2] [illegible]
[3] Photo courtesy of [illegible] at [illegible]
[4] NEDAP Voting System ESI2 functional specification [illegible]

The button which allowed voters to cast a blank ballot was also repurposed at the request of the government minister responsible for elections at the time. (The button was used to allow the voter choose between English and Irish for the messages displayed on the LCD screen). This decision to remove the ability to cast a blank ballot in secret became a source of controversy.

Under the system, voters would approach the registration desk as normal. Once their identity (and eligibility to vote) was confirmed, they would be given a token. The voter would then approach the attendant at the voting machine who would take the token and prime the machine to accept the vote. Once all preferences had been indicated, the voter would press the "cast vote" button. A beep would signal the successful completion of the voting process. Attendants were trained to deal with the case where the voter left the booth without completing the process.

Votes were stored within each voting machine on a "ballot module". After polls had closed, these modules would be physically transported to the count centre where the ballots were exported to a Microsoft Access database application (written in Borland Delphi) for tabulation. Due to the significant differences between the Dutch and Irish counting rules, new counting software had to be written for use in Irish elections. Unfortunately, and contrary to best practices, the functionality for Irish elections was added into the existing software suite, resulting in a code base of over 200,000 lines of code.

History of Electronic Voting in Ireland

Electronic voting was first proposed in Ireland in the late 1990's. In 1999 legislation was introduced which enabled the use of real ballots in research into the feasibility of electronic voting[1].

[1] Dáil Éireann - Volume 501 - 25 March, 1999. Written Answers. - Electronic Voting.

A tender process was undertaken and the winner was a system provided by Nedap/Powervote. Nedap is a well-established Dutch company that makes a wide range of devices[2]. They began producing voting machines for use in The Netherlands in the late 1980's and early 1990's[3]. Powervote was an English company apparently formed to sell the system in Ireland; one of the directors of Powervote was the author of the vote-tabulation software.

The system was piloted in three constituencies in early 2002, and seven constituencies in late 2002[4]. The plan was to use the system countrywide in the local and European elections in 2004. This was despite the "serious concerns"[5] of the head of the local government and franchise division of the DoELG.

He stated that the original plan had been to acquire 1400 machines for the 2004 elections, and to expand the pilot to the greater Dublin area. He expressed concern that the some constituencies might be presenting 4 or even 5 separate ballots to voters in that particular year, and that this was a "complex and crucial task".

The pilots had been portrayed as very successful but there were some issues. In fact significant discrepancies were recorded between the number of votes recorded by the returning officer, and the number of votes recorded by the voting machines in two constituencies[10, 11]. In addition, the

[2] NEDAP homepage
[3] First Report of the CEV, Appendix 2K Experience with Voting Machines in the Netherlands and Germany
[4] Irish Examiner, A litany of empty promises on secure and reliable e-voting by Paul O'Brien, Political Reporter, Thursday, July 08, 2004
[5] Memo from head of local government and franchise division to Secretary General of the DoELG
[10] Dublin North Election report, Dáil Election 2002, Date of Poll: Friday 17 May 2002
[11] Dublin West Election report, Dáil Election 2002, Date of Poll: Friday 17 May 2002

returning officer stated[11] that seals on the voting machines were broken in transit, that the counting software "occasionally hangs", and that the software loading ballot modules "frequently" displayed error messages.

When enabling legislation for the introduction of electronic voting was first brought forward, there was cross-party support for the idea. After the pilots in 2002 however, as awareness of the move towards electronic voting spread, concerns began to be raised by citizens and taken up by the opposition parties.

One such citizen is Mr Joe McCarthy, an experienced computer professional who conducted extensive research into the particulars of the Irish electronic voting system, spending thousands of euros of his own money on Freedom of Information requests to various government departments.

At the same time I was beginning my own research. I completed my undergraduate thesis on the Nedap/Powervote system in 2003. As a direct result of that research I formed the group Irish Citizens for Trustworthy Evoting (ICTE) while continuing my studies towards a PhD.

The Oireachtas Joint Committee on Environment and Local Government met three times in late 2003 to discuss electronic voting. As outlined above, these committees exist to allow members of all parties to examine issues without being restricted by official party policy. At the first of these meetings the minister responsible gave a presentation about the system, but comments were not accepted from the gallery. At the second meeting[12] I was invited to present my opinions on the system, as were Mr. Shane Hogan and Mr. Robert Cochran, authors of a report requested by the Labour party. At the end of that meeting the committee decided to write to the minister to ask that he not spend any more money on the system until they had finished examining it[13].

Eight days later the committee met again, presentations were made by Joe McCarthy and by Mr Niall Callan (the Secretary General from the DoELG). I attended to answer questions as did Mr. Robert Coughlan and representatives of Groenendaal (the developer of the counting software), Nedap and Nathean Technologies (the company that performed a code review). After the various witnesses left, a vote was taken (despite the misgivings of some members) on the motion "That the joint committee endorse the efforts on electronic voting made to date by both the Minister and his Department;"[13] and as predicted the vote was clearly split along partisan lines.

At the time of this third meeting "letters of intent" had been signed, but the vote to "endorse the efforts" paved the way for contracts of sale to be signed.

In February 2004 the official launch of the system took place in Dublin city centre. ICTE members attended the event and produced a leaflet outlining our concerns for the occasion. I appeared on radio and TV to communicate our position as broadly as possible.

During this period one of our chief goals was the establishment of an electoral commission. An issue as sensitive as the modification of the electoral system should not be left to the vagaries of politics. That commission has still not been set up, but in March of 2004 the Commission on Electronic Voting (CEV) was set up to examine the secrecy and accuracy of the chosen system. The reports of that commission were instrumental in the demise of the electronic voting system.

[11] Dublin County Poll Elector Report (incorporating report from Manning Ltd.) June 2002
[12] Minutes of the Joint Committee on Environment and Local Government, 10 December, 2003
[13] Irish Times, Call for review of electronic voting plan, Thu 12 Dec 2003
[13] Minutes of the Joint Committee on Environment and Local Government, 18 December, 2003

The CEV published an interim report, in April 2004. They had withheld certain details from that report (hence "interim") for legal reasons. The Government had committed to accepting the results of the work done by the Commission on Electronic Voting, so when the interim report stated that the Commission was

> "not in a position to recommend with the requisite degree of confidence the use of the chosen system at elections in Ireland in June 2004."[16]

the decision was taken to return to the paper system for the upcoming election.

The CEV issued their full final report in December 2004. They continued their research, and published their second and final report in July 2006. The second report detailed the significant changes they felt were required to make the system suitable for use in Ireland. Three years later the minister responsible declared that the Government had decided "not to proceed with the implementation of electronic voting in Ireland."[17]

Initial Reasons for Introducing Electronic Voting

The annual report of the Department of the Environment and Local Government in 1998 stated:

> "The use of electronic voting and counting would:
> - make it easier for the public to vote;
> - provide election results within a few hours from close of poll, depending on size of constituency;
> - improve efficiency of electoral administration; and
> - support a positive image of the country in the use of information technology."[18]

This list includes efficiency, but not cost-saving. A report of the Comptroller and Auditor General in 2003 makes clear that there was a perception that the system would save money, but the same report goes on to say that "the project should have been subject to more rigorous cost/benefit analysis in view of the scale of the financial commitments involved."[19]

At the time it was claimed that a reduction in the number of accidentally spoiled ballots would be a significant advantage of the system. Indeed, the nature of the interface did prevent certain errors (such as giving a first preference to more than one candidate) which invalidate votes. However, as mentioned above, the machines did not have a button to allow voters to cast a blank ballot by choice. Once the machine had been primed to accept a vote the voter could request that their vote be cancelled. This was the closest a voter could come to casting a blank ballot, though it was not secret.

Improved accessibility is often cited as a reason to introduce electronic voting. But like security, accessibility must be planned in from the earliest stages of design, it cannot be added on as an afterthought. The slogan "it's easier for everyone" was the core of the advertising campaign run by the DoELG. Sadly this was unfounded. The input of special needs groups was not sought before the preparations for the first pilot, where it became clear that the voting machines could not be used by wheelchair users[20]. The machines had an audio interface capability, but this was not integrated into the Irish version of the system[21].

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[16] INTERIM REPORT of the Commission on Electronic Voting on the Secrecy, Accuracy and Testing of the Chosen Electronic Voting System

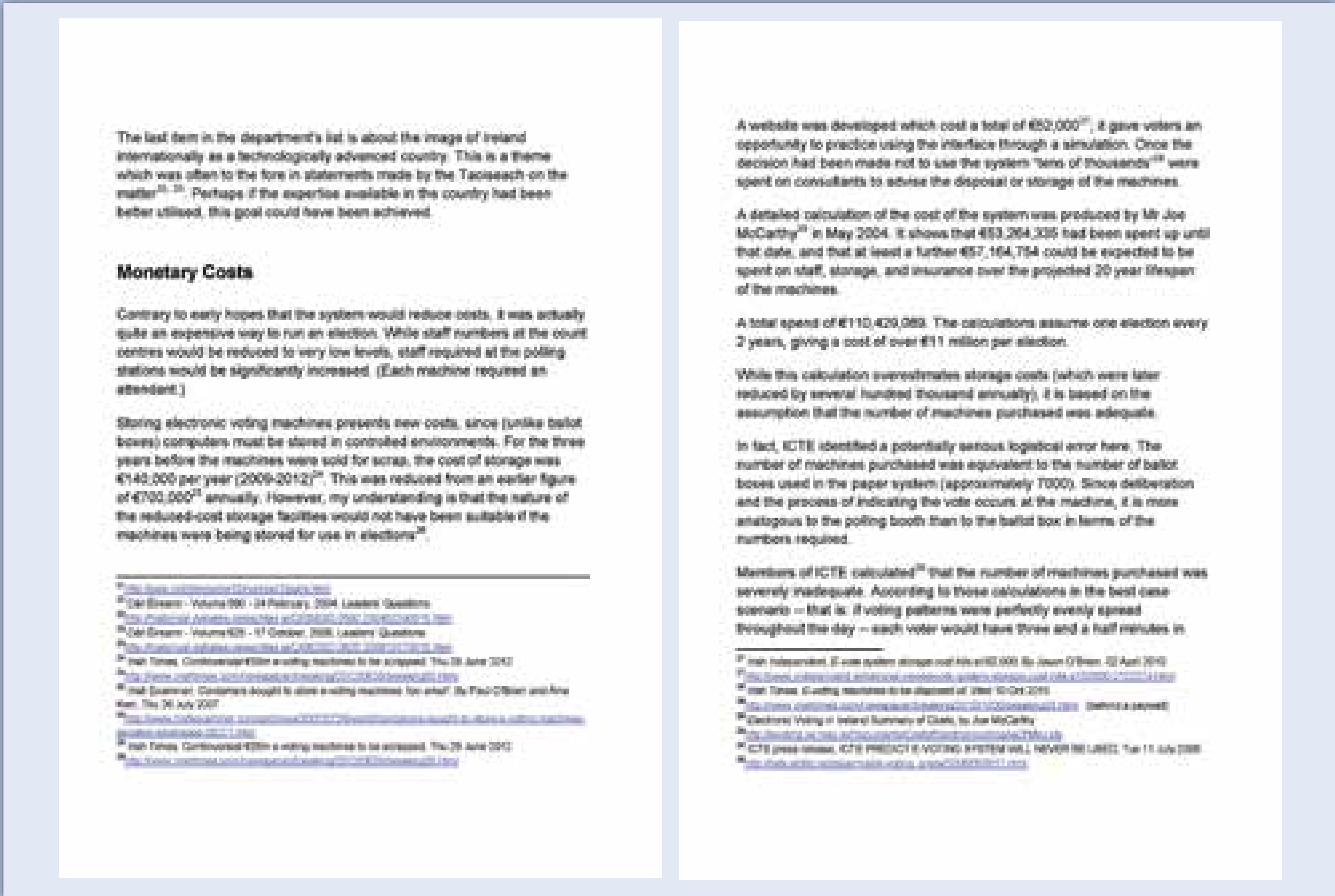
[17] DoELG press release, CMD4701: Minister Gormley announces Government decision to end electronic voting and counting project

[18] DoELG Annual Report 1998

[19] C&AG Annual Report 2003, Chapter 8 DoELG

[20] Dublin County Final Election Report (incorporating report from Managing Ltd.) June 2002

[21] Information Technology and Disabilities Journal, Vol. 8 No. 2, December 2004, Accessible Democracy and Electronic Voting in the Republic of Ireland, Seamus Parry



The last item in the department's list is about the image of Ireland internationally as a technologically advanced country. This is a theme which was often to the fore in statements made by the Taoiseach on the matter[illegible]. Perhaps if the expertise available in the country had been better utilised, this goal could have been achieved.

Monetary Costs

Contrary to early hopes that the system would reduce costs, it was actually quite an expensive way to run an election. While staff numbers at the count centres would be reduced to very low levels, staff required at the polling stations would be significantly increased. (Each machine required an attendant.)

Storing electronic voting machines presents new costs, since (unlike ballot boxes) computers must be stored in controlled environments. For the three years before the machines were sold for scrap, the cost of storage was €140,000 per year (2009-2012)[illegible]. This was reduced from an earlier figure of €700,000[illegible] annually. However, my understanding is that the nature of the reduced-cost storage facilities would not have been suitable if the machines were being stored for use in elections[illegible].

[illegible]
Dáil Éireann - Volume 580 - 24 February, 2004. Leaders' Questions
[illegible]
Dáil Éireann - Volume 629 - 17 October, 2006. Leaders' Questions
[illegible]
Irish Times, Controversial €50m e-voting machines to be scrapped. Thu 28 June 2012
[illegible]
Irish Examiner, Containers bought to store e-voting machines: for what? By Paul O'Brien and Ann [illegible]. Thu 26 July 2007
[illegible]
Irish Times, Controversial €50m e-voting machines to be scrapped. Thu 28 June 2012
[illegible]

A website was developed which cost a total of €50,000[illegible]. It gave voters an opportunity to practice using the interface through a simulation. Once the decision had been made not to use the system "tens of thousands"[illegible] were spent on consultants to advise the disposal or storage of the machines.

A detailed calculation of the cost of the system was produced by Mr Joe McCarthy[illegible] in May 2004. It shows that €53,264,335 had been spent up until that date, and that at least a further €57,164,754 could be expected to be spent on staff, storage, and insurance over the projected 20 year lifespan of the machines.

A total spend of €110,429,089. The calculations assume one election every 2 years, giving a cost of over €11 million per election.

While this calculation overestimates storage costs (which were later reduced by several hundred thousand annually), it is based on the assumption that the number of machines purchased was adequate.

In fact, ICTE identified a potentially serious logical error here. The number of machines purchased was equivalent to the number of ballot boxes used in the paper system (approximately 7000). Since deliberation and the process of indicating the vote occurs at the machine, it is more analogous to the polling booth than to the ballot box in terms of the numbers required.

Members of ICTE calculated[illegible] that the number of machines purchased was severely inadequate. According to those calculations in the best case scenario – that is: if voting patterns were perfectly evenly spread throughout the day – each voter would have three and a half minutes in

Irish Independent, E-vote system storage cost [illegible]. By Jason O'Brien. 02 April 2010
[illegible]
Irish Times, E-voting machines to be disposed of. Wed 10 Oct 2010
[illegible] (behind a paywall)
Electronic Voting in Ireland Summary of Costs, by Joe McCarthy
[illegible]
ICTE press release, ICTE PREDICT E-VOTING SYSTEM WILL NEVER BE USED. Tue 11 July 2006
[illegible]

front of the machine. In fact, of course, there are three main periods (early morning, lunchtime, and after work) which see much higher numbers of citizens coming to vote. Though this calculation was never tested, it is likely that the low number of machines purchased would have caused serious delays and even disenfranchised voters who gave up and left the queues.

There are generally at least two polling booths to every ballot box in the paper system. Doubling the number of machines would have almost doubled the costs, since all of the attendant costs in terms of storage and staffing would also double.

An outline of the main reasons for abandoning the implementation of e-voting technologies in Ireland

It was the CEV's interim report[31] which halted the implementation of electronic voting. In their research, the commission reviewed "expert reports, submissions received and other relevant information to date" and highlighted the following concerns.

The quality and testing of the count software

The count software was one of the major causes for concern amongst those opposed to the system. The software had a mission critical role in a safety critical context[32], yet it did not have any coherent version control system. Changes were being made constantly, right up to a "couple of days before polling day"[33].

[31] 'INTERIM REPORT of the Commission on Electronic Voting on the Secrecy, Accuracy and Testing of the Chosen Electronic Voting System'
[32] 'NUIM Dept. of Computer Science, Technical Reports - 2003. If voting: a safety critical system' Margaret McGaley, J. Paul Gibson
[33] Dublin County Post Election Report (Incorporating report from Wexford) (At) June 2002

The software version had not been finalised at the time the report was published – two months before the date of the election. Naturally it would be impossible for anyone to verify the accuracy of an unfinished product.

The code base was enormous for a system of its type (200,000 lines of code) in part because it incorporated functionality from other jurisdictions. Unnecessary functionality should never be included in code with high security demands, because it adds unnecessary risk of undesired behaviour. Excessively large code bases are more difficult to audit and test, and signal poor development practices.

Certain things which have been normalised for casual computer users are red flags for people with knowledge of how software must behave in a safety critical context. Software which "occasionally hangs"[34] may be par for the course in consumer computing, for example, but it indicates errors in design or implementation. Such errors are indicative of the lack of standards applied to the development of the software. The rapid and unstructured modification of the counting software was particularly worrisome.

Access to source code

The source code for both the voting machines and the count software was not made available to the Commission. They were therefore unable to perform an adequate code review.

I have argued elsewhere[35] that the source code for electronic voting should actually be made publicly available. There are several reasons for this approach, but one of the most pressing is this: as the final arbiter of election results, the software replaces the electoral law. It becomes the law.

[34] Dublin County Post Election Report (Incorporating report from Wexford) (At) June 2002
[35] 'Electronic Voting in Europe – Technology, Law, Politics and Society', Workshop of the ESF TED Programme, July 7th-9th 2004. 'Transparency and e-Voting Democratic vs. commercial interests' Margaret McGaley, Joe McCarthy

Incomplete testing

The CEV expressed concern that there had been inadequate testing of the system. The were no independent end-to-end tests of the system as a whole, which is of particular importance in such a complex system. Nor was there any parallel test (where the new system and old system would be run concurrently and their results compared).

The security of the PCs used at count centres

The so-called "hardened PCs" used at count centres were deemed to be the weakest link in the security of the system. Experts retained by the commission succeeded in bypassing security measures on these PCs, and gaining complete control. The commission highlighted their susceptibility to human error, as well as malice.

Procedural issues with respect to the storage and deployment of the machines

The report simply states that "attention is required" to this aspect of the system, but this is consistent with reports from the returning officer in the pilots.

Secrecy of the ballot for those needing assistance using the machines

As discussed above, the system failed to improve accessibility for voters who normally need assistance in voting, and even reduced accessibility. Functionality to provide an audio interface was not implemented, and the cast vote button was not reachable to wheelchair users.

Conflict between desirability of publishing all votes for verification of results and potential use of unlikely vote combinations as a signal in cases of corruption or intimidation

One suggestion for added affirmation of results is that all cast ballots be published to allow citizens to perform their own analysis of the declared results. Since votes are anonymous, this should not impinge on the requirement for ballot secrecy.

Unfortunately, due to the nature of ballots in PR-STV there is a very large number of possible combinations of preferences which a voter can indicate on a ballot. Many of these combinations are valid but unlikely (for example, alternating preferences between candidates with opposing views). It has been suggested that this might be used by an unscrupulous person to force or pay someone to cast a particular vote. The first preference would be for the desired candidate and the remaining preferences would simply mark the vote as being from the victim. The victim could not rely on such an unusual pattern occurring naturally, and the authorities could not identify such ballots for certain as not occurring naturally.

Voter Verified Audit Trail

While the commission's terms of reference did not strictly include the question of a Voter Verified Audit trail, it was the first item listed where they discuss the main themes of submissions they received (section 3.2). In the conclusion (section 4.4) of their interim report, they also state:

> "the system does not have a voter-verifiable audit trail (VVAT), argued by many to:
>
> - reassure voters that their vote has been correctly recorded,
> - create a disincentive to the manipulation of the system by providing an external check on accuracy,
> - enable recovery from a serious system failure,
>
> the absence of a VVAT significantly raises the standards and quality of other system testing that is required."

An analysis of the key lessons learnt from the Irish experience of e-voting technologies

Electronic voting has the potential to bring some improvements to the electoral process, but it must be introduced carefully and with full cognizance of the safety critical nature of the electoral system[26]. Impartial, reliable, informed expertise is vital to the successful introduction of electronic voting. Several significant mistakes were made in Ireland that contributed to the failure of electronic voting there.

Perhaps the most avoidable and serious mistake was in the response to growing opposition to the system. Professional, educated citizens raised concerns based on their experience in the field of information technology. The response from the government was to demonize[27] the people opposing the system, and dig in their heels (as evidenced by the Oireachtas committee meeting process described above). A cautious, considered, inclusive approach could have avoided many of the other mistakes described below.

In my PhD[28] I discuss best practice in the procurement by government agencies of information and communication technologies (with reference to the work by the UK government's National Audit Office and Office of Government Commerce). The relevant findings are summarised below.

Expertise

The DoELG did not have adequate in-house expertise to evaluate the quality of the system, and ended up relying on the vendor's advice. Anyone with minimal experience developing or procuring safety critical software systems would have realised that there were serious problems with this system: for example, the inconsistent version numbering and the excessive size of the count software.

The advice and opinions of Irish citizens with the requisite expertise was not sought. When it was offered it was mostly dismissed with derision[27]. Retaining in-house expertise (especially in a well-paid field) and finding impartial advice are not simple propositions, but we cannot allow the difficulty of the task to overshadow the real need it represents.

Specification

A clear set of requirements was never developed. If requirements are not established, one cannot test whether they have been met. All requirements of all stakeholders must be clearly defined and laid out as a first step. All other steps in the procurement process must be completed with reference to the specification (though the specification may be updated as later steps may improve understanding of the project). There are well-established techniques for developing such a specification. The lack of expertise in the department was likely a major contributing factor to this failure.

Special interest groups were not consulted until after the system was purchased (for example wheelchair users, as discussed above).

Planning

Inadequate planning resulted in several oversights (including the insufficient number of machines purchased, as discussed above). This stage should have also included a thorough risk analysis and cost/benefit analysis, which were never developed.

An important system like this requires regular oversight including gateway reviews. Gateway reviews identify key decision points in the process of

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[26] NUIM Dept. of Computer Science, Technical Reports - 2003. *E-voting: a safety critical system*. Margaret McGaley, J. Paul Gibson

[27] Dáil Éireann - Volume 580 - 17 February, 2004 Electronic Voting: Motion

[28] PhD Thesis 2008, Margaret McGaley, *E-voting: an immediate technology in a critical context*

procuring a system; each "gateway" must be completed to the satisfaction of an independent team before the project can move on to the next.

Buy-in

The project did not have buy-in from all stakeholders. Opposition parties did originally support the introduction of the system, but once concerns were raised by citizens with relevant expertise, opposition parties lost confidence in the system. The government at the time allowed it to become a political bone of contention, rather than listening to the rational arguments being presented. They dug in and extended the degree of political commitment to this deeply flawed system.

Clarification of the roles and responsibilities of key players

The contracts with the vendors of the system appear to have been wholly inadequate. They had no legal responsibility to provide a system that was fit for purpose, nor were they liable for the costs incurred due to its critical flaws.

Conclusion

A project of this scale and criticality must be well-specified, well-planned, and supported by impartial advice from sufficiently knowledgeable experts. Above all, it must be undertaken with caution.

Notes:
Many of the documents cited were retrieved through Joe McCarthy's Freedom of Information requests, they are available from the ICTE website www.evoting.ie/foia

The website of the Commission on Electronic Voting is no longer live. URLs have been provided where copies of the reports are available.

SPEECH OF SHRI V. S. SAMPATH

CHIEF ELECTION COMMISSIONER OF INDIA

ON

ELECTRONIC VOTING AND COUNTING

IN INDIA

Distinguished Delegates, Ladies and Gentlemen,

1. It gives me great pleasure to share with you our experience on Electronic Voting and Counting. I intend to take you on an exciting journey which is more than 2 decades long – a journey which has firmly established Electronic Voting and Counting in India.

2. **The Complexities and Scale of Indian Elections** -

Before I give you the details of electronic voting and counting in India, let me first explain the scale and complexities of elections in India. India has a population of approximately 1210 million and an electorate of over 770 million. The size of Indian electorate is greater than the electorate of all the countries of Europe taken together. It is greater than all the countries of Africa taken together. It is more than all the countries of North and South America taken together and greater than all the countries of the Commonwealth except India taken together. There are 543 Parliamentary Constituencies, 4120 Assembly Constituencies and 9,00,000/- polling stations. More than 8000 candidates contested in the 2009 Parliament Elections. Approximately 11 million polling personnel and 100,000 Personnel of Central Police Forces were deployed in 2009 elections. 129 special trains with 3660 coaches were used to transport Central Police Forces. 50 helicopters ferried polling staff in 601 sorties. However, it is not just the scale but also its diversity and complexity which make Indian

elections so challenging and exciting. We have the mighty Himalayas on the one side and the Andaman & Nicobar and Lakshadweep islands on the other. We have the desert in Rajasthan and the lush green fields in the plains. We have dense forests and also sprawling metropolis. People of our country are as diverse as its geography. There are 22 languages recognized by our Constitution. However, there are hundreds of minor languages and dialects spoken by the people of India. Almost all major religions of the world exist in our country. India has the super-rich of the world and also poorest of the poor. While some of the most highly educated persons live in our country, we also have illiterate people. While elections are conducted on such a large scale in India, the Commission also has an eye for detail. The Commission takes special pains to ensure that every single voter is able to cast his vote in a free and fair manner. This can be seen from the fact that a separate polling station was created in the middle of Gir forest in Gujarat state for a single voter so that he does not have to walk for a long distance to cast his vote. Similarly, in 2009 Lok Sabha election 12 men trekked 45 kms in knee-deep snow to reach a polling station with just 37 voters at a height of 15300 feet above mean sea level in Ladakh. The Commission tracks every polling station on the poll day. Special mechanisms like SMS based poll monitoring, video recording of polling process and direct web casting from polling station is done to ensure this monitoring.

3. The system of voting in our country has evolved from a very primitive system to electronic voting in the last 60 years. In the first General Elections held in 1951 separate ballot box was kept for each candidate. This was done because it was felt that the voters in India will not be able to understand the process of marking of ballot papers. They were therefore asked to simply deposit the ballot in the box of the candidate of their choice. Marking system on ballot paper was introduced during the mid-term elections to the Legislative Assemblies of Kerala and Orissa in 1960-1961. This system remained in vogue till General Elections to Lok Sabha 1999. Electronic voting was introduced for the first time in India in the year 1982. India has used electronic voting in all elections since 1999.

4. **<u>Types of Electronic Voting</u>** -

Electronic Voting can be of two different types. These are 'place of poll electronic voting' and 'internet voting'. Internet voting has been tried on a limited scale in some countries like Austria, Canada and the USA. India has also experimented with internet voting in elections to Ahmedabad Municipal Corporation in Gujarat. 'Place of poll Electronic Voting' can be of different varieties. It can be Electronic Voting using 'direct recording machines' or it can be voting by marking on a paper ballot in the usual manner with optical scanning for counting of votes. Direct recording voting machines are used in India, Brazil,

Venezuela, etc. Optical scanners are used in some States of the United States of America. Some countries like Venezuela use direct recording Electronic Voting Machines with Voter Verifiable Paper Audit Trail or VVPAT.

3. **The Journey of Indian EVM** –

The concept of Electronic Voting Machines in India was first mooted in 1977 by Shri S L Shakdhar, the then Chief Election Commissioner of India. Electronic Corporation of India (ECIL) and Bharat Electronics Limited (BEL) two public sector companies were asked to develop EVMs. These companies developed EVMs with a common user interface in 1980. These machines were extensively tried out at locations across the country. Seminars were conducted by Election Commission of India with all stakeholders and the machines were then fine-tuned based on the feedback obtained. The Commission took the decision to use EVMs in a meeting with the Law Ministry, Chief Electoral Officers of some states and manufacturers of EVMs on 29th July, 1981. EVMs were used for the first time in India in May, 1982 in 50 polling stations of Parur Assembly Constituency in Kerala. However, before the use of these machines could become widespread, it was challenged in an Election Petition. On 5th March, 1984, the Supreme Court ruled in this Election Petition that EVMs cannot be used in elections unless the law is amended and a specific provision is made in the law for their use. The matter was referred by Government of India to Electoral

Reforms Committee in February, 1990. This Committee consisted of representatives of several recognized National and State-level political parties. Government of India then constituted a Technical Experts Committee to technically examine EVMs and give a report to the Electoral Reforms Committee. The Technical Experts Committee after examining the EVMs unanimously recommended that they should be used in elections. On the recommendations of the Electoral Reforms Committee, the law was amended by the Parliament in December, 1988 and a new section – Section 61A was added in Representation of People Act, 1951 empowering the Commission to use EVMs. Necessary amendments were made in the Conduct of Election Rules on 24th March, 1992. The Commission spent approximately six years from 1992 – 1998 to create awareness about EVMs. Since 1999 EVMs have been used in our country in every General Election and bye election. General Election to Lok Sabha (House of the People) in 2004 and 2009 were conducted exclusively on EVMs.

4. **Main Technical Concerns** –

When EVMs were being developed, some important concerns were raised. These are summarized below:-

a. The first and the most important concern was about the possibility of tampering with data in the EVM. The remedy provided for this concern in the Indian EVMs is:-

i. The microprocessor used in the EVM has software code "burnt-into" it. The code can neither be changed nor even read back from the microprocessor.

ii. There is no operating system in the Indian EVMs. All coding is at the chip level.

iii. Indian EVMs are stand-alone machines which cannot be networked and therefore they cannot be accessed or hacked remotely.

b. The second concern was about using the machine without mains power in rural areas. This has been remedied by using a special power pack, 7.7 volt battery which is independent of mains power.

c. The third concern was that the data should be stored long enough so that it can be used as evidence in a Court of law in case of an electoral dispute. This is taken care of by recording data on volatile dual redundant memory chips. The data can be retained for years even when the power pack battery is removed.

7. **Improvements in EVMs over time** –

EVMs in India have been improved as technology has progressed. The first model of EVMs manufactured in 1989-90 is no longer used. It has been declared obsolete. The Commission has fixed the life of EVMs to be 15 years. A new

improved model of EVMs was designed in the year 2006. Important new features of this new model are:-

a. Date and time stamping of all keys pressed.

b. Dynamic key coding.

c. Real time clock.

8. **Description of the EVM and the voting process** –

The EVM consists of a ballot unit, a control unit and the connecting cable. The ballot unit has candidate buttons. Ballot can be cast by pressing the candidate button on the Ballot Unit. No input is possible in the EVMs from any source except the ballot unit. The Control Unit is the brain of the EVM with a microcontroller and memory. The Control Unit is kept with the Presiding Officer at the polling station while the Ballot Unit is kept in the voting compartment where a voter can cast his vote in privacy. The two are connected with a long connecting cable. Pressing of a button on the Ballot Unit will not record a vote unless the Ballot Unit has been enabled by pressing the Ballot button on the Control Unit. When the voter comes to the polling station he is first identified based on his Elector Photo Identity Card (EPIC) or other valid photo identity documents. After this, the voter signs on the Voter Register and indelible ink is applied on his left forefinger. The Presiding Officer then enables the Ballot Unit

by pressing Ballot button on the Control Unit. The voter then goes to the polling compartment and presses the candidate button on the Ballot Unit for the candidate of his choice. As soon this button is pressed, the vote is recorded in the Control Unit and Ballot Unit goes dead till it is re-enabled by pressing the Ballot button on the Control Unit. However, it cannot be re-enabled within 12 seconds of casting a ballot. When the candidate button is pressed, an LED gets lit up against the name of the candidate whose button has been pressed and a loud beep sound is heard so that a voter knows that his vote has been cast in favour of the candidate of his choice.

9. **Security of EVMs** –

EVMs are kept under very strict security. They are stored in strong rooms which have only one door. The door has a double lock system and the keys of the two locks are kept with two different senior officers. The strong room is kept under armed guard 24 hours a day and is also under coverage of CCTV camera. When EVMs are transported from the strong room to the polling stations and back they are always accompanied by armed police guard.

10. **Transparency and involvement of Stakeholders** –

The Commission ensures complete transparency and involvement of all stakeholders in the use for EVMs. An elaborate procedure has been prescribed by the Commission for this purpose. It begins with the process of First-Level Check which is done a few months before every election in the presence of

representatives of recognized political parties. During First-Level Check engineers of manufacturers check every EVM. After this, a mock poll is conducted by casting one thousand votes in at least 5% of EVMs picked up randomly by representatives of political parties. After the mock poll, a sequential printout of the result is taken and shown to the political party representatives so that they can compare it with the sequence of votes polled during the mock poll. Thereafter, the control unit of EVMs is sealed using a uniquely numbered Pink Paper Seal which is manufactured by Security Printing Press, Nasik. It may be mentioned here that this Security Printing Press, Nasik also prints currency notes for our country. Political Party representatives sign on the pink paper seal after it is applied on the Control Unit. The Control Unit cannot be opened without damaging the pink paper seal once it is applied. After the candidates are finalized in an election, a similar process of second-level check is done on the Ballot Unit after which the Ballot Units are also sealed using the pink paper seal. Even during this process, mock poll with one thousand votes is done in 5% of EVMs picked up randomly by candidates. A sequential print out is shown to candidates and their representatives. Another mock poll is done by casting at least 50 votes at each polling station before the commencement of the poll. In addition to these measures, several other thread seals and paper seals are put on the Control Unit and Ballot Unit to ensure that they cannot be opened and are 100% secured. Before the process of counting is started, the integrity of the seals is checked in the presence of candidates and their representatives.

11. **Judicial Scrutiny of EVMs in India** –

EVMs in India have not only stood the test of time but also scrutiny by courts. Bombay High Court (Nagpur Bench) and Karnataka High Court, in two election petitions, expressed satisfaction about the non-tamperability of the ECI-EVMs. Karnataka High Court went to the extent of observing "this (ECI-EVM) invention is undoubtedly a great achievement in the electronic and computer technology and a national pride". Kerala High Court has also recorded its appreciation of the efficiency of the mechanism of the ECI-EVMs. Madras High Court held that, "There is also no question of introducing any virus or bugs" It further observed "The contention of the learned counsel that the use of EVMs in Japan and United States of America proved to be a failure also will not hold any water. In India, we are not following the system prevailing in the United States of America or Japan"

12. **Advantages of using EVMs** –

EVMs have several advantages:–

a. They modernize the election process.

b. They are user friendly – can be used even by illiterates.

c. They are simple to operate and can be installed in a short time.

d. They preserve voting secrecy.

e. There is no scope for invalid votes.

f. They facilitate quick and accurate counting. It is possible to declare results instantaneously.

g. They are re-usable by simply erasing votes recorded in earlier poll.

h. Huge expenditure involved in printing, storing and transportation and security of ballot paper can be avoided (Approximately 12000 MT of paper will be needed at a total cost of Rs. 578,400,000/- in each parliamentary election).

i. They have low operating costs.

j. They are easy to manage with less demand on man-power.

k. They are environment Friendly – If Election is held in the entire country using ballot paper then 12,000 MT of paper will be needed. One MT of paper requires felling of 24 full grown trees so we save 282,240 trees in every election by using EVMs. One MT of paper needs 400 liters of water so we save 5,160,000 liters of water in every election

13. **Future Plans** –

Election Commission of India is continuously engaged in the process of further improvement of EVMs. BEL and ECIL have already developed a Voter Verifiable Paper Audit Trail (VVPAT) system. The design of this system has been approved by Technical Experts Committee. The Commission has now decided to use EVMs

with VVPAT in a bye-election before it can be used more widely. The Commission is also working on a new model of EVM and is considering the following additional features:-

a. Code verification and unit authentication

b. Public Key Infrastructure (PKI) authentication

c. Possibility of code in public domain

d. Integrated VVPAT

e. Confirmation of choice of vote by the voter

f. Possibility of larger number of candidates

14. At the end, I would like to point out the lessons from the Indian experience:-

a. Electronic Voting and Counting makes election process faster, simpler and tamper-proof.

b. Provision must be made in election law before EVMs are used.

c. Electronic Voting should be introduced gradually in the country.

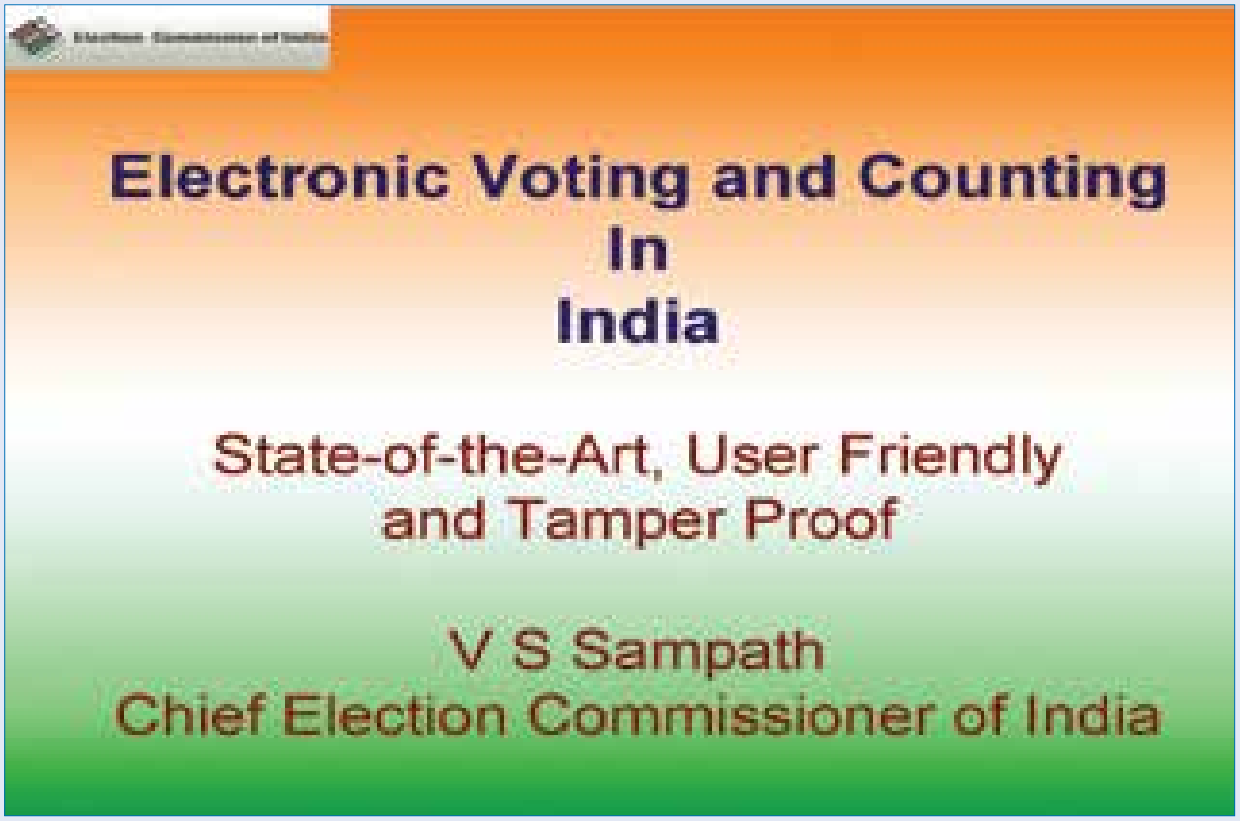
d. Consultation with all stakeholders is a must.

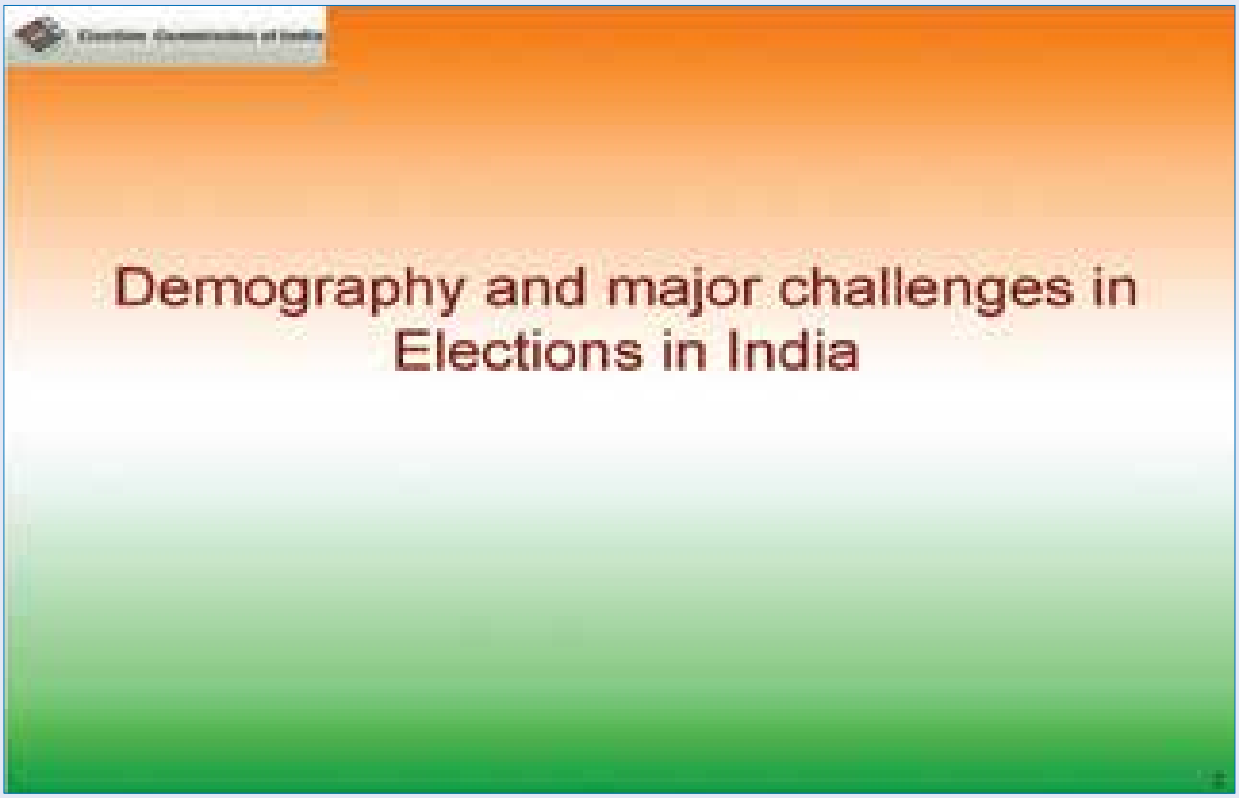
e. Voter education in the use of EVMs is desirable.

f. Continuous improvement is necessary with changing technology.

13

APPENDIX 8

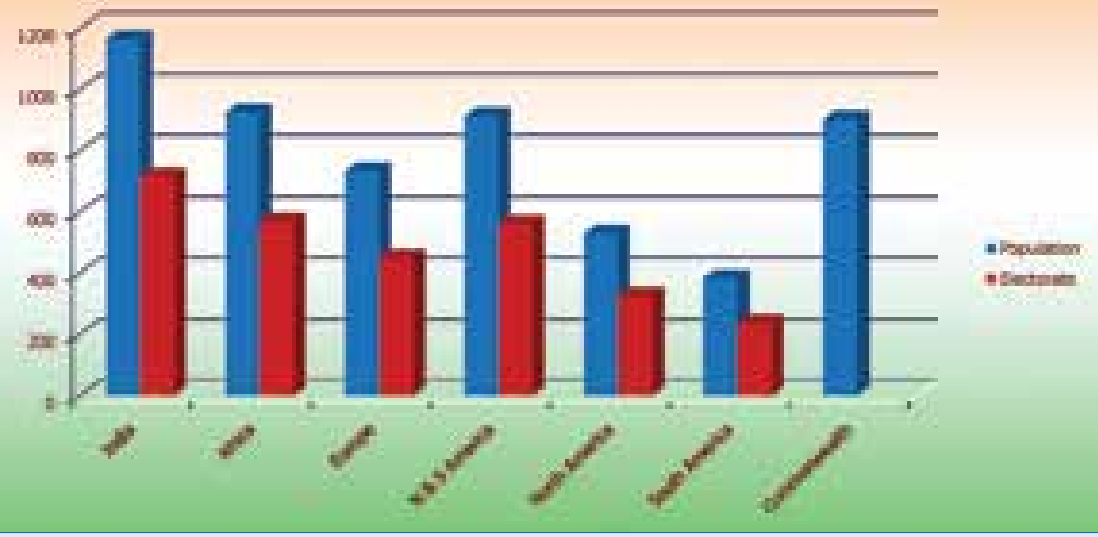

Electronic Voting and Counting
In
India
State-of-the-Art, User Friendly
and Tamper Proof
V S Sampath
Chief Election Commissioner of India


Demography and major challenges in
Elections in India

Population and Electorate in India compared to the World

	Population	Electorate
Entire Europe (50 Countries) -	731 m	449 m
Entire Africa (54 Countries) -	922 m	566 m
North America (41 Countries) -	528 m	324 m
South America (15 Countries) -	382 m	235 m
N&S. America (56 Countries) -	910 m	560 m
India -	1,219 m	780 m
Commonwealth (52 countries ex India - 900 m approx)		

Population and Electorate in India compared to the World



The Complexities

- It's not just size and magnitude.
- It is about the pain taken to ensure the value attached to each vote is honored.
- Democracy even at the remotest locations
- Separate polling station for a lone voter in the Gir Forest of Gujarat
- 12 men trekking 45 km in knee-deep snow to reach a polling stations with 37 voters in Auley Phu at 15,300 ft above MSL in Ladakh

The Complexities.....2

- Using elephants, camels, boats, cycles, helicopters, trains to ferry EVMs and polling teams
- Countrywide 'vulnerability mapping'
- Tracking information from each polling stations
- Dealing with Regional, Religious, Ethnic, Cultural and Linguistic Diversities

G.E.2009: The Ballot Field

- Number of Parliamentary Constituencies: 543
- Total Candidates : 8070
- Large number of Candidates in each Constituency: 43 (Chennai South PC, Tamilnadu)
- 834,944 Polling Stations (Now there are One Million Polling Stations)
- 11 Million personnel deployed for polls
- 100,000 CPF used in 8 phases of polls
- 119 Special Trains / 3000 coaches for movement of CPF
- 6800 security personnel were airlifted over-flying Bangladesh to avoid delay
- 55 Helicopters used. 601 sorties to take polling staff/ EVM to remote locations and for evacuations in the Maoist Extremism infected areas

Different Types of E-Voting and E-Counting Technologies used in the World

Different Types of E-Voting

- Polling Place E-Voting-
  - Direct Recording Machines (India, Brazil etc.)
  - Direct Recording Machines with VVPAT (Venezuela)
  - Paper ballot with Optical Scanning for Counting (Some States in USA)
- Internet Voting –
  - Tried on a limited scale in some countries e.g. Austria, Canada, USA etc.
  - Tried to a limited scale in India by State Election Commission of Gujarat in Municipal Elections

The Story of Indian Electronic Voting Machine

The Concept

- Idea mooted by Sh. S.L. Shakdhar the Chief Election Commissioner in 1977
- Recommended E-voting to save avoidable and recurring expenditure on *printing, storage, transportation and security* of Ballot Paper to the exchequer (Approximately 12000 MT of paper will be needed at a total cost of Rs 578,400,000/- in each parliamentary election)

Top: Ballot paper counting despatch
Bottom: EVMs in store room

Development of EVM

- Electronics Corporation of India Limited (ECIL) a leading Public Sector Company engaged in the design and manufacture of professional electronics was commissioned to design a machine to prove the feasibility
- Once feasibility was established, Bharat Electronics Limited (BEL) a second Public Sector Company was co-opted into the exercise

Voters waiting to cast their vote

Development of EVM

Voting the Ballot box way

Voting the EVM way

- Both the companies (ECIL & BEL) brought out models with a common User Interface in 1980
- The machines were extensively tried out at locations across the country
- Publicity campaigns were run in the press and other media
- Seminars conducted by Election Commission of India in various forums
- Feedback obtained used to fine-tune the machine

Major Concerns and Remedies

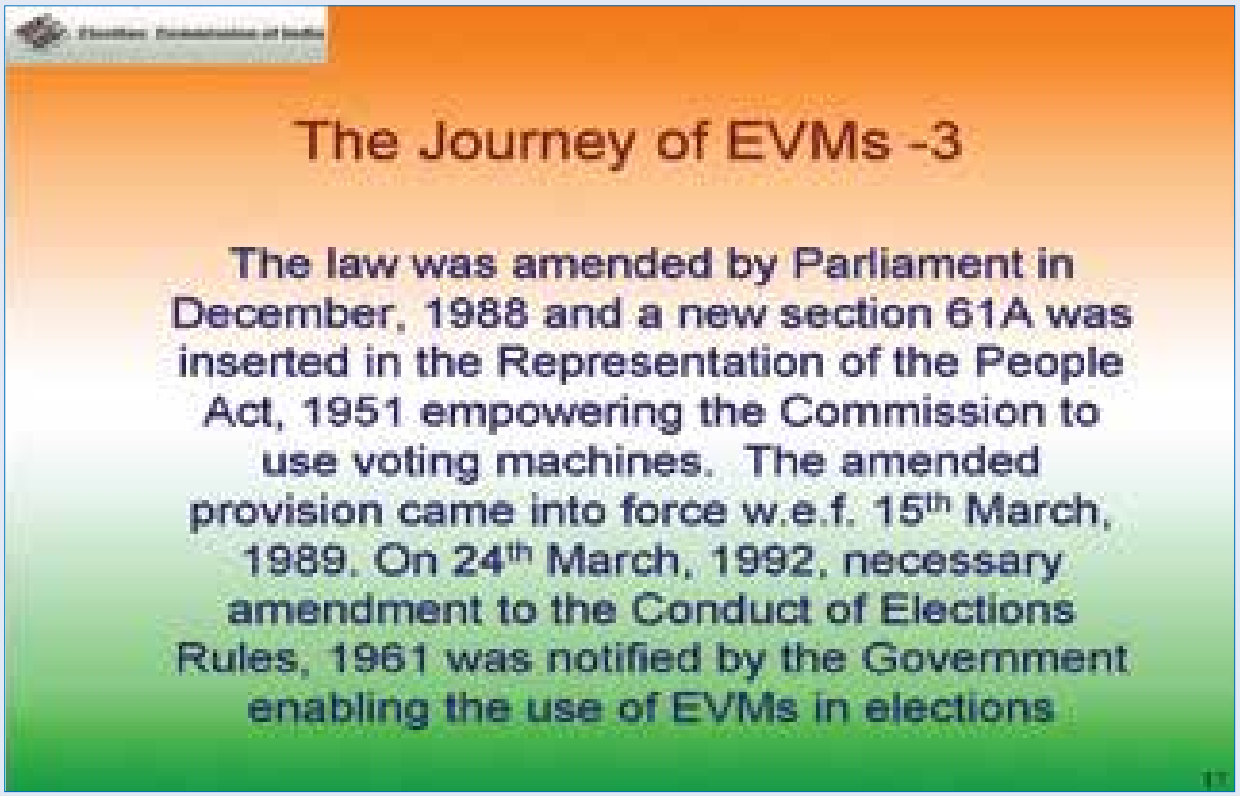
Concerns	Remedies
Can the data be tampered with ?	1. It incorporates a microprocessor that has 'burnt-in' software code which cannot be altered or retrieved 2. No operating system 3. No Networking
How does the machine operate in remote areas without electric power ?	It is independent of mains power and operates on a special power pack (7.5 volts battery)
Can the data be stored long enough to be used as evidence in a court of law in case of electoral disputes ?	All the data is recorded on non-volatile dual redundant memory chips and can be retained for years even when the power pack is removed

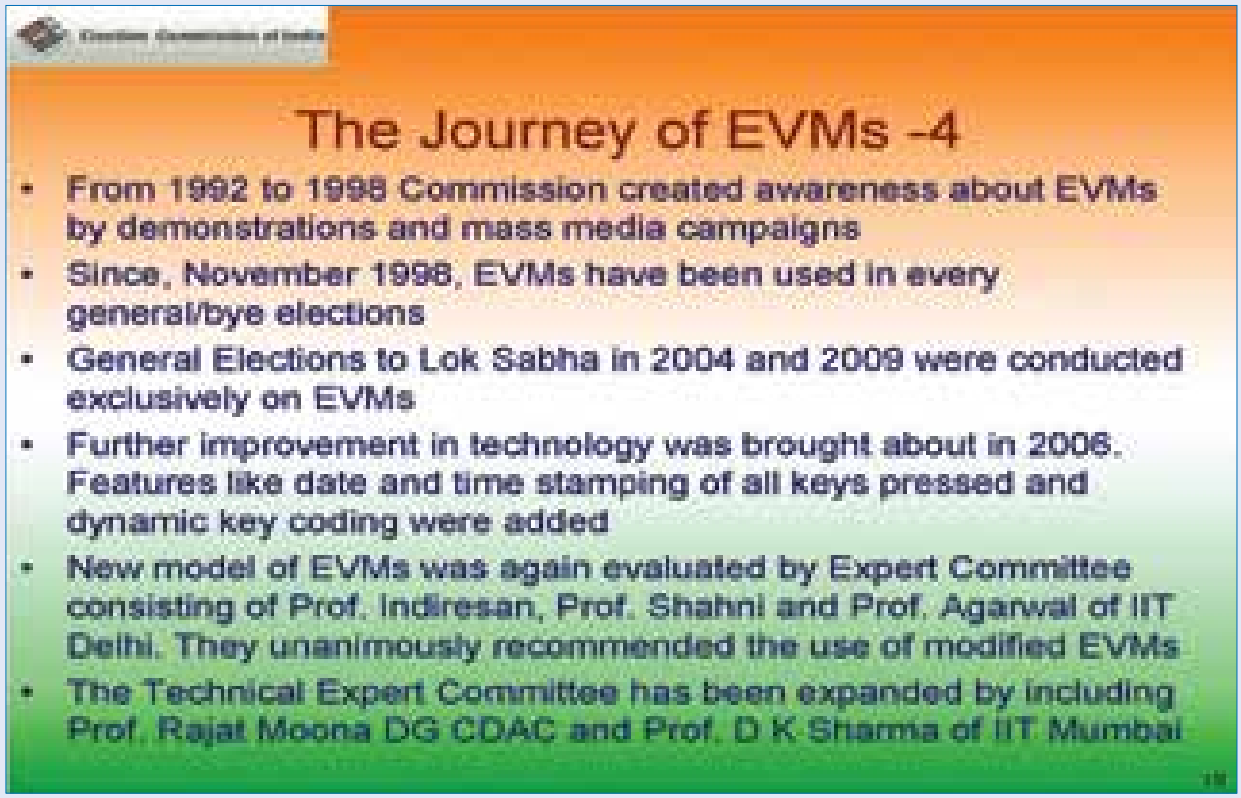
The Journey of EVMs -1

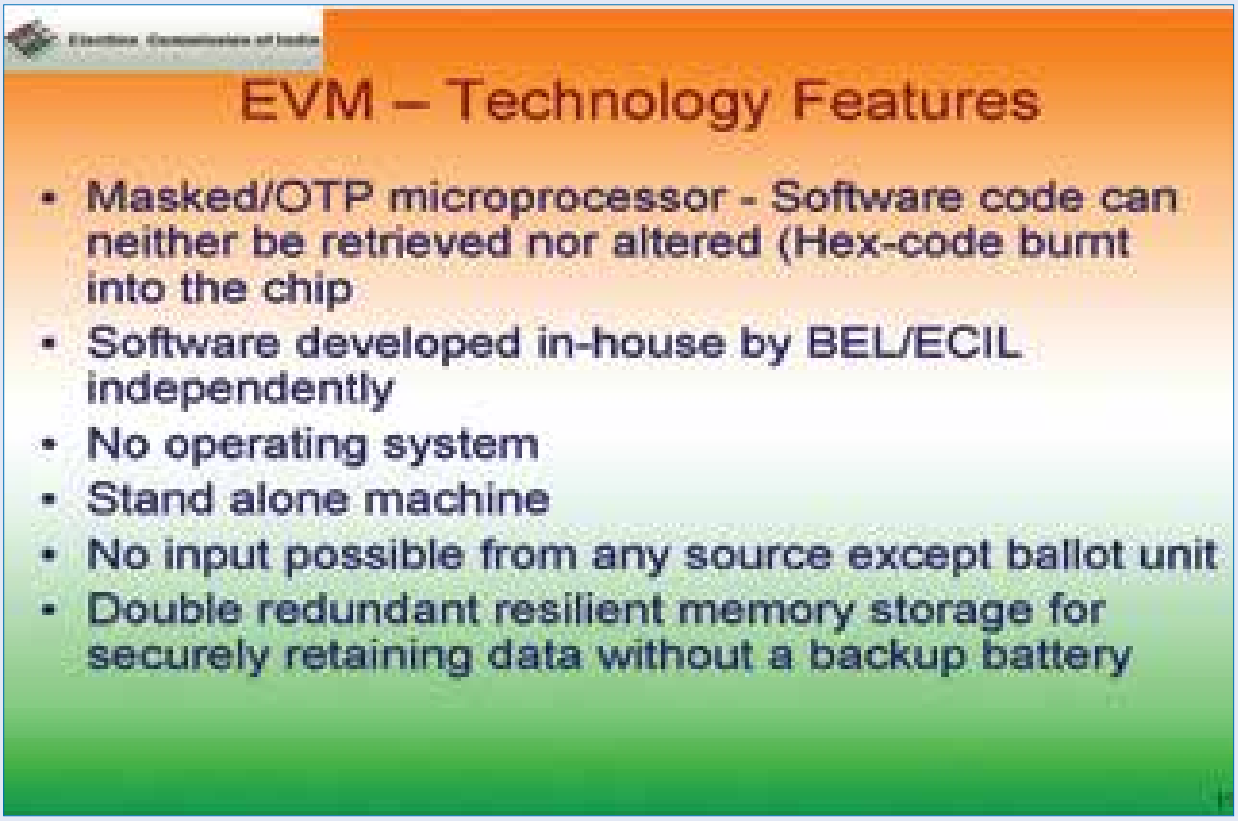
- Decision to use EVMs taken in a meeting on 29th July, 1981 with BEL, ECIL, Law Ministry and some of the CEOs
- First used in 50 polling stations of Parur Assembly Constituency of Kerala in May 1982
- On 5th March 1984 the Supreme Court ruled in an election petition that EVMs can not be used in elections unless a specific provision in the law providing for their use is enacted

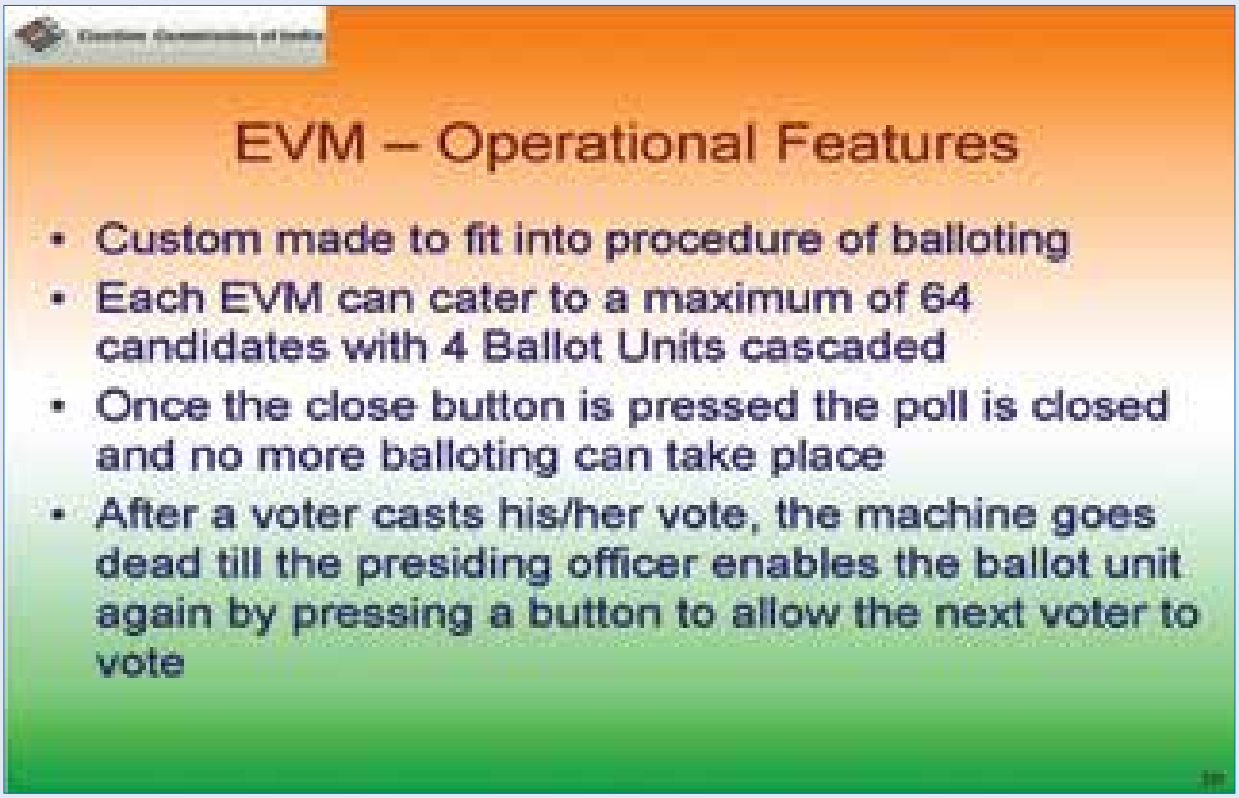
The Journey of EVMs -2

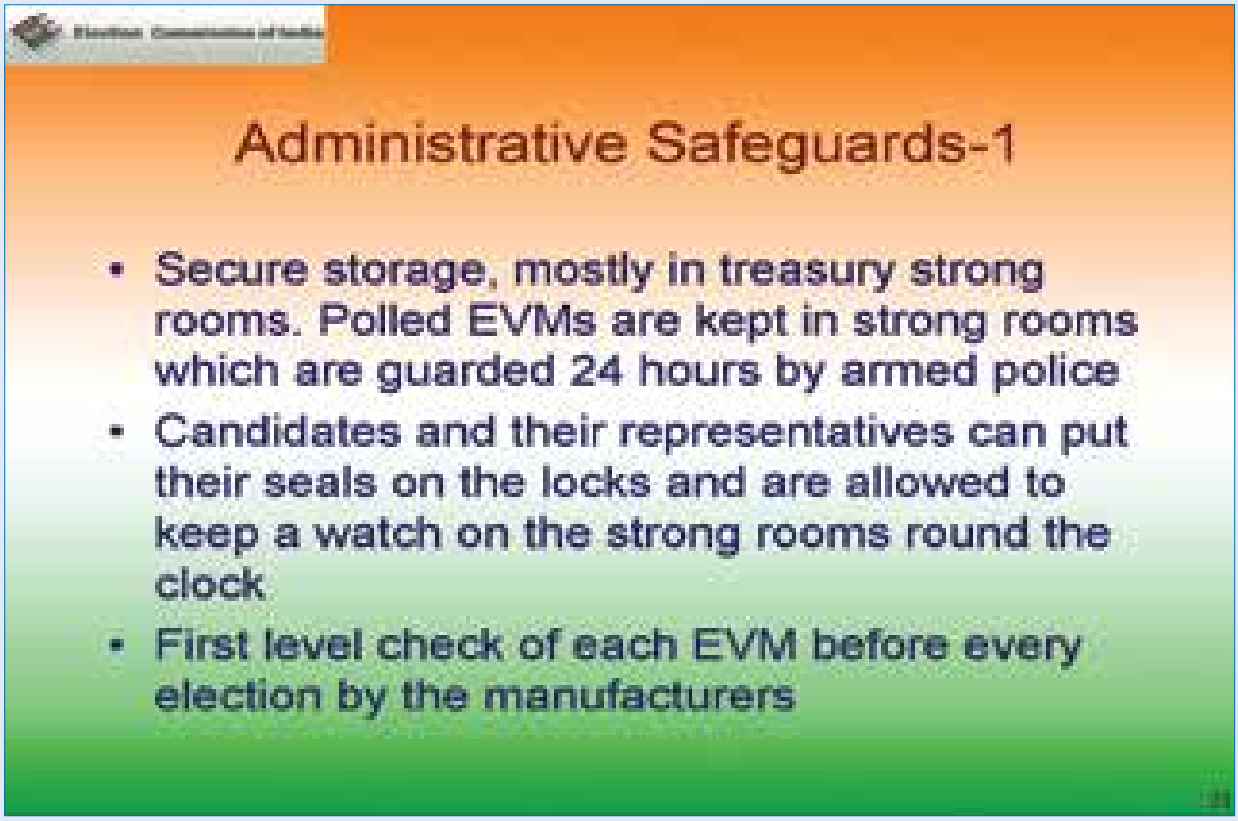
- Matter of use of EVMs was referred by the Government of India to Electoral Reforms Committee in February, 1990 consisting of representatives of several recognized National and State parties
- Expert Committee constituted by the GOI, consisting of Prof. S. Sampath, Chairman RAC, DRDO, Prof. P.V. Indiresan, IIT Delhi and Dr C. Rao Kasarabada, Director Electronics Research and Development Centre, Trivandrum. Expert Committee unanimously recommended use of EVMs

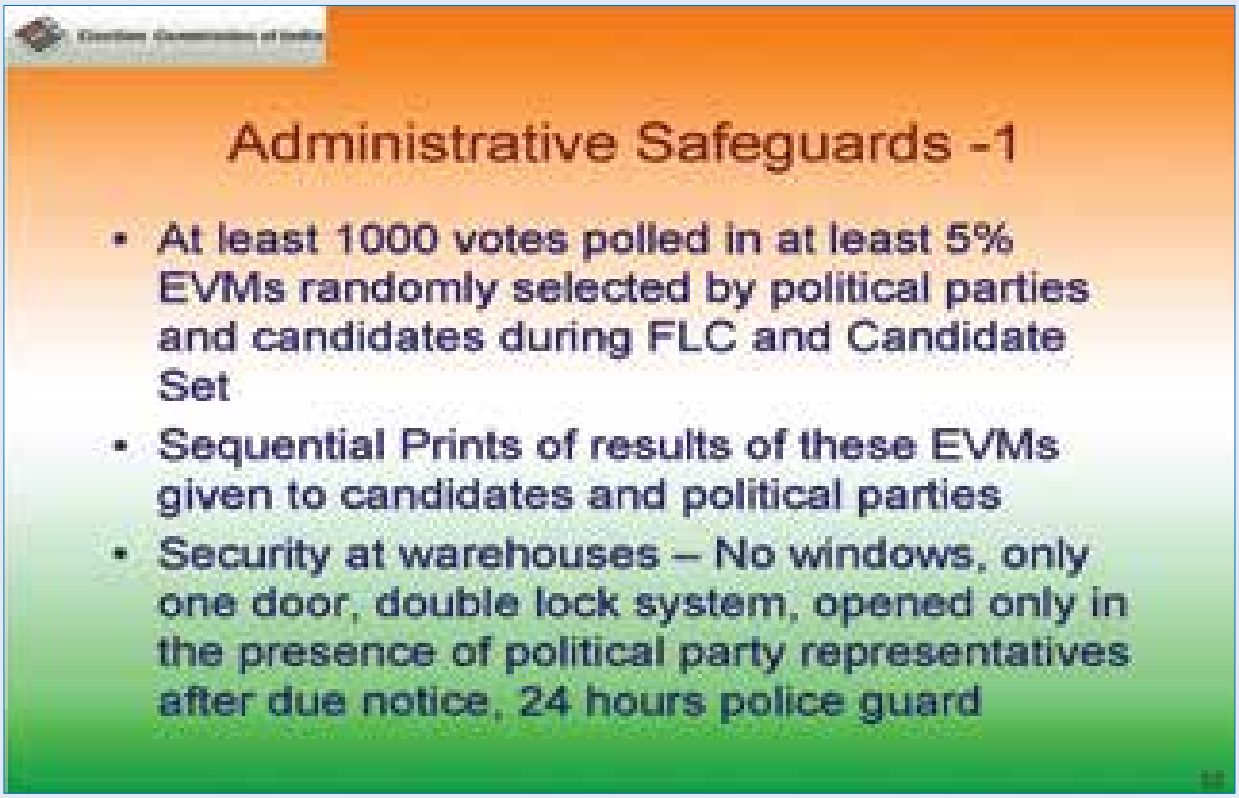

The Journey of EVMs -3
The law was amended by Parliament in December, 1988 and a new section 61A was inserted in the Representation of the People Act, 1951 empowering the Commission to use voting machines. The amended provision came into force w.e.f. 15th March, 1989. On 24th March, 1992, necessary amendment to the Conduct of Elections Rules, 1961 was notified by the Government enabling the use of EVMs in elections


The Journey of EVMs -4
• From 1992 to 1998 Commission created awareness about EVMs by demonstrations and mass media campaigns
• Since, November 1998, EVMs have been used in every general/bye elections
• General Elections to Lok Sabha in 2004 and 2009 were conducted exclusively on EVMs
• Further improvement in technology was brought about in 2006. Features like date and time stamping of all keys pressed and dynamic key coding were added
• New model of EVMs was again evaluated by Expert Committee consisting of Prof. Indiresan, Prof. Shahni and Prof. Agarwal of IIT Delhi. They unanimously recommended the use of modified EVMs
• The Technical Expert Committee has been expanded by including Prof. Rajat Moona DG CDAC and Prof. D K Sharma of IIT Mumbai


EVM – Technology Features
• Masked/OTP microprocessor - Software code can neither be retrieved nor altered (Hex-code burnt into the chip
• Software developed in-house by BEL/ECIL independently
• No operating system
• Stand alone machine
• No input possible from any source except ballot unit
• Double redundant resilient memory storage for securely retaining data without a backup battery


EVM – Operational Features
• Custom made to fit into procedure of balloting
• Each EVM can cater to a maximum of 64 candidates with 4 Ballot Units cascaded
• Once the close button is pressed the poll is closed and no more balloting can take place
• After a voter casts his/her vote, the machine goes dead till the presiding officer enables the ballot unit again by pressing a button to allow the next voter to vote


Administrative Safeguards-1
• Secure storage, mostly in treasury strong rooms. Polled EVMs are kept in strong rooms which are guarded 24 hours by armed police
• Candidates and their representatives can put their seals on the locks and are allowed to keep a watch on the strong rooms round the clock
• First level check of each EVM before every election by the manufacturers


Administrative Safeguards -1
• At least 1000 votes polled in at least 5% EVMs randomly selected by political parties and candidates during FLC and Candidate Set
• Sequential Prints of results of these EVMs given to candidates and political parties
• Security at warehouses – No windows, only one door, double lock system, opened only in the presence of political party representatives after due notice, 24 hours police guard

Administrative Safeguards

- EVMs are randomized twice using a computer software in the presence of candidates and their representatives before every election
- Candidates and their representatives allowed to check as many EVMs as they want at the time of candidate set before the election
- The exact sequence of candidates in the ballot paper is known only 14 days before the poll as the sequence is in alphabetical order of the names of candidates

Administrative Safeguards – Sealing

- At the time of FLC – Pink paper seal on CU
- At the time of Candidate set–
  - Thread seal for the "Candidate Set" and Power Pack (Battery) Section of Control Unit after setting of number of contesting candidates and installation of battery.
  - Thread seal for Ballot paper screen of Balloting Unit after fixing of ballot paper.
  - Thereafter, two thread seals for Ballot paper cover of Balloting Unit
  - Pink paper seal on BU
- After mock poll in Polling Station –
  - Green paper seal signed by polling agents and presiding officer for result section
  - Thread seal for inner door of result section
  - Thread seal for Bottom compartment
  - Thread seal for connector box for cascading Balloting Unit, if any (when there are more than 16 candidates

Administrative Safeguards – Mock Poll

- Mock poll of 1000 votes in at least 5% EVMs selected by political parties at the time of First Level Check (FLC)
- Mock Poll of 1000 votes in at least 5% EVMs selected by candidates at the time of candidate set
- Mock Poll of 50 votes before the poll in every polling station
- Mock Poll in the polling station if an EVM is changed for any reason before the poll in the new EVM

Administrative Safeguards – Malfunction in EVMs

- The rate of malfunction is very low (0.1%)
- If result is not displayed for some reason it is possible to connect an Auxiliary Display Unit (ADU) to see the result. If this does not work the result can be printed out
- All malfunctioning machines are kept separately. Manufacturers run complete diagnostics on them to determine the cause of malfunction and for future improvements

Process of Polling by EVM

- The voter is identified from the voters' list and records his presence by a signature or thumb impression in the Register of Voters (Form 17A)
- The Presiding Officer presses the "Ballot" button on the Control Unit enabling the EVM for only one vote
- The voter then proceeds to the polling cubicle and after perusing the ballot paper on the Ballot Unit, presses the key against the candidate of his choice to record his vote

Process of Polling by EVM

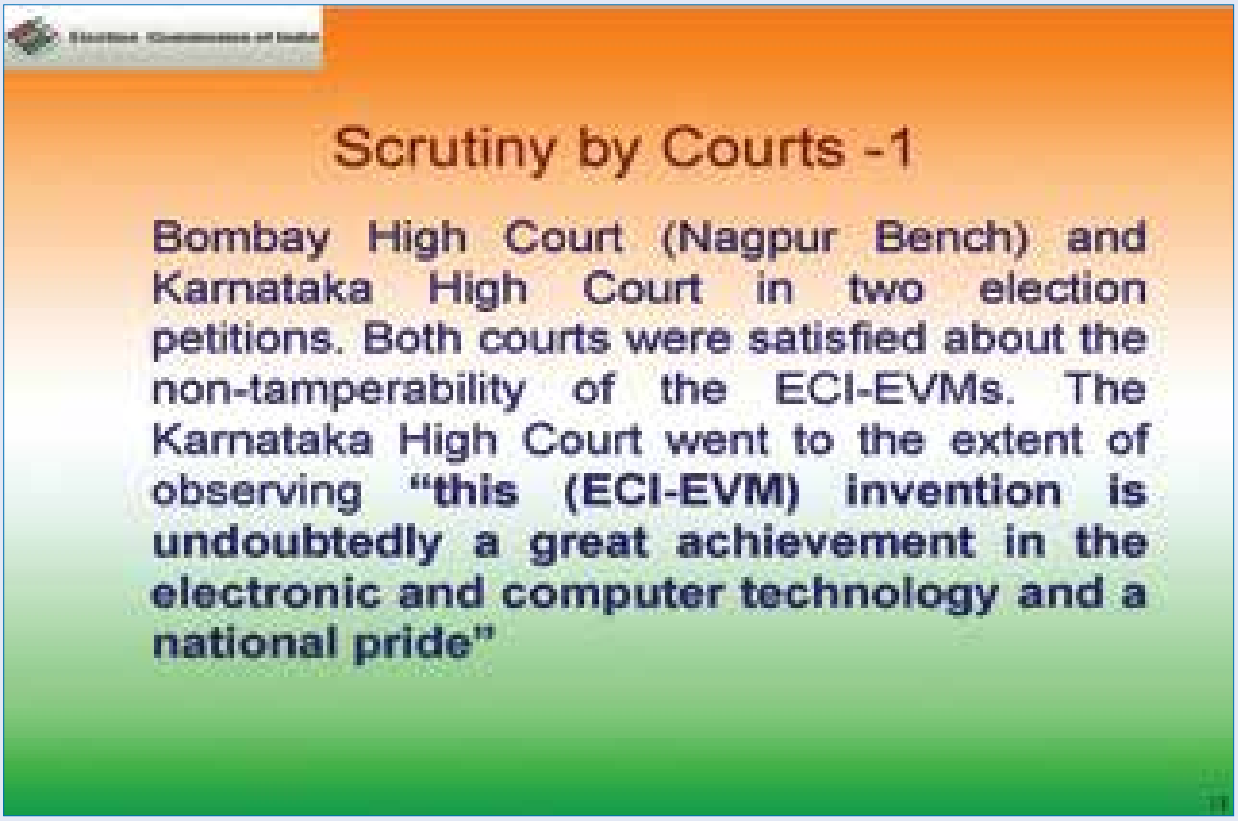
- A red lamp glows against the name and symbol of the candidate indicating to the voter that his vote has been cast in favor of the candidate of his choice
- The casting of the vote results in a beep in the Control Unit indicating to the Presiding Officer and polling agents that a vote has been cast
- The EVM goes dead after this. Nothing will happen even if the candidate button is pressed on the ballot unit
- The presiding officer has to enable the ballot unit by pressing the "Ballot" button on the control unit for the next voter. EVM cannot be enabled within 12 seconds of a voter casting vote

Closing the Poll

- The cap on the "Close Button" on the control unit is removed and the button pressed. After this no more votes can be cast in this machine.
- The cap is then replaced
- The unit is then switched "Off" and the interconnecting cable disconnected

Counting & Results

- Once the EVM is brought to the counting table all seals are checked to ensure that they are intact
- After getting ready to note down the result, the green paper seal over RESULT Button is pierced and RESULT Button is pressed
- The machine first displays the total number of votes cast, and then the votes by each candidate one by one
- The result is noted by the counting officers and shown to the counting agents


Scrutiny by Courts -1
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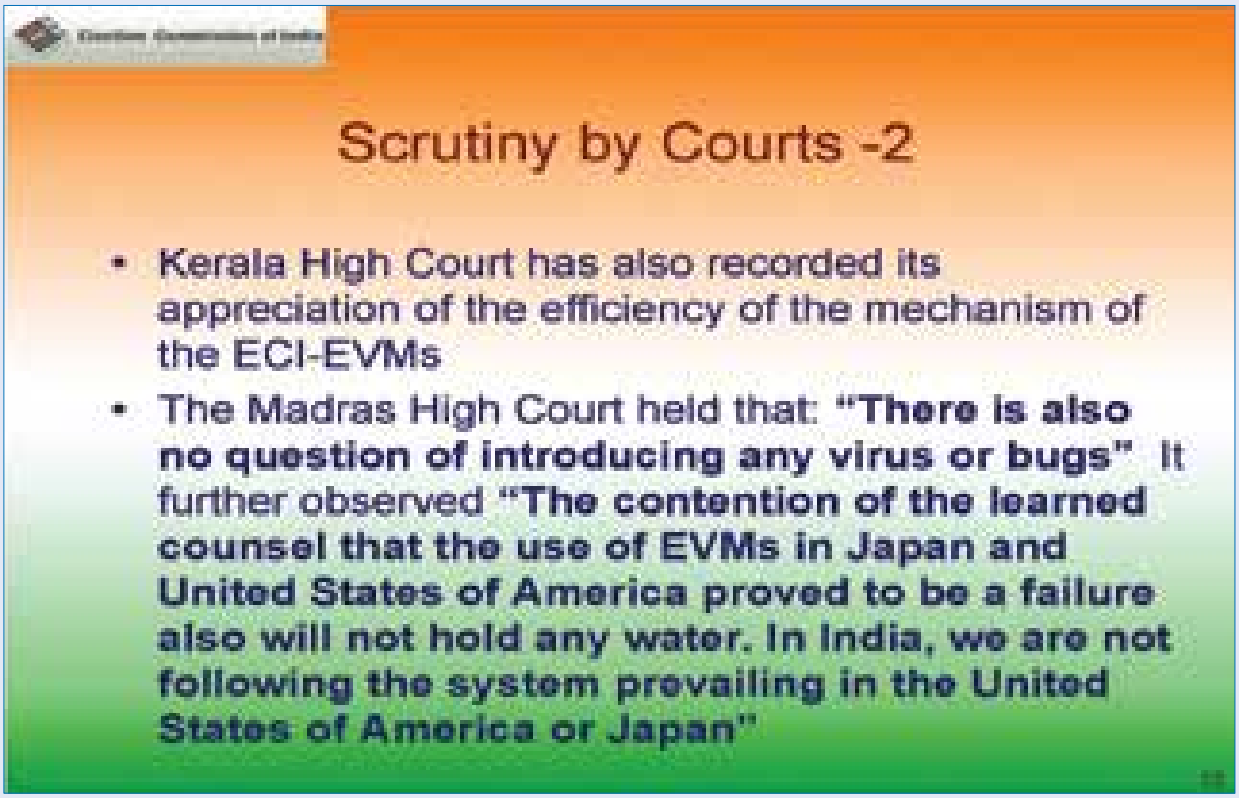
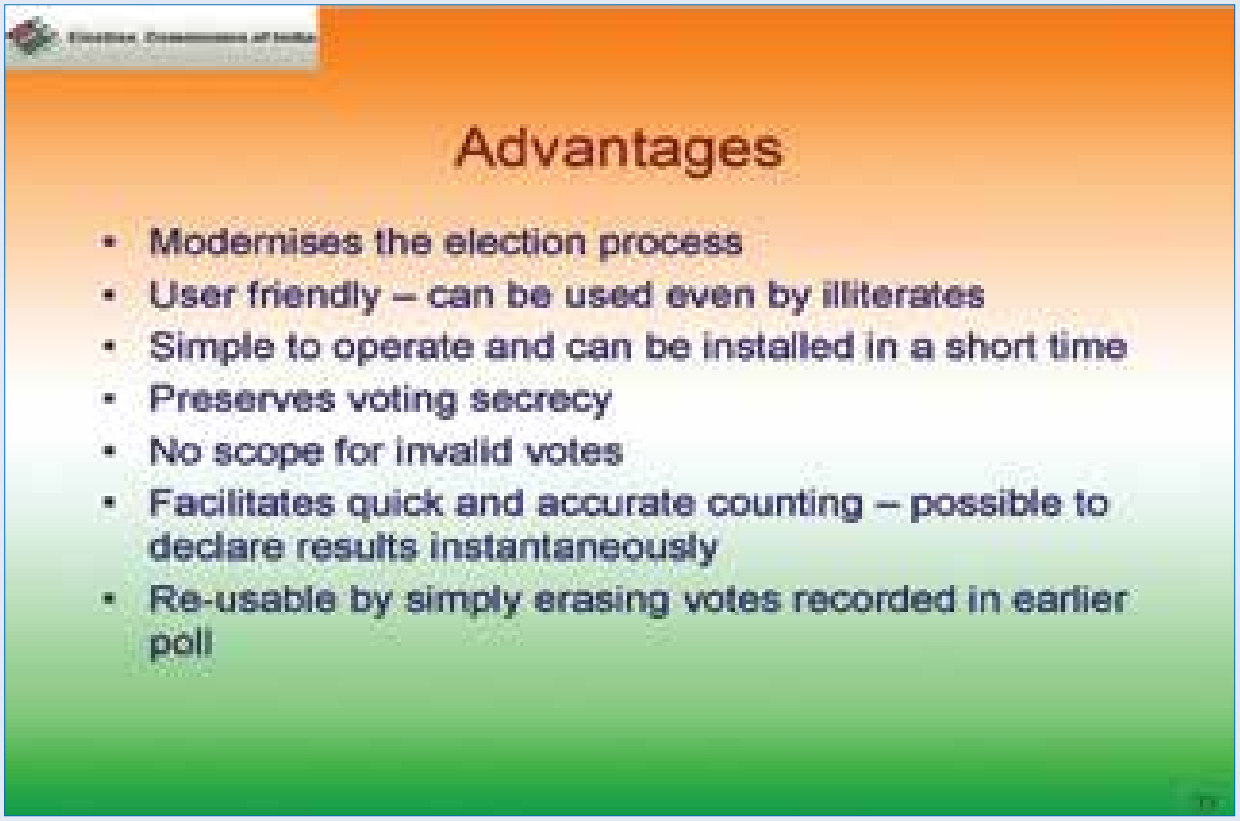
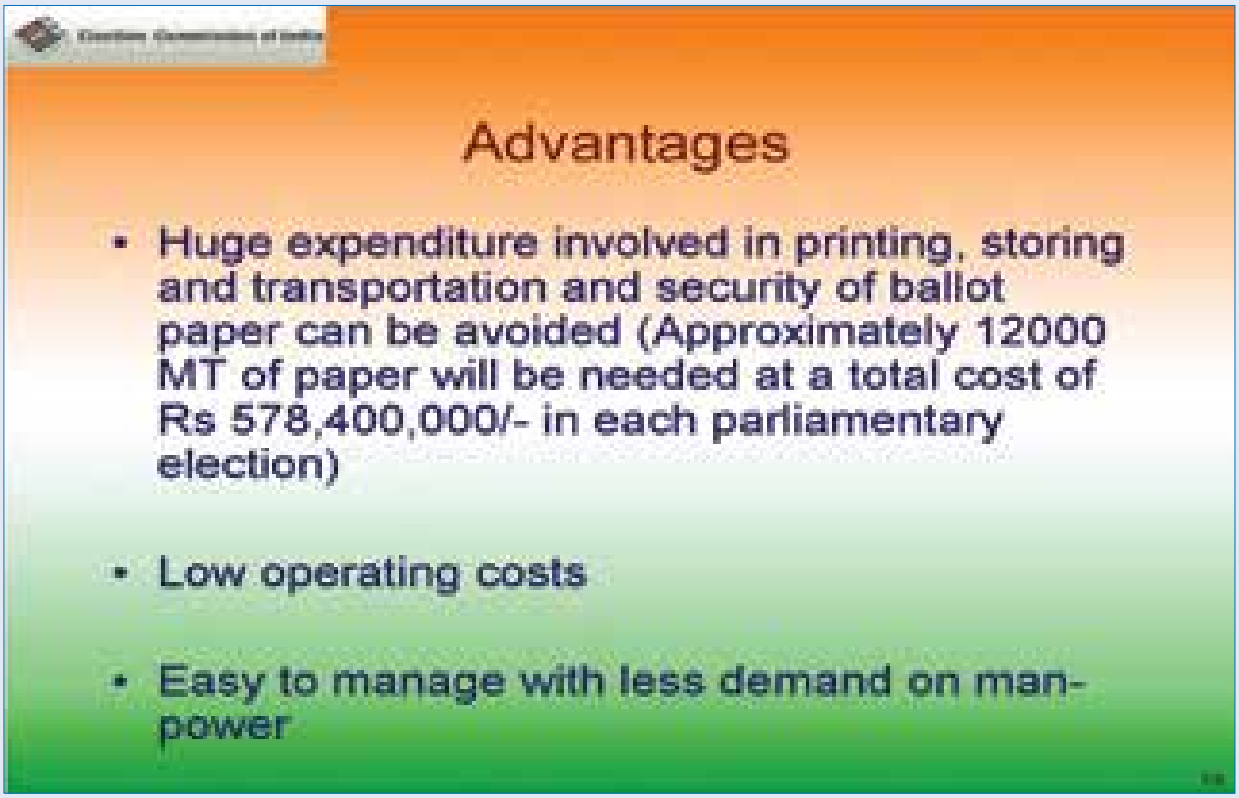

Scrutiny by Courts -2
• Kerala High Court has also recorded its appreciation of the efficiency of the mechanism of the ECI-EVMs
• The Madras High Court held that: "There is also no question of introducing any virus or bugs" It further observed "The contention of the learned counsel that the use of EVMs in Japan and United States of America proved to be a failure also will not hold any water. In India, we are not following the system prevailing in the United States of America or Japan"


Advantages
• Modernises the election process
• User friendly – can be used even by illiterates
• Simple to operate and can be installed in a short time
• Preserves voting secrecy
• No scope for invalid votes
• Facilitates quick and accurate counting – possible to declare results instantaneously
• Re-usable by simply erasing votes recorded in earlier poll


Advantages
• Huge expenditure involved in printing, storing and transportation and security of ballot paper can be avoided (Approximately 12000 MT of paper will be needed at a total cost of Rs 578,400,000/- in each parliamentary election)
• Low operating costs
• Easy to manage with less demand on man-power

Advantages

- Environment Friendly –
  - If Election is held in the entire country using ballot paper then 12,000 MT of paper will be needed
  - One MT of paper requires felling of 24 full grown trees so we save 282,240 trees in every election by using EVMs
  - One MT of paper needs 680 liters of water so we save 8,160,000 liters of water in every election

Future Plans - VVPAT

Manufacturers of EVMs have developed a prototype VVPAT with thermal paper printers to be used with EVMs. The prototype was tested in five places in the field in July 2011 and 2012. Several improvements have been made since then and ECI has now decided to use EVMs with VVPAT in a Bye-election

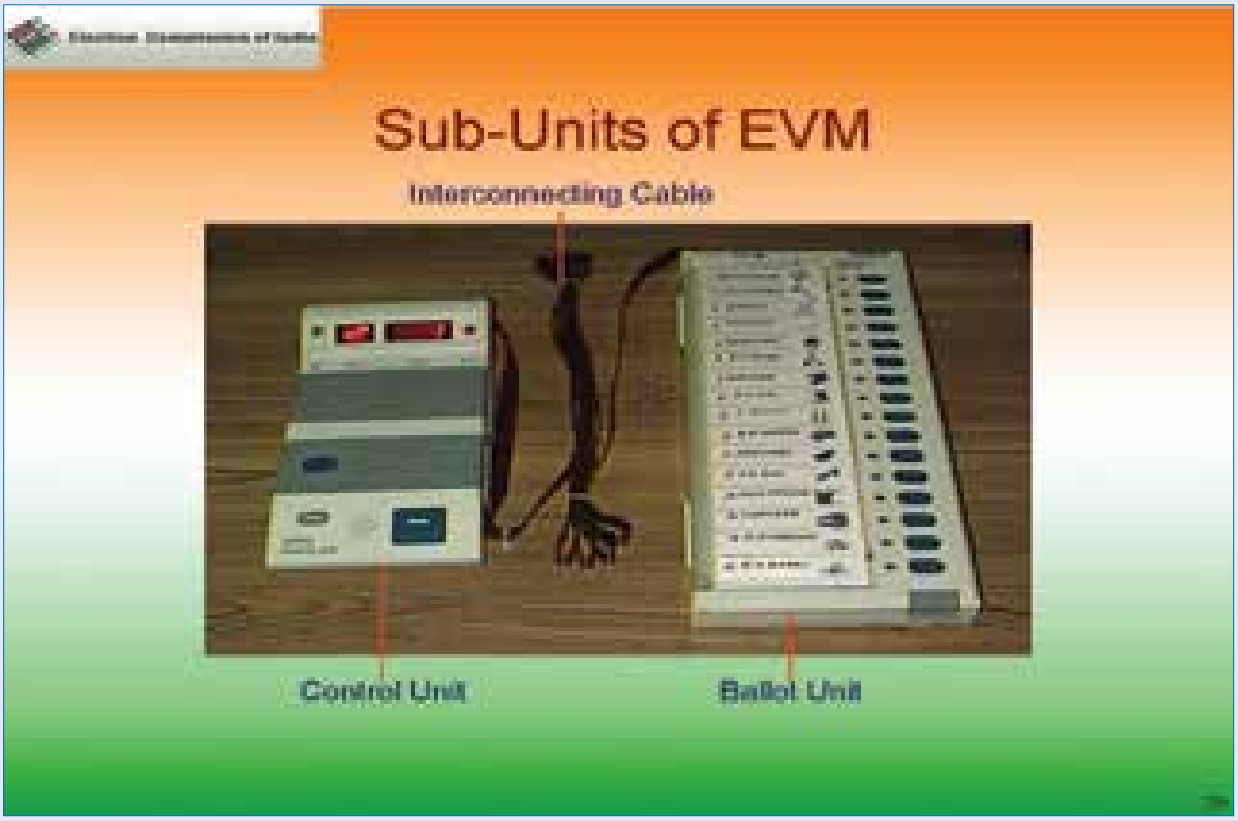
Future Plans – New model of EVM

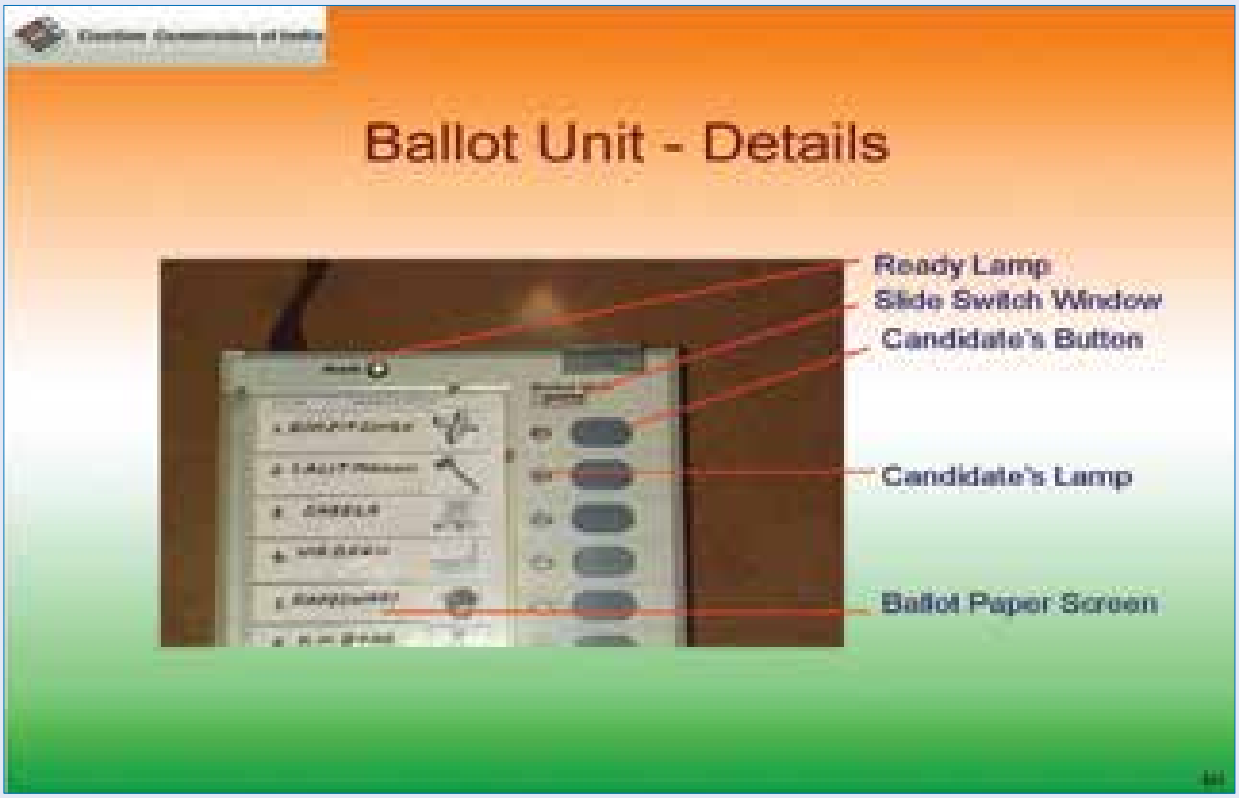
Manufacturers are working on developing a new model of EVM which will have additional features like –

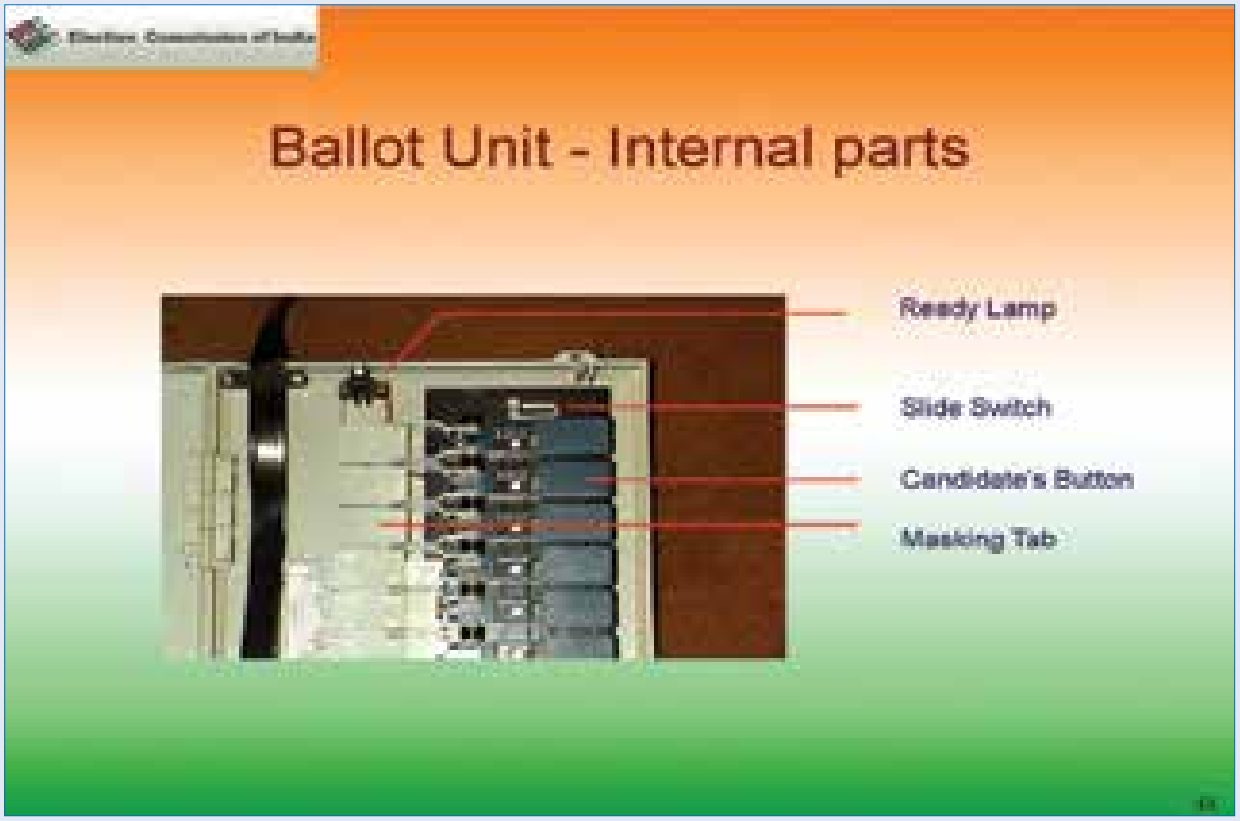
- Code verification and unit authentication
- Public Key Infrastructure (PKI) authentication
- Possibility of code in public domain
- Integrated VVPAT
- Confirmation of choice of vote by the voter
- Possibility of larger number of candidates

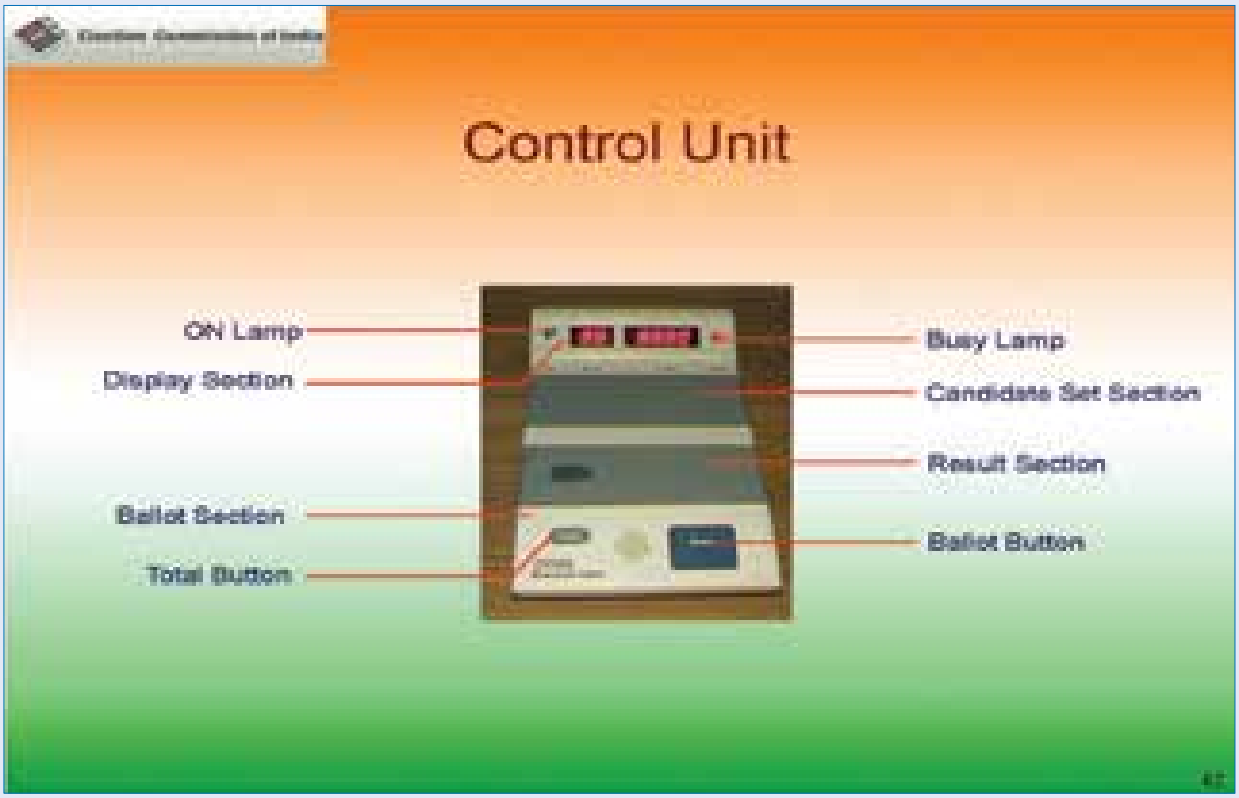
Lessons from the Indian Experience

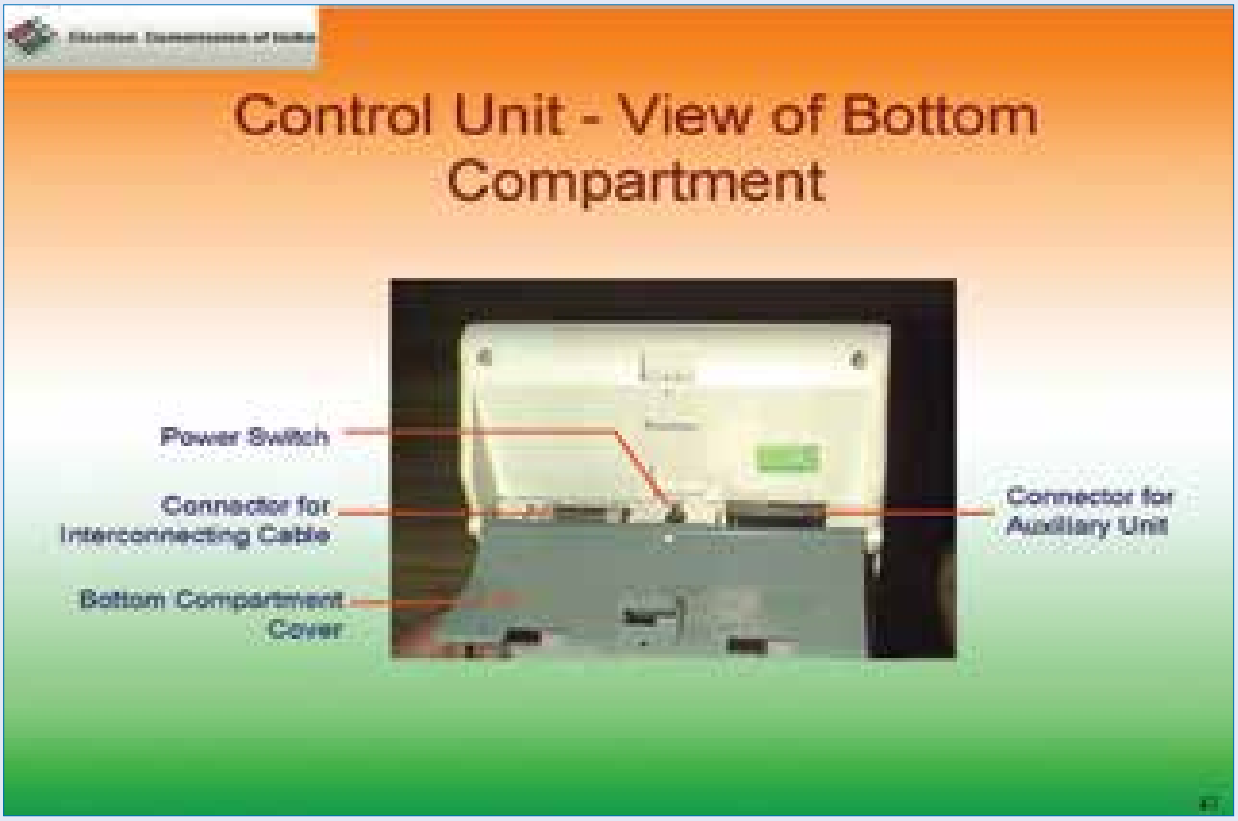
- Electronic Voting and Counting makes election process faster, simpler and tamper-proof
- Provision must be made in election law before EVMs are used
- Electronic Voting should be introduced gradually in the country
- Consultation with all stakeholders is a must
- Voter education in the use of EVMs is desirable
- Continuous improvement is necessary with changing technology


Sub-Units of EVM
Interconnecting Cable
Control Unit
Ballot Unit

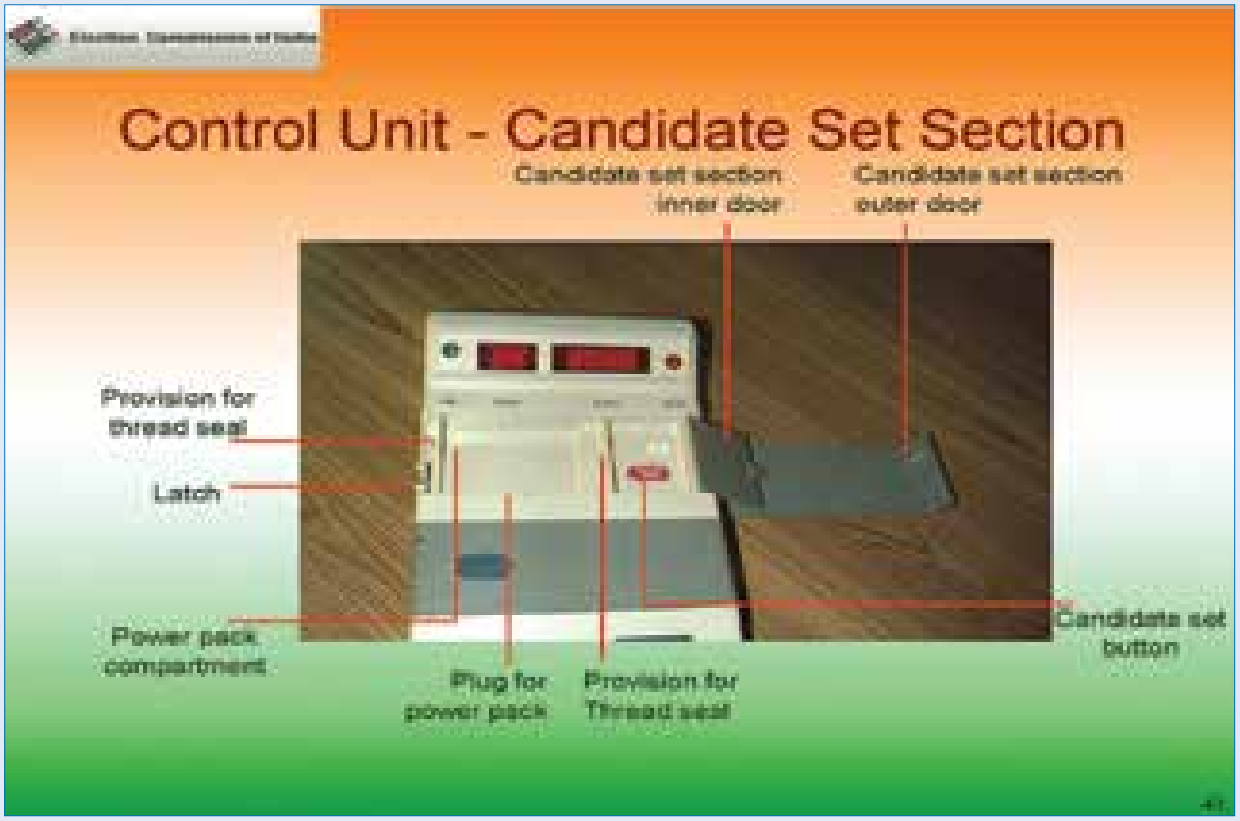

Ballot Unit - Details
Ready Lamp
Slide Switch Window
Candidate's Button
Candidate's Lamp
Ballot Paper Screen


Ballot Unit - Internal parts
Ready Lamp
Slide Switch
Candidate's Button
Masking Tab


Control Unit
ON Lamp
Display Section
Ballot Section
Total Button
Busy Lamp
Candidate Set Section
Result Section
Ballot Button


Control Unit - View of Bottom Compartment
Power Switch
Connector for Interconnecting Cable
Bottom Compartment Cover
Connector for Auxiliary Unit


Control Unit - Display Section
4-Digit Display Panel
ON Lamp
Busy Lamp
2-Digit Display Panel


Control Unit - Candidate Set Section
Candidate set section inner door
Candidate set section outer door
Provision for thread seal
Latch
Power pack compartment
Plug for power pack
Provision for Thread seal
Candidate set button


Control Unit - Result Section
Result I button
Clear button
Close button
Result II button
Inner latches
Frames for Paper seal

Control Unit - Ballot Section

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Thank You

e-Voting: an enabler or disabler to strengthening electoral democracy?

Country Case Study – The Philippines

11-13 March 2013

Any opinions, findings, conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the International Foundation for Electoral Systems.

About IFES

The International Foundation for Electoral Systems (IFES) supports citizens' right to participate in free and fair elections. Our independent expertise strengthens electoral systems and builds local capacity to deliver sustainable solutions.

As the global leader in democracy promotion, we advance good governance and democratic rights by:

- Providing technical assistance to election officials
- Empowering the citizenry/environment to participate in the political process
- Applying field-based research to improve the electoral cycle

Since 1987, IFES has worked in over 135 countries – from developing democracies, to mature democracies.

For more information, visit www.IFES.org

"E-Voting: an enabler or disabler to strengthening electoral democracy?"

The case study of the Philippines 2010 elections

This paper presents the issues, challenges and lessons learned from the Philippines during the first nationwide implementation of automated elections in 2010. A brief country background will provide context to the decision to apply technology to solve intransigent problems facing the Commission on Elections. It is hoped that sharing key lessons from this experience will provide guidance to other Election Management Bodies who may be considering a similar automation program in the future.

Background

The electoral process is shaped by a combination of unique geographic, demographic, political and socio-cultural characteristics of the Philippines.

This archipelagic nation is located in Southeast Asia on the western edge of the Pacific Ocean and comprises more than 7,000 islands, eleven of which contain 94% of the total land area. The islands are geographically divided into three main groupings: Luzon, Visayas and Mindanao. It is listed as the seventh most populated country in Asia and ranked twelfth in the world. In 2010, the population according to the census stood at 92,337,852. With an annual estimated growth rate of 2.18%, the population is estimated to balloon to 103 million by 2013. Filipinos are considered to be a fairly young population, with 33.4 % belonging to the under-15 age bracket. Males comprise 50.3% of the population, just outpacing females at 49.7%. Statistics also show that approximately 2 million Filipinos work abroad, sending much needed financial support to their families back home.

In 2010, the data on the number of registered voters was 50,896,164. As of January 2013, the total number of registered voters for the May 2013 elections is estimated at 52,014,648.

The Philippines is divided into a hierarchy of local government units (LGUs) with 80 provinces as the primary unit. Provinces are further subdivided into 138 cities and 1,496 municipalities, which are in turn composed of 42,029 Barangays or villages. The Barangay is the smallest local government unit that holds elections for its officials. For administrative purposes, there are 17 regions but they do not possess a separate local government structure with the exception of the Autonomous Region in Muslim Mindanao (ARMM). The seat of government is located in the National Capital Region (NCR).

The Philippines is a presidential democracy, with President Benigno Simeon Aquino III currently serving as the Chief of State and Head of Government until 2016. His Vice-President did not run on his "ticket" so it is possible in the Philippines to have a President from one party and a Vice-President from the opposition. The President and Vice-President run on a First Past the Post basis. The bicameral Congress consists of the Senate with 24 seats and the House of Representatives with 287 seats. The President is elected by plurality vote to serve a 6-year term. In the Senate 24 members are elected by plurality vote in multi-member constituencies to serve 6-year terms.

One-half of the members of the Senate are elected at-large from the country every three years, with electors able to cast up to 12 votes for the Senate race. In the House of Representatives, 230 members are elected by plurality vote in single-member constituencies to serve a 3-year term and 57 members are elected through a closed-list proportional representation (PR) system to serve the same 3-year term. Under constitutional provisions, the PR tier must comprise 20 percent of total seats. In the PR tier, members generally represent special "sectoral" minorities. The threshold in the PR tier is 2 percent, but no party may hold more than three seats. This PR tier is known as the Party-list system.

Elections in the Philippines have been synchronized since 1992. Filipinos vote for candidates from President down to municipal councilor, all levels except for the barangay and youth council which are normally held in the October following the May national polls. Synchronized elections require the voters to elect approximately 39-80 candidates on the same ballot depending on the sizes of their provincial and city/municipal assemblies.

In its Assessment Report of the 2004 Presidential elections in the Philippines, the ITG technical team noted the overwhelming majority of its participants showed resiliency and a commitment to democracy despite the tedious manual voting, counting and canvassing of results processes. These same characteristics were shown during the first automated Presidential elections in May 2010, when long queues forced voters to wait for hours in the hot sun for their turn to vote in those historic elections. There was substantial voter interest and turnout, significant mobilization of civil society and the public, and dedicated efforts by election officials in the field to deliver the franchise to a high turnout of voters in 2004, and this did not change during the 2007 and 2010 elections.

Negative social characteristics, however, can be found at the root of many of the challenges facing the Philippine electoral process. It makes little difference whether the elections are manual or automated processes.

The patron-client relationship is a phenomenon wherein repayment of debts to a benefactor overrides most other principles including legal considerations and, in some cases, moral values.

Consequently, people tend to be very conscious of authority, especially in relation to the senior members of the local political family/dynasty. This strong loyalty seldom extends to central institutions, such as the government, which are often seen by people as being the cause of a multitude of problems in their lives, as opposed to their solution. The result is the continuation of old patterns of patronage politics and poor governance.

Social status is closely linked to being seen as a success and therefore failure, or "losing face", is a traumatic event to be avoided at any cost. Some actors are willing to employ extreme measures, including the use of violent means to remove competition as was seen during the tragic Maguindanao massacre where prospective candidates were horrifically killed on their way to registering for the 2010 elections. If eventually defeated, the loser goes into denial as a default mode. The typical example given is that politicians never lose an election, rather they always claim to have been cheated. This position dictates that the losing politician will challenge the result by every avenue available, including the court system, making the Philippines a highly litigious electoral process. Automation did play a role in 2010, during which losing Presidential candidates conceded defeat on election night for the first time as the results were already available and were in line with people's expectations as to the eventual winner.

A small social group owns a significant share of the country's resources, while the majority of the Philippine population is left with very limited means. The actions of the poor are often driven by their immediate needs of survival. As a result of their dire situation they have limited respect for a government unable to resolve their problems. For many, selling their vote is more logical than participating in a democratic process. The significant disparity in economic status fuels the search for positions, such as public office, from which one has access to significant resources.

This pursuit of social advantage and self-enrichment has resulted in a serious corruption problem that is recognized throughout society. Political as well as financial corruption has become a dominant factor in many decision-making processes. Striving for elected office is therefore not always a genuine intent to "perform public duty" and "serve the people", but often to obtain a position in order to personally gain undue means and influence. On the flip side, losing an election has serious consequences beyond a simple loss of influence, since violent retaliation by winners against losers is commonplace.

These social underpinnings are inter-linked in a way that contributes to an environment where electoral actors often behave in whatever manner will benefit their self-interest without any regard for whether their actions will have a damaging impact on the credibility of the electoral process, manual and automated alike. Social characteristics are an important part of the context in which the electoral process unfolds and must be understood in order to address the widely recognized shortcomings of Filipino democracy.

The Great Migration

The long and winding legal journey toward automating the Philippine elections officially commenced on 7 June 1995 when Republic Act No. 8046 was enacted into law. This legislation authorized the Commission on Elections (COMELEC) to conduct a nationwide demonstration of an automated election system. This first ever experiment on automated elections in the Philippines was held in the ARMM on 8 September 1996. Congress subsequently enacted R. A. No. 8436 on 22 December 1997 authorizing the COMELEC to automate the national and local elections of 11 May 1998 and succeeding ones. Because of the limited time to prepare for a nationwide automated election, automation was limited again to the ARMM region. Because of the failure of the automated counting machines to read the ballots correctly in many municipalities in Sulu province in the ARMM, the ballots were counted manually.

While the COMELEC had authority under R.A. No. 8436 to automate the 2001 national and local elections, Congress failed to appropriate the budget needed for its implementation. COMELEC was not able to carry out automated elections in 2004 either. Even with an appropriation for the automation of the 2004 national and local elections, the Supreme Court declared as null and void the contract between the Commission and Mega Pacific, who won the bid to supply the machines.

On 23 January 2007, Congress passed R. A. No. 9369 amending R. A. No. 8436. Among other items, the amendatory law authorized anew the COMELEC to implement an automated election system (AES). In August 2008, the COMELEC automated the regional polls in the ARMM, using direct recording electronics (DRE) technology in the province of Maguindanao and the optical mark reader/recording (OMR) system technology with a central count in the other four provinces of the ARMM.

By the end of 2008, more than 13 years after the passage of the original legislation allowing for election automation, three pilots had been implemented – all in the 5 provinces of the ARMM either during regional or national elections. While this perhaps seems like an agonizingly prolonged timeline, what it did do was provide for pilot testing of several different types of election automation. According to IFES e-voting technology expert Ben Goldsmith, "Before any final decision can be made about the possible use of electronic voting and counting technologies it is essential that the technology be piloted." Lessons learned from these limited efforts then informed decision-making regarding technology choices for the first nationwide election finally conducted in May 2010.

During the 1 September 2008 hearing of the Joint Congressional Oversight Committee (JOCC), then-Chairman Senator Richard J. Gordon encouraged COMELEC and the COMELEC Advisory Council (CAC) to pursue a vendor fair to expose the Philippine electorate to a wider selection of

equipment and technical solutions. Subsequently, in the first week of September, the CAC approached IFES to organize this event given our extensive experience in working with election commissions on technology issues and holding similar vendor fairs in the past.

IFES launched the Election Technology Conference and Vendor Exhibition/Vendor Fair in November 2008, a week before the CAC deadline for submitting its recommendations to COMELEC on selection of technology. Over the course of three days, 250 conference attendees viewed the latest election equipment and supplies from 17 international vendors representing 9 countries, as well as local election supply vendors. The double objective of the event was not only to expose Philippine stakeholders to the latest selection of equipment and technical solutions for elections, but also to provide a forum to discuss lessons learned from other countries and identify potential pitfalls before pursuing such an enormous undertaking as nationwide automation. Participants listened to presentations on international standards in the application of technology to electoral processes from IFES' leading experts on election administration and management and engaged in discussions on how this related to the Philippine context.

Based on the experience in automating the ARMM elections in 2008, and upon the recommendation of its advisory council, the COMELEC decided to utilize the paper-based Precinct Count Optical Scan (PCOS) system that requires voters to fill out paper ballots and feed them into a scanner that counts the votes automatically. The same machine then transmits the precinct results electronically after the close of polls from the polling center directly.

On 19 March 2009, Congress enacted R. A. No. 9525 and appropriated PHP 11,301,790,000 (USD 233,228,569.07 / ZAR 2,108,101,696.12) for the May 2010 national and local elections. The COMELEC finally had all of the necessary ingredients to move forward with automating a nationwide election, including a legal framework, budget and sufficient time.

On 10 July 2009, the COMELEC and SMARTMATIC-TIM entered into a contract for the provision of an AES for the May 2010 elections. The contract provided for the automation of the counting, transmission and canvassing of votes, with systems integration and overall project management included. It contained three components consisting of a Paper-Based AES, which consists of an Election Management System (EMS), a PCOS System and a CCS (Canvassing and Consolidation System). The 2nd and 3rd components are the provision of Electronic Transmission of Election Results using Public Telecommunications Network and Overall Project Management. The COMELEC designated a PMO as its implementing unit, borrowing staff from existing posts to fulfill these new tasks. Training and capacity building now becomes an enormous undertaking for this type of change management exercise.

Approximately 82,000 PCOS machines were leased for use in the 2010 polls, requiring precincts to be clustered and raising the maximum number of voters from 300 voters to 1,000 voters per precinct. While budget constraints are oftentimes beyond the control of the election management body, it would be more ideal to design an automated election system basing the number of machines on operational needs rather than adjusting operations to the number of machines that can be afforded.

Description of the 2010 Technology

The PCOS system is a paper-based technology that uses a paper ballot where the names of the candidates to be voted are pre-printed in the ballot. One of the greatest adjustments for COMELEC was changing from a blank, write-in ballot under the manual system to a pre-printed ballot for the automated system, which had several impacts on timeliness in the areas of confirmation of political parties and candidates which oftentimes requires waiting for Supreme Court decisions on their disqualification cases, length of printing time to ensure security ink and other features are incorporated and tested, and even logistical issues such as shipping of ballots to the field as they now need to be specially packaged per precinct.

After voting the paper ballot at a simple primary school desk with only limited secrecy protection provided by a folder, the voter will feed the double-sided paper into an automated counting machine (ACM). Counting of votes will be done in the precinct, one PCOS or Automated Counting Machine (ACM) for every clustered precinct (up to 1000 voters per precinct). The machine scans ballot; both sides of the paper ballot can be read in a single pass and takes and stores a digital image of every ballot cast. The machine is also able to automatically reject fake, photocopied, invalid and previously scanned ballots. The machine runs on a main power source of 220V AC and has a back up battery that will allow machine to run for 16 hours. There is also a CMOS battery that runs the internal clock. The lifespan of these types of batteries is typically 3-5 years, so using these machines for multiple elections becomes an issue as this battery would need replacing every election in countries with a similar electoral cycle. This becomes an issue in the upcoming Philippines election, and is indeed part of the risk management plan for the 2013 election, as the same PCOS machines are being used.

COMELEC and SMARTMATIC-TIM entered into a contract on 30 March 2012 agreeing to a deal that involves using 82,000 of the same PCOS machines for the May 2013 elections. The contract was worth PhP 1.2 billion (USD 29.5 million / ZAR 268.6 million). This contract also covered the consolidation and canvassing system of SMARTMATIC-TIM at no additional cost to the COMELEC.

Automation

The legal framework, namely R.A. 9369, clearly spelled out the objectives for automating the electoral process:

"...an automated election system...will ensure the secrecy and sanctity of the ballot and all election, consolidation and transmission documents in order that the process shall be transparent and credible and that the results shall be fast, accurate [emphasis added] and reflective of the genuine will of the people."

While speed and accuracy have certainly improved, automating the election system has not done much to improve the secrecy of the ballot and has had a mixed impact on the transparency of the process. However, the achievement of being able to announce preliminary election results on election night has done much to increase the credibility of the electoral process.

While accelerating the reporting of results was a big motivating factor in moving toward automation, the main reason was to eradicate the wholesale padding and shaving of votes (known as dagdag bawas) that was taking place on a large scale during the canvassing or summarization of results process. This extremely laborious, paper-based canvassing process under the manual system took up to 3-4 weeks to complete, allowing for ample opportunity to manipulate the results. Confidence in the electoral process and in the consequent government was low due to this weakness in the system, which was clearly seen during the post-2004 anti-government demonstrations after election fraud scandals were brought to light.

In the automated consolidated canvassing system and electronic transmission of results, opportunities to manipulate the results have been diminished. In this regard, automation measures have increased the integrity of the electoral process by lowering the opportunity for fraud, while creating a more efficient system to provide results more quickly. This gain, however, can quickly disappear if the reliability of the technology is called into question.

COMELEC has taken a very important step forward in making precinct level results more transparent by requiring a copy of the election results to be posted at each precinct, while also providing disaggregated election results down to the precinct level on their central server website. Therefore, election observers have end-to-end transparency when comparing the results they witnessed being tallied by the PCOS machine at the precinct with the results being reported at the national level on the COMELEC Central Server as well as the National Board of Canvassers Server and server for parties, civil society observers and the media.

However, it is the actual counting of the votes that is now less transparent in the Philippine electoral process, as it is a machine that tallies the results at the close of polls. Under the

manual system, the entire barangay would remain at the polling center and watch the conduct of the count for hours, looking over the shoulder of the poll worker reading the ballot and checking that the tally marks on the blackboard matched those in the official paperwork. Goldsmith recognizes this shortcoming and states, "Leading experts in the field of e-voting argue that the lack of transparency with electronic voting and counting systems is the greatest challenge facing the implementation of such technologies." This requires a retraining of election observers as to how to scrutinize the most vulnerable areas of the process and to ensure the technology itself is not tampered with. A different set of skills and a more sophisticated understanding of information technology and e-voting equipment specifically must be introduced to civil society and other stakeholders. Therefore, one can argue that transparency as an international standard has been partially sacrificed to accommodate the other standards of speed and accuracy to address the election problems found in the Philippine context.

Cost and Benefit

Was the benefit of automating the Philippine elections worth the cost? Goldsmith writes, "If the benefits of using electronic voting or counting technology are many and the additional per election cost are small then there is a strong case for the new technology." This decision can only be made on a country-to-country basis by taking into consideration the problems faced by the election management body, place them in a socio-cultural context, and whether technology can be applied effectively to resolve these issues. Automation is not a silver bullet, and other issues such as campaign finance, accessibility and vote-buying still need to be addressed to ensure a free and fair election for all. In fact, automation can have unintended consequences, such as increasing fraud, intimidation and violence at the precinct level due to the fact that other avenues of manipulating the election results are no longer accessible or cost-effective. These scenarios must be anticipated and contingency measures put into place to mitigate their negative impact on the new process.

It is difficult to measure the value of political stability and what credible elections have contributed to more promising numbers of the Philippines' economic indicators. The country is rating as one of the best economies in the Asian region, investments are up and tourism is experiencing a boom. President Benigno Aquino III and other key elected leaders enjoy a continued high public approval rating, and the President's anti-corruption reforms are gaining traction.

Challenges and Successes during the Transition

The challenges of implementing a new system in an environment where trust in the electoral process is low demands inclusiveness of other stakeholders. The COMELEC has risen to this

challenge in opening up its processes to external stakeholders to create more responsive policies and procedures in all areas of the election process, including accessibility, adjudication and campaign finance. This approach has been successful in transforming not only the policies, but the way in which they are determined.

The 13-year timeframe between the passage of the first enabling law and the 2010 nationwide automated elections required patience and perseverance. Turning these setbacks into opportunities for additional pilot testing eventually led to a more informed decision once all of the elements were in place to move forward with the nationwide automation project.

Improvement in management and communications within the EMB is required whenever a new system is introduced. Capacity-building becomes a major focus as does change management. More emphasis on quality control and risk management is also necessitated by a less forgiving system, where similar mistakes in a manual system could be resolved by creative troubleshooting on the spot. The COMELEC has made great strides toward implementing a more professionalized management process; however there is much room still to improve.

Overall, when old management processes are applied to new systems, inefficiencies within the organization begin to show very quickly as existing resources are strained. A modern election system requires a modern and EMB, and this may mean a restructuring of the entire organization to support the transition to the new system.

Key Lessons Learned

In any implementation of technology there are a complex combination of external activities and inputs that have a direct impact on the ability of the machines to deliver accurate results. The reality is that automated election systems can simplify the processes of voting, counting and reporting, but often add complexity to planning and execution compared to a manual election process. Ballot printing flaws, mistakes in distribution of materials, and failures to follow procedures that may be feasible in a manual election can cause significant problems in an automated election.

"Educating voters on the use of new electronic voting or counting technologies is essential, and must start before they are confronted with the new system on Election Day," exhorts Goldsmith. Likewise, poll worker training must be planned for and prioritized, along with additional confidence-building activities in public relations such as the holding of field tests and mock elections.

A very thorough analysis of the source code for all systems that comprised the AES was carried out and found that the system was acceptable for use to conduct elections in the Philippines, while noting a number of deficiencies. In spite of a general lack of discipline in coding, it was

concluded that there were no instance discovered of any intentional malicious code, and that most issues are considered minor in nature. Of great significance is the remark that the issues that were discovered could be reconciled with appropriate manual processes. This is one more solid argument for putting a much greater emphasis on the requirement of a serious random manual audit as soon as polls close on Election Day.

RA 9369 (Section 12) states that once an AES technology is selected for implementation, the Commission shall promptly make the source code of that technology available and open to any interested political party or group which may conduct their own review thereof. The COMELEC followed guidelines drafted by Comelec Advisory Council (CAC) and Technical Evaluation Committee (TEC), which provided two computer terminals in the Project Management office at which interested parties could inspect the source code. There were many complaints that the opportunity for source code review was inadequate, based upon limitations of time and limitations of resources available to do such a review. Two arguments were advanced to justify the limited access: (a) it would violate the intellectual property rights of SMARTMATIC-TIM and (b) it would make it easier for computer hackers to exploit vulnerabilities in the system, if any.

Proponents of greater access to source code point argue that greater access to the source code will uncover any vulnerability. If the vulnerabilities are minor the system can be modified to address them; if they are major, then the system is not ready for deployment in an election system. Opponents argue that allowing complete access to the source code provides opportunities for malicious parties to look for security loopholes.

Ballot printing, originally scheduled to begin on 11 January 2010, was delayed until 15 February 2010. The calculations about how many printers would be needed to print the ballots appears to have been based upon printing non-stop, 24 hours per day, 7 days per week, from 11 January 2010 through 25 April 2010 (barely allowing time for packaging and distribution before May 10). This calculation required 4 Kodak VersaMark VL4000 printers, provided by SMARTMATIC-TIM.

During the first month of printing, production levels were lower than planned. Based upon actual printing speed during this first month, the 4 printers would have been inadequate to produce all the required ballots even if the full printing period had been used, a problem exacerbated by the delay in starting printing.

A 5th printer helped speed up the printing processes and there was just barely enough time to complete the ballot printing. The near-disaster was the result of the delay in start of printing, in combination with a miscalculation of the number of printers required, and a failure of the COMELEC lines of communication.

When calculating a requirement for mission-critical resources it is imperative to provide a margin of safety, typically at least 30% capacity above the minimum calculated requirement. Further, when planning round-the-clock shifts, it is important to take into consideration that 2-3 hours will be sacrificed to the time lag between shift changes. Ideally, a production system for critical election materials such as ballots should be designed on a 2 shift basis, or a 5-day work week basis, allowing for increasing the number of hours per week in case of any unexpected circumstances.

One of the key security features for the AES is that it provides for multiple security mechanisms. However, in order to achieve the high degree of security offered by the system it is important to actually implement all of the security measures which were not done in the Philippines' case due to time constraints.

Early testing of the ballots indicated that the PCOS scanners were not detecting the ultraviolet marks designed to prevent use of counterfeit ballots. This was due to a problem with the UV printing that was a direct result of the delay in the start of printing, i.e. because printing speed was increased, the UV ink jets were emitting less ink. Further, three days before the start of printing, the NPO mandated that there must be a special micro-mark on the ballot papers or they would not allow printing. The decision was made to use the UV ink to print the NPO-required micro-mark instead of the UV token required by the PCOS scanners.

The result of this decision was a sacrifice of one level of security. Although it has been pointed out that the ballot numbering plus barcode provided some security against introduction of counterfeit ballots this misses the point of redundant security measures. Hand held scanners were provided to check existence of UV ink on the ballots, but were rarely used on Election Day.

The PCOS machines contain a console port that allows connection of an external terminal. The Joint IT Forensic Team tested this port and determined that it is easy to connect a laptop computer to the port using a serial cable, and to take full control over the underlying Linux operating system. The system is not implemented with a username and password, so anyone making such a connection has root access, allowing complete control over the PCOS machine.

This was a major security flaw that will no doubt be corrected before any further usage of their PCOS, but the fact that this loophole slipped by is a further indication of a truism of automated systems. Absolute security in a technology system is an oxymoron. Again, this points to a need for much greater emphasis on the random manual audit to provide the necessary transparency and security by detection.

Although this problem has come to be explained as a problem with compact flash (CF) card configuration, it was more accurately a problem with a late modification of the ballot design.

ballots for local elections were double-spaced, a decision that was made without going back to modify the configuration of the CF cards. As a result, the PCOS machines expected to see voter marks in some spaces that were blank on the ballot, resulting in zero votes for those candidates, while in other cases the marks were allocated to the wrong candidates.

The root cause of the problem is a management issue. When implementing an automated system it is critical to have a well-organized change management process to approve and track every change to any component and conduct end-to-end testing when appropriate.

Future Outlook

Despite the technical shortcomings just reviewed, seventy five percent of Filipinos were satisfied with the general conduct of the May 2010 automated elections, according to the Second Quarter 2010 Social Weather Survey conducted from 25 to 28 June 2010.

The survey also found that Filipinos were satisfied with how the COMELEC and other institutions handled various aspects of the May 10, 2010 elections. In addition, a complementary survey of 480 Poll Workers nationwide who served in the May 2010 elections showed that they are even more satisfied with the conduct of the May 2010 elections compared to the general public. COMELEC officials are also confident of the use of PCOS for the upcoming elections. This may be partly due to the existence of a paper trail as a back up in case of system failure, as well as the fact that voters still have a paper ballot interface which increases their trust and confidence in the process.

Ensuring transparency in the preparations for an electoral exercise will go a long way in regaining the public's trust, confidence and support. The requirements of transparency cannot be dispensed with for expediency purposes. Transparency, being a crucial factor in creating voter confidence in the voting system, and in consequence, in that of the elected representative's legitimacy, must be constantly favored over other considerations. It allows the detection of structural confidential defects and of some threats to the election process or the voters themselves (fraud, intimidation) that could alter the results.

Institutional capacity building for COMELEC, and possible reorganization, should be continued through implementation of their strategic plan dubbed COMSTRAT 2016, which will run through the 2016 Presidential Elections. This particularly applies to the IT department and encompasses modern project management skills for the entire Commission, both at HQ and field office level.

Finally, there will be the need for a post-election assessment in 2013 and a decision on whether to use the same PCOS machines for the third time, or invest in a new system for the 2016 Presidential elections. This may hinge on the results of the upcoming election implementation in May.

Summary

A summary of key lessons is provided below for consideration by those EMBs considering automating their election process.

- Define a core need for targeted implementation of technology, i.e. canvassing and results transmission.
- Ensure legal framework, budget, timeline and political will are in place.
- Safeguard procurement processes that are clean and transparent.
- Conduct pilot testing and vendor fairs and have a strong public relations and media strategy.
- Prioritize voter education and poll worker training.
- Invest in capacity building for all election stakeholders, including EMB staff, civil society, judiciary, media, and security agencies.
- Adjust for new timelines that require major changes to the former process.
- Design contingency measures to mitigate unintended consequences of automation.
- Implement a timely random manual audit on election night.

Enabled or Disabled?

In the Philippines case study of the 2010 elections, automation served its purpose by providing speedy and accurate results that raised the credibility of the electoral process. However, a wide margin in the Presidential race resulted in a lower level of scrutiny during the days immediately following the elections. COMELEC cannot count on this scenario repeating itself for the national elections in 2013 and therefore needs to ensure that transparency through a robust random manual audit process is properly implemented. Otherwise, there is a real danger that a lack of transparency will result in the eventual loss of credibility in the automated system.

Whether looking at international standards or a commission's own defined values, such as those we have here from South Africa's own IEC, keeping these standards in mind while determining whether or not to automate will help guide decision-making. These values are the same under a manual or automated system and should always be the guiding principles. Not all standards will be equally prioritized under different systems, so weighing the costs and benefits vis-à-vis what you gain or lose for each value needs to be done carefully and keeping the local context in mind. As if it's we like to say, there is no blueprint for democracy, and nowhere is that more true than in the application of technology to electoral processes.

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17

APPENDIX 10

Country Case Study Philippines

Population:

- **94.9 million people** in 2011 from 27.1 million in 1960, changing 251 percent during the last 50 years.
- Voting population: **52,014,648 voters**

Geography:

- An archipelago comprising of 7,107 islands with a total land area of 300,000 km^2.
- The islands are divided into three groups: **Luzon, Visayas, and Mindanao.**

Geography:

- A hierarchy of local government units (LGUs) with the 80 provinces as the primary unit.
- The barangay is the smallest local government unit.

Geography:

- Divided into 17 regions with all provinces grouped into one of 16 regions for administrative convenience.
- The **National Capital Region** however, is divided into four special districts.

Geography:

- Most government offices establish regional offices.
- The regions themselves do not possess a separate local government, with the exception of the **Autonomous Region in Muslim Mindanao.**

Description of Government Structure:

- Chief of State and Head of Government: **President Benigno Simeon AQUINO III**
- Assembly: Philippines has a bicameral Congress consisting of the Senate with 24 seats and the House of Representatives with 287 seats.

Description of Electoral System:

- The President is elected by plurality vote to serve a 6-year term.
- In the Senate 24 members are elected by plurality vote in multi-member constituencies to serve 6-year terms*.

Description of Electoral System:

- In the House of Representatives, 230 members are elected by plurality vote in single-member constituencies to serve 3-year terms and 57 members are elected through a closed-list proportional representation system to serve 3-year terms.**

Future Elections:

- Presidential - May 2016
- Legislative - May 13, 2013

Characteristics as a Democracy

IFES CEPPS 2004 Report

- Overwhelming majority of its participants showed resiliency and a commitment to democracy.
- There was substantial voter interest and turnout

Characteristics as a Democracy

IFES CEPPS 2004 Report

Social Characteristics

- The patron-client relationship
- Losing face
- Poverty and self-enrichment
- Financial and political corruption

Characteristics as a Democracy

IFES CEPPS 2004 Report

- These social underpinnings are inter-linked
- These social characteristics are an important part of the context

Characteristics as a Democracy

Description of the type of e-voting/counting technology

Characteristics as a Democracy

- On 7 June 1995, R. A. No. 8046 was enacted into law
- 9 September 1996.
- Congress subsequently enacted R. A. No. 8436 on 22 December 1997
- Ballots were counted manually.

Characteristics as a Democracy

- While the COMELEC had authority under R.A. No. 8436 to automate the 2001 national and local elections, Congress failed to appropriate the budget needed for its implementation.

Characteristics as a Democracy

- COMELEC was not able to carry out automated elections on 2004
- On 23 January 2007, Congress passed R. A. No. 9369 amending R. A. No. 8436.
- In August 2008, the COMELEC managed to automate the regional polls in the ARMM

Characteristics as a Democracy

Type of Voting Technology

- COMELEC decided to utilize the paper-based PCOS system
- On 23 March 2009, Congress enacted R. A. No. 9525 and appropriated **PHP 11,301,790,000 ($233,228,569.07)** for the May 2010 national and local elections.

Characteristics as a Democracy

Type of Voting Technology

- On 10 July 2009, the COMELEC and SMARTMATIC-TIM entered into a contract
- There were around 82,000 PCOS machines used in the 2010 polls

Characteristics as a Democracy

Type of Voting Technology

PRECINCT COUNT OPTICAL SCAN (PCOS)

ource: COMELEC

Characteristics as a Democracy

Type of Voting Technology

SMARTMATIC PCOS MACHINE AND SAMPLE BALLOT BOX

Source: COMELEC

Characteristics as a Democracy

Type of Voting Technology

PCOS READY TO RECEIVE BALLOTS

ource: COMELEC

Characteristics as a Democracy

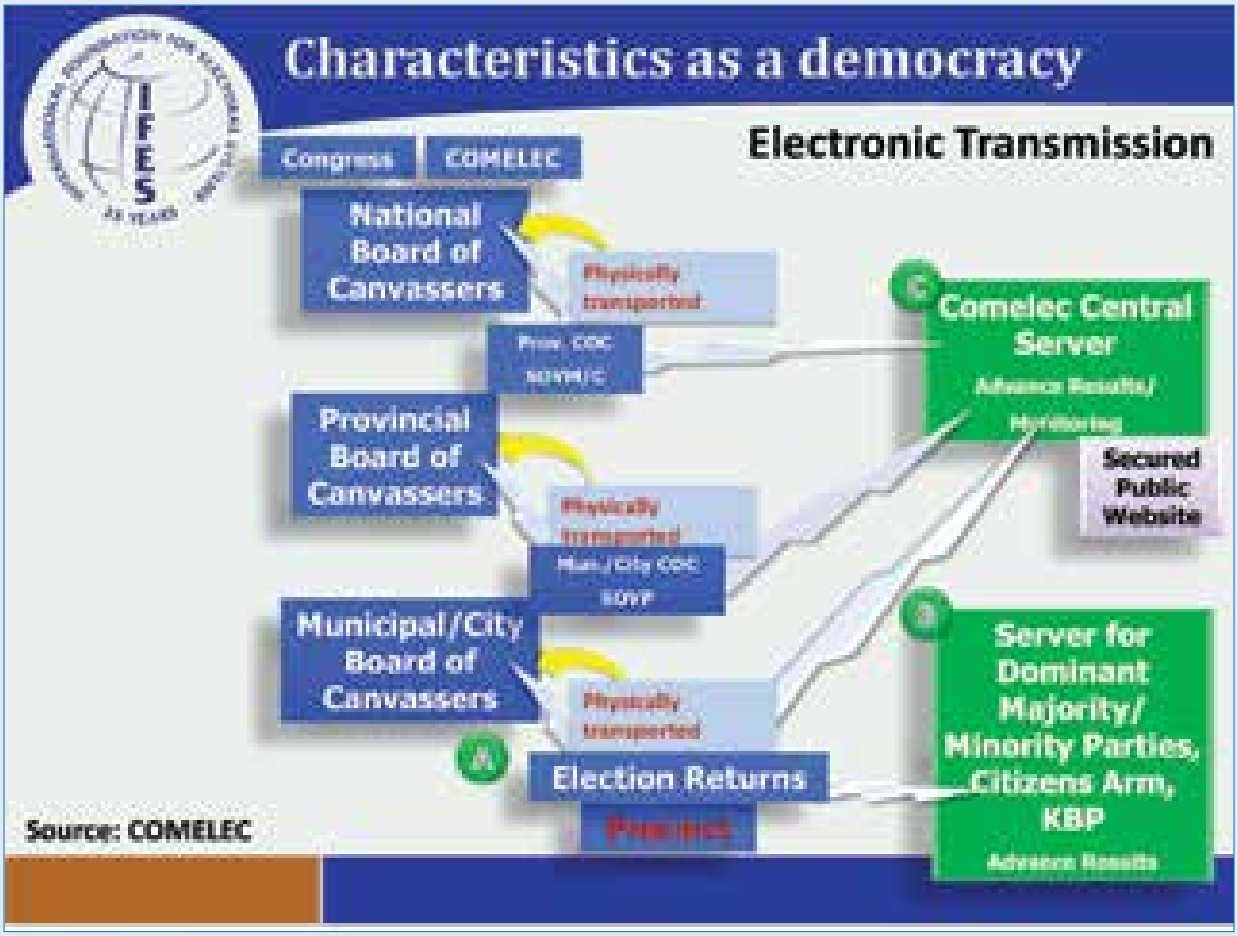
Type of Voting Technology

- The same election technology will be used for the 2013 midterm and ARMM regional elections.
- COMELEC and SMARTMATIC-TIM entered into a contract on 30 March 2012

Characteristics as a Democracy

Manual System of Canvassing

Source: COMELEC


Characteristics as a democracy
Electronic Transmission
Congress
COMELEC
National Board of Canvassers
Physically transported
Comelec Central Server
Provincial Board of Canvassers
Secured Public Website
Municipal/City Board of Canvassers
Server for Dominant Majority/ Minority Parties, Citizens Arm, KBP
Election Returns
Source: COMELEC


Characteristics as a Democracy
Description of the main reasons for deciding to migrate to e-voting/counting technologies in Philippines

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

- The Philippines infused automation into an environment where electoral legitimacy has been frequently questioned and criticized.
- The Achilles' heel of Philippine elections has always been the dual challenge of speed and fraud prevention.

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

- In the past, counting ballots often took days, with weeks or even months until the results were tabulated.

"...an automated election system...will ensure the secrecy and sanctity of the ballot and all election, consolidation and transmission documents in order that the process shall be transparent and credible and that the results shall be ***fast, accurate*** *[emphasis added] and reflective of the genuine will of the people."*

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

- Faster vote counting and tabulation was intended to shorten the perceived power vacuum
- Decrease opportunities for erroneous counting, whether deliberate or accidental, by eliminating the subjective factor.

Characteristics as a Democracy

Vendor Fair

- On September 2008 Chairman Senator Richard J. Gordon encouraged COMELEC and the COMELEC Advisory Council (CAC) to pursue a vendor fair
- To expose the Philippine electorate to a wider selection of equipment and technical solutions, an activity IFES had been proposing since 2005.

Characteristics as a Democracy

Vendor Fair

- IFES launched the Election Technology Conference and Vendor Exhibition (ETCVE)/Vendor Fair from 17 to 19 November 2008

Characteristics as a Democracy

Vendor Fair

- Over three days, 253 conference attendees viewed the latest election equipment and supplies from 17 international vendors representing 9 countries as well as local election supply vendors.
- The vendor fair provided an important venue for lively and productive discussions
- Helped to identify the pitfalls and dangers presented by automation

Characteristics as a Democracy

Description of the monetary costs of e-voting/counting

Characteristics as a Democracy

- Summary of COMELEC Budget for the May 2010 national and local elections (Source: Presentation by the Commission on Elections to the Members of the House of Representatives February 9, 2009)

Characteristics as a Democracy

ITEM	COST	REMARKS
Purchase cost per unit for PCOS	145,867.50 ($3,000.15)	PHP 48.62 per US$
Total purchase cost for PCOS	11,669,400,000.00 ($240,012,340.60)	For 80,000 units
Cost of Lease	8,168,580,000.00 ($168,008,638.42)	70% of purchase cost
Cost of Services	1,555,038,400.00 ($31,981,513.95)	19.00% of the cost for lease
Canvassing Units	200,000,000.00 ($4,113,533.52)	For use by the National, Provincial, City and Municipal Boards of Canvassers
Cost of ballot paper	1,000,000,000.00 ($20,567,667.62)	PHP 20 per ballot
Transmission Cost	200,000,000.00 ($4,113,533.52	Use of Public Telecommunications Networks
Project Management Cost	100,000,000.00 ($2,056,766.76)	
Ballot Box	78,170,000.00 ($1,607,774.57)	PHP 977.125 per ballot box
TOTAL	11,301,768,400.00 ($232,466,427.99)	

Characteristics as a Democracy

Description of the transition/migration from traditional voting methods to e-voting/counting technologies

Characteristics as a Democracy

An analysis of the key lessons learn from the experience of the Philippines of e-voting/counting technologies

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Human vs. Technology

- Most of the issues that have been raised in relation to the AES are tied not to the machines, but errors in human decisions and failure to adequately define and adhere to sometimes complex procedural requirements.

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

System Certification

- SysTest labs review very thorough
- Slow delivery of source code
- List of standards imposed after contract with SMARTMATIC had been signed
- Significant amount of "minor" deficiencies
- Issues could be reconciled with "appropriate manual processes"
- Accountability remains with COMELEC

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Source Code Review

- Security argument of conducting fully open source code review relevant
- Opportunities provided were too limited to fulfill the transparency requirement
- Compromise required

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Ballot Printing

- Delay in start of printing
- Miscalculation of number of printers required
- Failure of COMELEC lines of communication
  - Need to establish who has final authority in ballot production
  - Leave ample room for errors and delays

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Ultraviolet Mark

- While other levels of security existed, turning off UV reader sacrificed (paid-for) level of security
- Perceived vs. real shortcoming
- Hand held scanners were rarely used
- "Left door unlocked because the alarm system was turned on"

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Open Console Port

- Major Security Flaw
- Needs to be fixed before future elections
- "Absolute security in technology is impossible"
- Greater importance of RMA – "security by detection"

Characteristics as a Democracy

IFES 2010 Elections Assessment Report

Compact Flash Cards

- Problem of late ballot design modification
- Insufficient quality management/control
  - Task separate unit with quality control
  - End-to-end testing needs to take place as soon as first batch of real ballots is printed

Characteristics as a Democracy

Philippines and the future of e-voting/counting?

Characteristics as a Democracy

- Seventy-five percent of Filipinos are *satisfied* with the general conduct of the May 2010 automated elections
- The survey also found that Filipinos are satisfied with how the COMELEC and other institutions have handled various aspects of the May 10, 2010 elections.

Characteristics as a Democracy

- Poll Workers are even more satisfied with the conduct of the May 2010 elections compared to the general public.
- EMB officials (including Chairman Brillantes) are confident of the use of PCOS for the upcoming elections

Characteristics as a Democracy

- PCOS is said to be more acceptable as it provides paper trail
- PCOS cost lower than DRE
- Ballot paper interface

Characteristics as a Democracy

- Future gaps
  - Ensuring transparency in the preparations for an electoral exercise
  - Transparency, being a crucial factor in creating voter confidence in the voting system

Characteristics as a Democracy

- Future gaps
  - Institutional capacity building for COMELEC, possible reorganization
    - COMELEC Strategic Plan 2011-2016, Pillar (Technological Capacity):
    - To enhance the capability of the COMELEC to support the conduct of modernized, efficient, transparent, speedy and credible elections.
    - To strengthen the information and communications technology (ICT)-capable personnel in their pursuit of supporting modernized elections.

Characteristics as a Democracy

- Future gaps
  - Investing in new machines for 2016 (Use SMARTMATIC PCOS for the third time or bid for new PCOS?)

THANK YOU!

APPENDIX 11


Brazilian Superior Electoral Court
Seminar on Electronic Voting and Counting Technologies
Judge Paulo de Tarso Tamburini
Cape Town – March 2013
Electoral Commission of South Africa


Tribunal Superior Eleitoral
Seminar on Electronic Voting and Counting Technologies
Brazilian Electoral Justice
Art. 118 – Brazilian Constitution:
Superior Electoral Court
Regional Electoral Courts
Electoral Judges

Tribunal Superior Eleitoral

Seminar on Eletronic Voting and Counting Technologies

Brazilian Electoral Justice

- Superior Electoral Court
- 27 Regional Electoral Courts
- 138.544.348 voters
- 5.568 municipalities
- 3.033 electoral zones
- 96.116 polling stations
- 437.443 precincts

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

Brazilian Elections

In Brazil, there are elections every two years.

Municipal elections Mayors and City Councilors

... 2008, 2010 ...

General Elections President, Governors, Senators and Federal, State and District Representatives

... 2012, 2014 ...

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Seminar on Electronic Voting and Counting Technologies

Brazilian Electoral Justice

The Electoral Justice is in charge of three distinct functions:

- Legislative
- Jurisdictional
- Executive

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Seminar on Electronic Voting and Counting Technologies

Legislative Activities

1. Preparation of the Internal Rules.
2. Preparation of Regulations

   In the 2012 Elections TSE laid down 14 Resolutions on, for example:

   - Electoral propaganda
   - Money collection and accountability of campaign expenses
   - Preparatory acts
   - Candidatures register.

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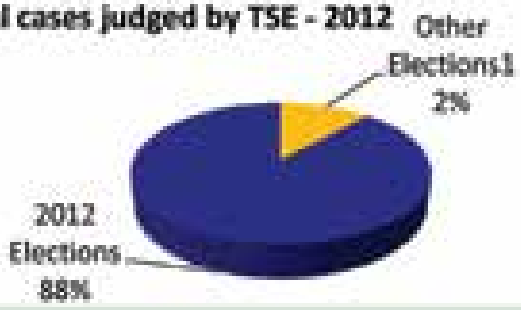
Seminar on Electronic Voting and Counting Technologies

Jurisdictional Activities

In 2012:

- 481.776 requests of candidacy register.
  - ▸31.982 for mayor/vice-mayor;
  - ▸449.784 for city councilor.
- 10.411 lawsuits judged by TSE
  - ▸9.189 cases related to the 2012 Elections.

Legal cases judged by TSE - 2012



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Jurisdictional Activities

Human resources:

- 7 Justices of the TSE
- 196 judges in the TREs
- 3.028 electoral judges, and
- 25.259 public servants

2010

72.000 – legal cases judged

2011

40.500 – legal cases judged (non-electoral year)

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Executive Activities

R$ 395.270.694 spent for doing the elections, what represents a cost of R$ 2,81 per elector.

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Executive Activities

Main questions related to the elections:

1. Private lines for data transmission
2. Procurement and logistics of the electronic voting machines
   a) 500.000 electronic voting machines
   b) 96.000 polling stations in Brazil and abroad
3. Development of more than 50 electoral software
4. Calling and training of polling workers
   a) 1.095.971 total poll workers
   b) 428.946 volunteers
   c) 1.267.025 called up
5. Maintenance of the electoral register
   a) 140.646.446 voters
6. Institutional campaigns
7. Press centre

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Executive Activities

Important partnerships:

- Press
- Armed Forces
- National Agency of Telecommunications
- National Agency of Electricity
- State Secretaries of Public Security
- Federal Audit Court

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2012 Elections - 1º Round – 07/10/2012

Results

Eleições 2012

- 0,55% voting machines replaced
- 2 precincts with manual voting
- 115.807.514 presented to vote (84,59%)
- 5.518 mayors elected
- 57.424 city councilors
- End of counting at 01:48:30, on 08/10/2012
- 197.278.311 accesses to the TSE website, from 167 countries, besides Brazil
- Access peak at 18h50, with around 15.000 accesses per second.

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2012 Elections - 2º Round – 28/10/2012

Results

- 0,35% voting machines replaced
- No manual voting
- 25.661.378 presented to vote (80,88%)
- 50 mayors elected
- End of counting at 21:51:51 on 28/10/2012

Eleições 2012

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Perspectives

A. Biometrics

B. Technological updating
   - ✓ Voting in transit
   - ✓ Voting abroad

C. Electronic judicial process

D. Improvement of the electoral system

In 2012 Elections, 7.803.050 electors could vote using biometrics in 298 municipalities in 24 states.

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The secret...

One of the secrets to successful elections is the complicity of the Brazilian people.

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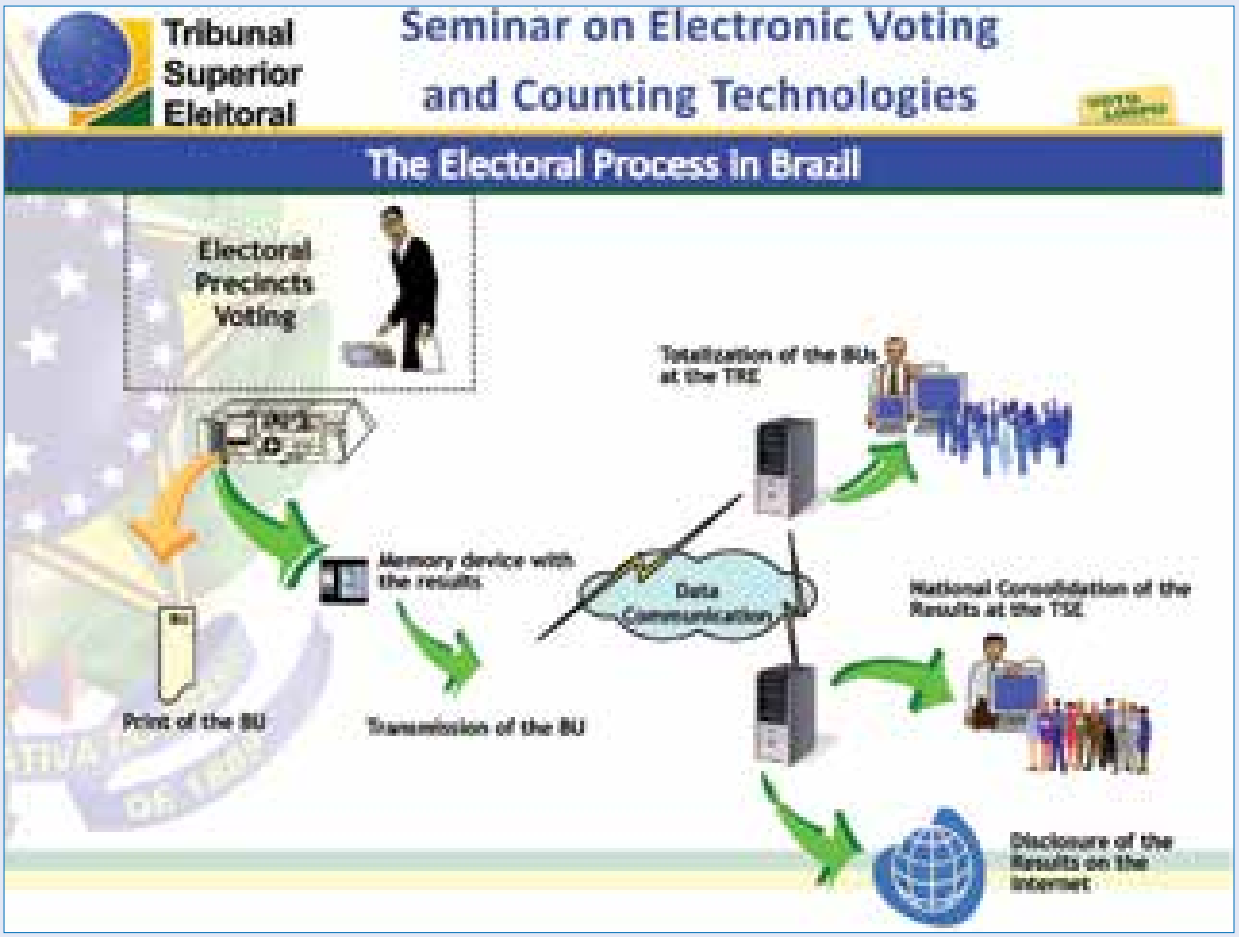
Electronic Ballot Box

The electronic ballot box is a microcomputer specifically built for the election process, with the following features: resistant, with small dimensions, light, with power autonomy and security resources.

Two terminals integrate the electronic ballot box: the poll worker terminal, where the voter is identified and authorised to vote (in some models of electronic ballot box, this identification is through a biometric system), and the voter terminal, where the vote is numerically registered.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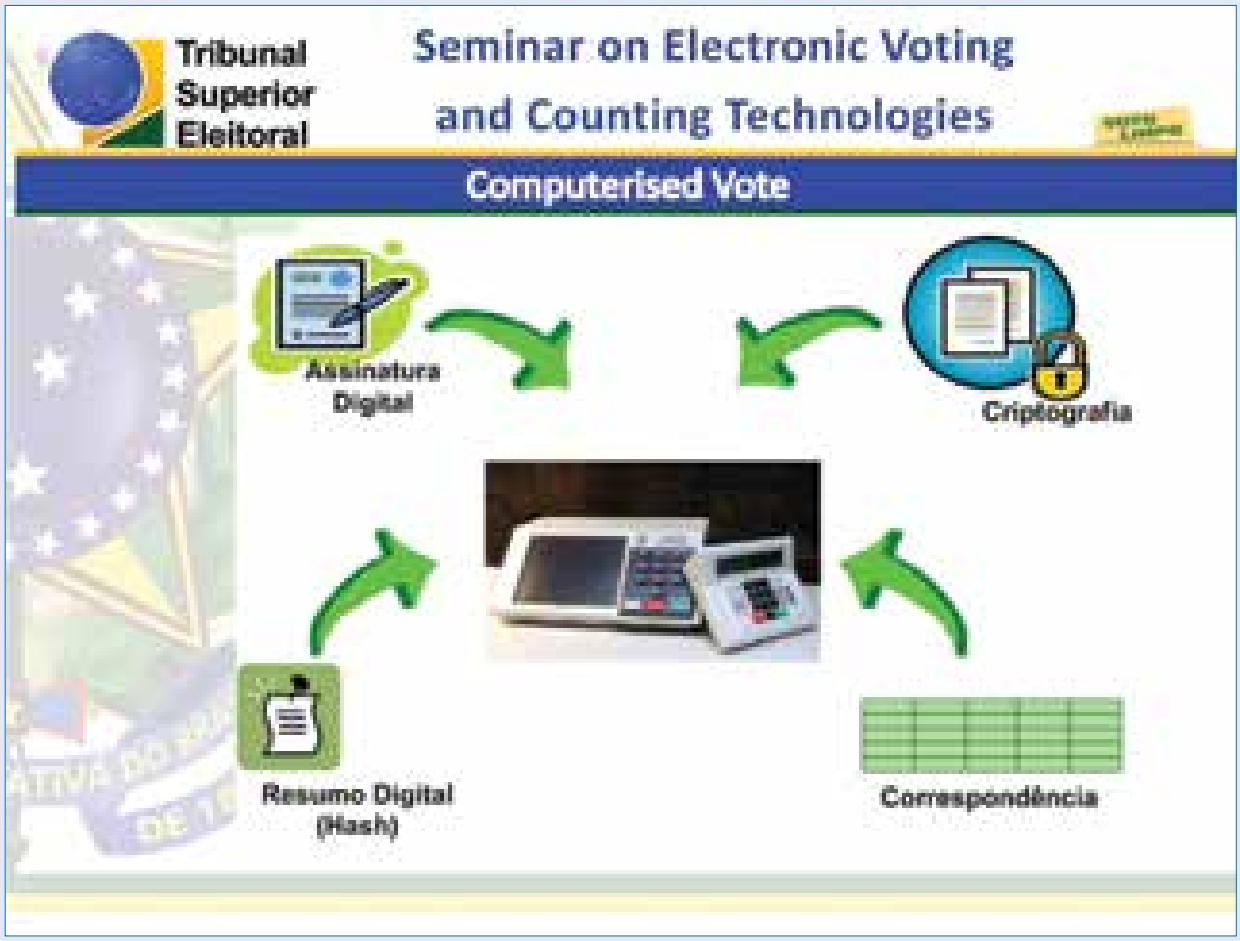
The Electoral Process in Brazil
Electoral Precincts Voting
Totalization of the BUs at the TRE
Memory device with the results
Data Communication
National Consolidation of the Results at the TSE
Print of the BU
Transmission of the BU
Disclosure of the Results on the Internet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Computerised Vote
Assinatura Digital
Criptografia
Resumo Digital (Hash)
Correspondência

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Adoption of the Computerised Vote

The computerised process of the Brazilian Electoral Justice was initiated in 1986, when the single computerised register of the voters was defined and created through the voters' national re-registration.

The first vote via electronic ballot boxes in Brazil was in 1996 and, in 2010, more than 134-million voters participated in the entirely computerised general elections.

Both the hardware and software used in the electronic system of voting are made and assembled under the supervision of the Superior Electoral Court.

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Adoption of the Computerised Vote

In the adoption of the computerised vote, we sought:

- Observance of the Legislation
- Padronisation
- Friendly process
- Reduced costs
- Perennial
- Security
- Logistics
- Autonomy

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LOGISTICS

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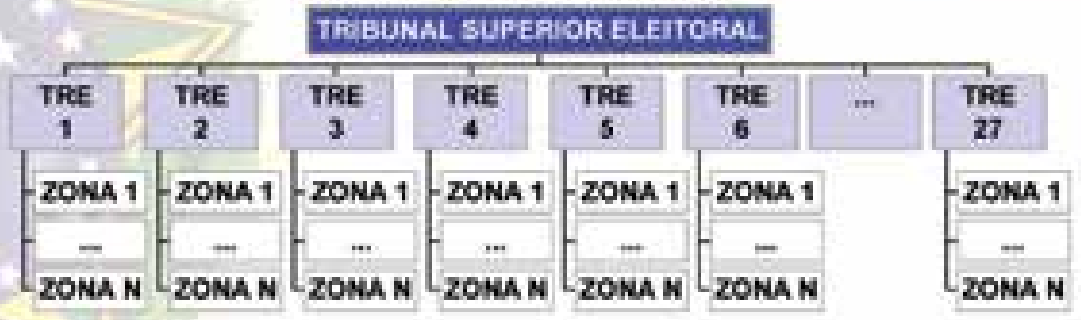
Organisational Structure of the Electoral Justice



TSE	1
TRE	27
ZONES	3.033
PRECINCTS	437.942

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Seminar on Electronic Voting and Counting Technologies

The Electoral Process in Brazil - 2012 elections data

Population: 193,946,886 inhabitants in july 2012

Electorate
140,646,446

Municipalities
5,730

Candidates
481,775

Political parties 30

Electoral zones
3,3033

Electoral precincts
431,185

Electoral workers
1,695,971
(428,946 volunteers)

Electronic ballot boxes 467,163

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Electoral Logistics

Brazil's geographic area: 8,547,403.5 km²

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

Electoral Logistics

Brazil's geographic area: 8,547,403.5 km²

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

Electoral Logistics

Brazil's geographic area: 8,547,403.5 km²

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

Electoral Logistics

Brazil's geographic area: 8,547,403.5 km²

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

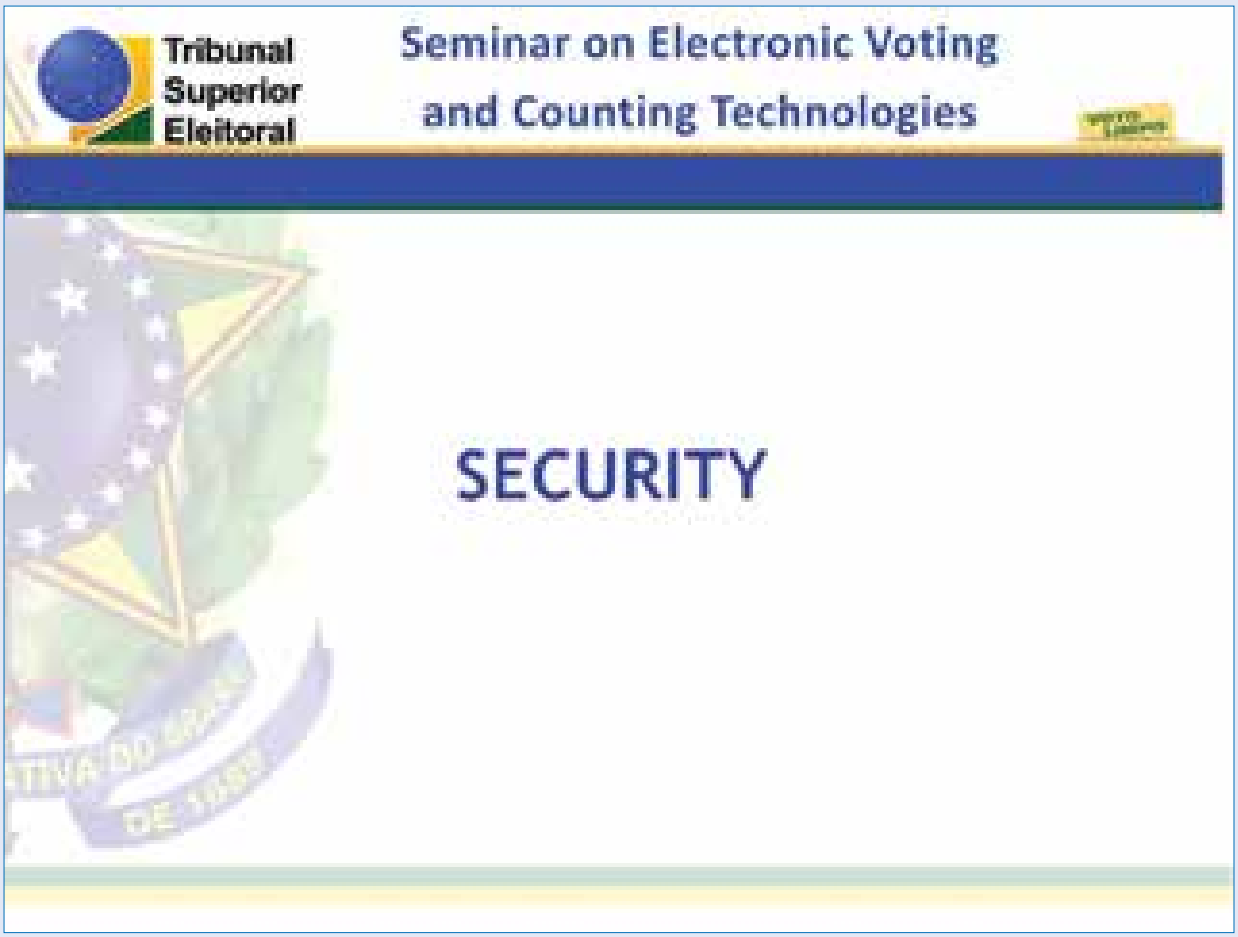
Electoral Logistics

Ballot box replacement
1st round of elections

Eleitores Aptos	Total de Seções (sem agregação)	Urnas de Votação	Urnas de Recepção de Justificativas	Urnas de Contingência	Urnas Substituídas	Percentual de Substituição	Seções com Votação Manual	Percentual de Seções com Votação Manual
138.544.348	431.185	407.551	2.528	57.084	2.273	0,55%	2	0,000%

Ballot box replacement
2nd round of elections

Eleitores Aptos	Total de Seções (sem agregação)	Urnas de Votação	Urnas de Recepção de Justificativas	Urnas de Contingência	Urnas Substituídas	Percentual de Substituição	Seções com Votação Manual	Percentual de Seções com Votação Manual
31.725.967	88.285	86.187	-	8.815	303	0,35%	0	0,000%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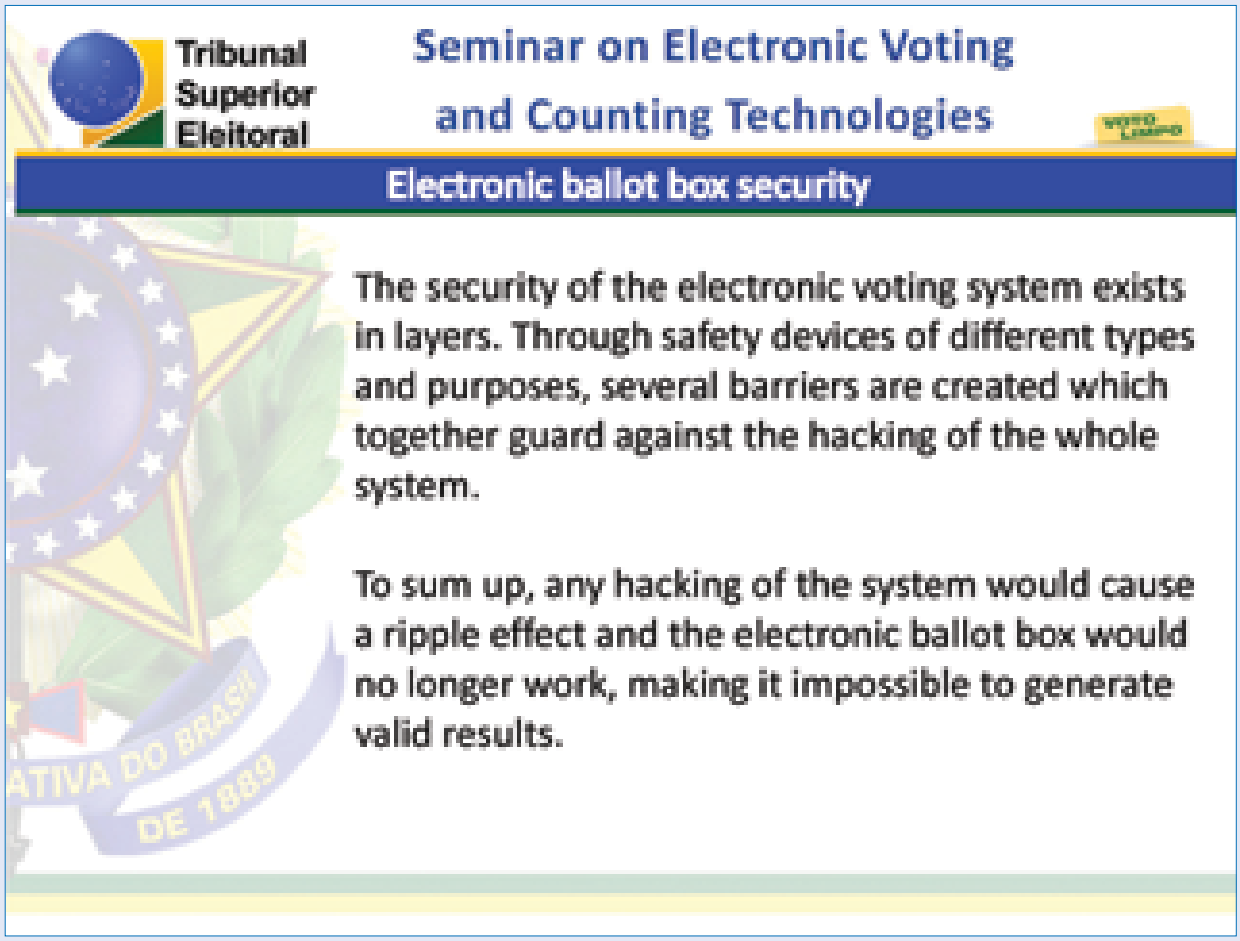
SECURITY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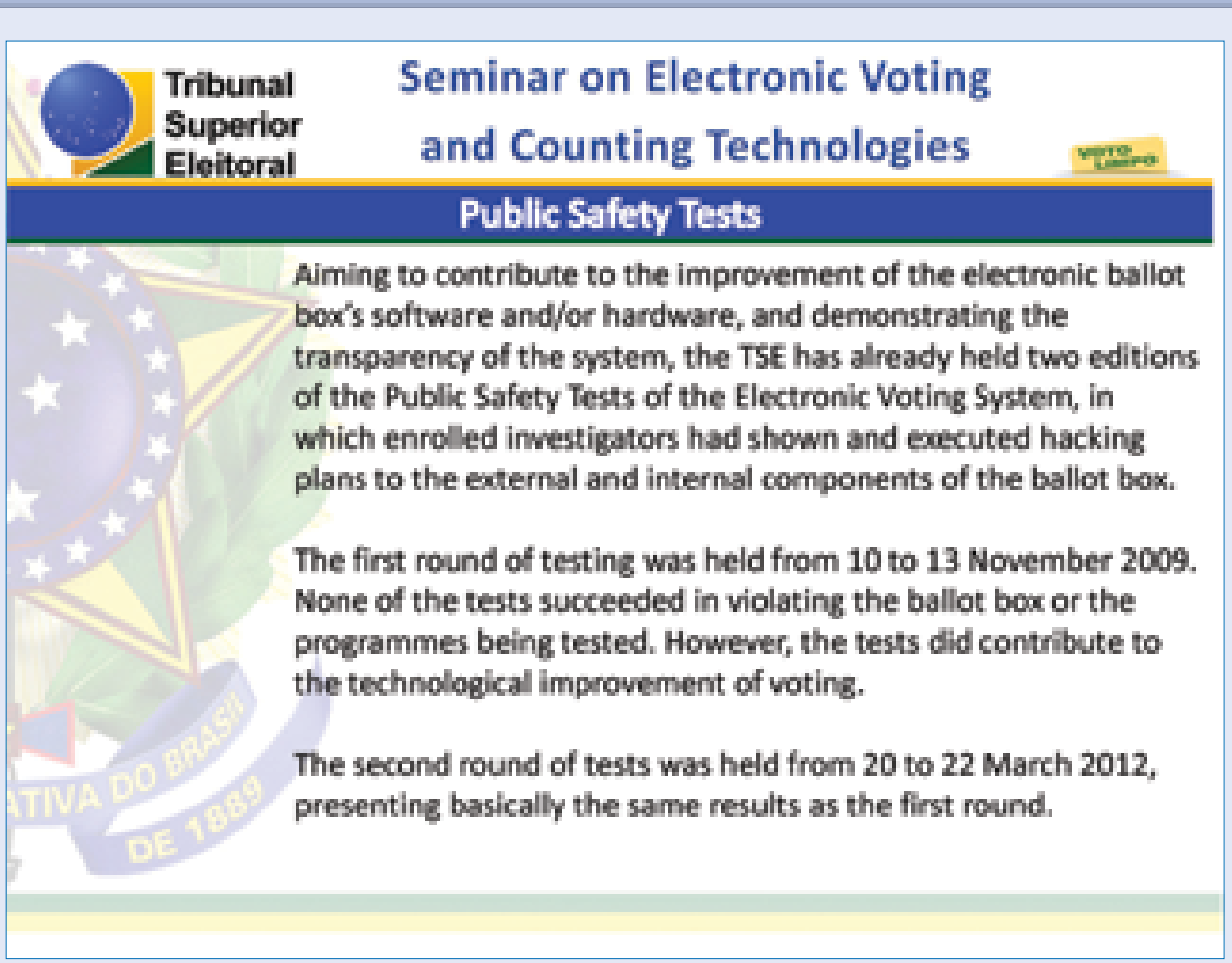
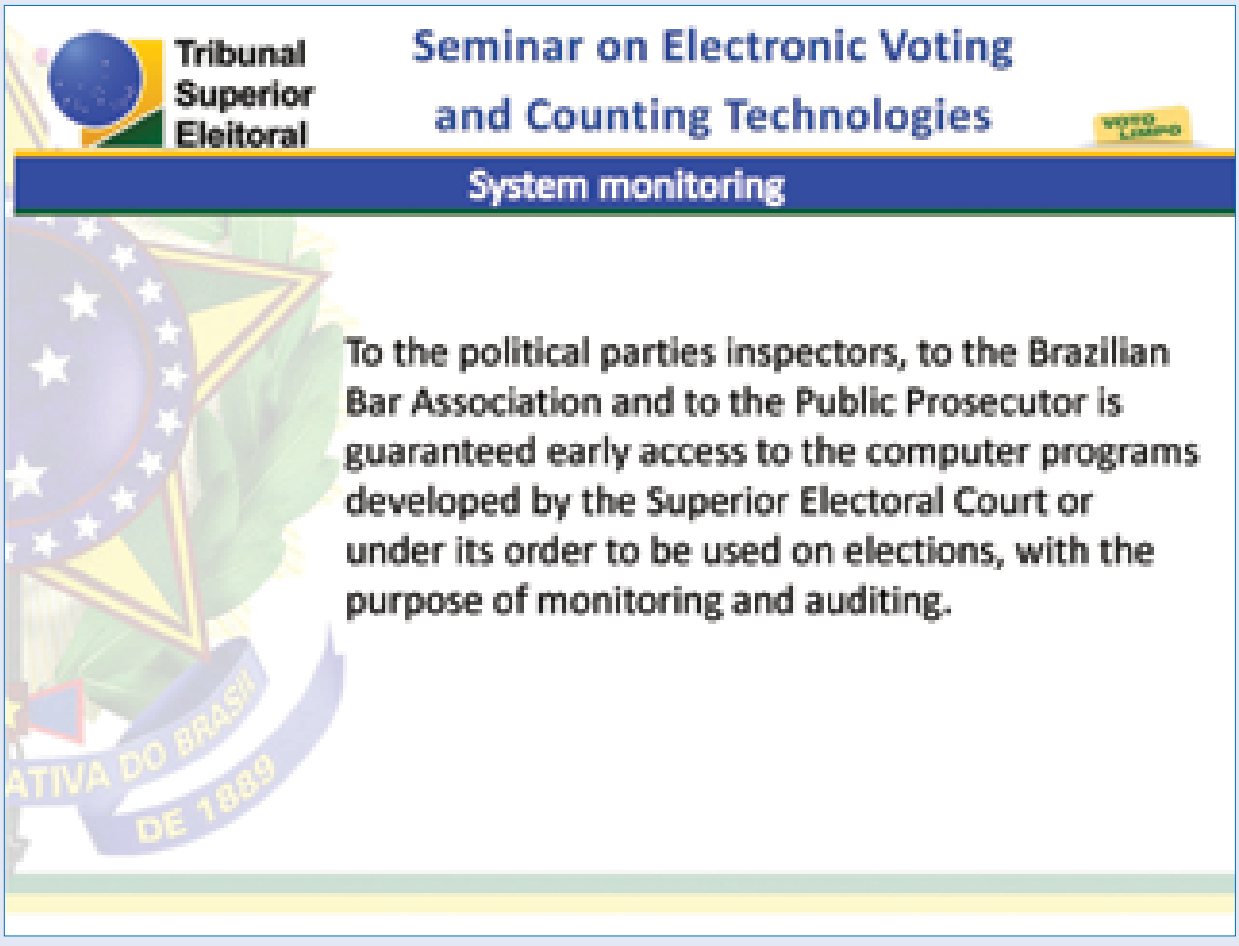
Seminar on Electronic Voting and Counting Technologies
Electronic ballot box security
The security of the electronic voting system exists in layers. Through safety devices of different types and purposes, several barriers are created which together guard against the hacking of the whole system.
To sum up, any hacking of the system would cause a ripple effect and the electronic ballot box would no longer work, making it impossible to generate valid results.


Tribunal Superior Eleitoral
Seminar on Electronic Voting and Counting Technologies
Public Safety Tests
Aiming to contribute to the improvement of the electronic ballot box's software and/or hardware, and demonstrating the transparency of the system, the TSE has already held two editions of the Public Safety Tests of the Electronic Voting System, in which enrolled investigators had shown and executed hacking plans to the external and internal components of the ballot box.
The first round of testing was held from 10 to 13 November 2009. None of the tests succeeded in violating the ballot box or the programmes being tested. However, the tests did contribute to the technological improvement of voting.
The second round of tests was held from 20 to 22 March 2012, presenting basically the same results as the first round.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System monitoring
To the political parties inspectors, to the Brazilian Bar Association and to the Public Prosecutor is guaranteed early access to the computer programs developed by the Superior Electoral Court or under its order to be used on elections, with the purpose of monitoring and auditing.

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Audits and Expertise

Since its adoption, the electronic voting system has undergone several audits and expertise.

In 2002, the University of Campinas testified that "the electronic voting system fulfills the fundamental requirements of the electoral process".

In 2008, the Federal Police, on a technical report about the 2008 municipal elections in Caxias (MA), dismissed suspicions of possible fraud in the electronic voting system.

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Parallel Voting

Parallel voting is another mechanism adopted by the Electoral Court to confirm the credibility of the electronic voting system.

All Regional Electoral Courts, on the eve of the election, held a public hearing to set the electoral sections that will give in ballot boxes to test through parallel voting.

In parallel voting, the contents of the ballots, already filled up, are typed in the ballot boxes drawn.

At the end, the results of the bulletin of the electronic ballot boxes are compared with those obtained in the reports issued by the support system to achieve parallel voting.

Parallel voting is verified by an auditing company and all the jobs are recorded.

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Continuous Improvement

IDENTIFICAÇÃO BIOMÉTRICA

Description: Collection through the updating of information such as the fingerprints and photo of the voter.

Benefits: Ensuring greater reliability and transparency to the process of voting and counting of the electronic ballot box.

Goal: To implement mechanisms that inhibit possible fraudulent acts in the process of voter identification, through the recognition of the holder from their fingerprint and, if necessary, their photograph.

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Biometric Identification of the Voter (2012)

UF	Comparecimento de eleitores com biometria	Eleitores habilitados biometricamente	Eleitores não habilitados biometricamente	% Eleitores não habilitados biometricamente*	% Eleitores habilitados biometricamente*
AC					
AL					
AP					
AM					
BA					
CE					
ES					
GO					
MA					
MG					
MS					
MT					
PA					
PB					
PR					
PE					
PI					
RJ					
RN					
RS					
RO					
RR					
SC					
SE					
SP					
TO					
Total					

*Percentual baseado no comparecimento de eleitores em seções com biometria

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COSTS

Tribunal Superior Eleitoral

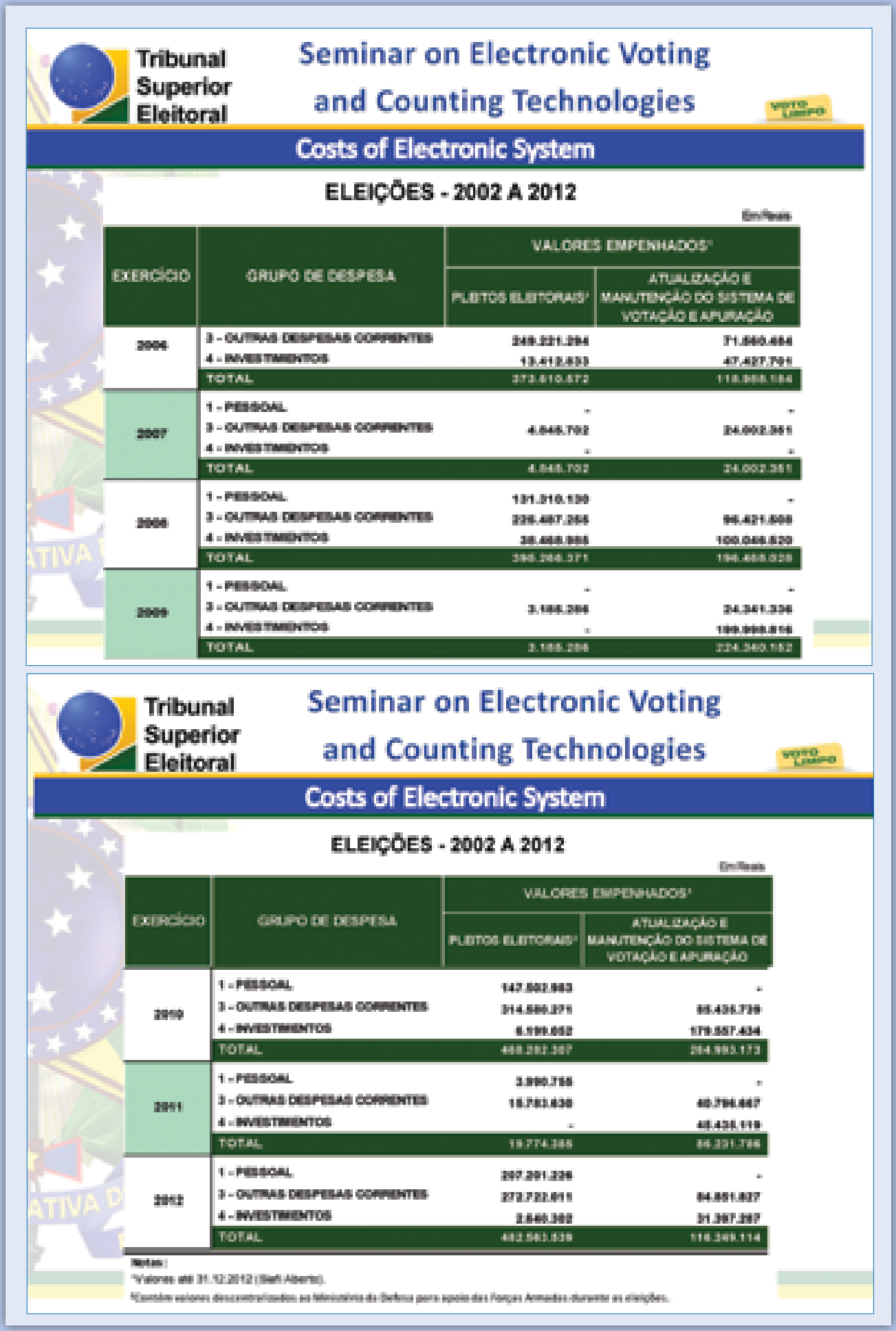
Seminar on Electronic Voting and Counting Technologies

Costs of Electronic System

ELEIÇÕES - 2002 A 2012

Em Reais

EXERCÍCIO	GRUPO DE DESPESA	VALORES EMPENHADOS*	
		PLEITOS ELEITORAIS*	ATUALIZAÇÃO E MANUTENÇÃO DO SISTEMA DE VOTAÇÃO E APURAÇÃO
2002	1 - PESSOAL	84.270.918	-
	3 - OUTRAS DESPESAS CORRENTES	192.762.253	44.516.656
	4 - INVESTIMENTOS	19.000.708	61.299.412
	TOTAL	296.133.879	105.816.068
2003	1 - PESSOAL	1.474.169	-
	3 - OUTRAS DESPESAS CORRENTES	2.788.440	3.661.884
	4 - INVESTIMENTOS	-	-
	TOTAL	4.262.609	3.661.884
2004	1 - PESSOAL	99.985.860	-
	3 - OUTRAS DESPESAS CORRENTES	196.147.924	77.247.938
	4 - INVESTIMENTOS	65.930.657	109.405.133
	TOTAL	362.065.441	186.653.072
2006	1 - PESSOAL	49.709.377	-
	3 - OUTRAS DESPESAS CORRENTES	141.092.373	14.999.988
	4 - INVESTIMENTOS	9.741.191	-
	TOTAL	200.542.941	14.999.988



Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

VOTO LIMPO

Costs of Electronic System

ELEIÇÕES - 2002 A 2012

Em Reais

EXERCÍCIO	GRUPO DE DESPESA	VALORES EMPENHADOS*	
		PLEITOS ELEITORAIS*	ATUALIZAÇÃO E MANUTENÇÃO DO SISTEMA DE VOTAÇÃO E APURAÇÃO
2006	3 - OUTRAS DESPESAS CORRENTES	349.221.284	71.880.484
	4 - INVESTIMENTOS	13.412.693	47.427.701
	TOTAL	372.610.872	119.308.184
2007	1 - PESSOAL	-	-
	3 - OUTRAS DESPESAS CORRENTES	4.848.702	24.002.361
	4 - INVESTIMENTOS	-	-
	TOTAL	4.848.702	24.002.361
2008	1 - PESSOAL	131.210.130	-
	3 - OUTRAS DESPESAS CORRENTES	226.487.268	96.421.698
	4 - INVESTIMENTOS	38.468.988	100.046.820
	TOTAL	396.266.371	196.468.028
2009	1 - PESSOAL	-	-
	3 - OUTRAS DESPESAS CORRENTES	3.188.288	24.341.336
	4 - INVESTIMENTOS	-	199.998.816
	TOTAL	3.188.288	224.340.152

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Seminar on Electronic Voting and Counting Technologies

VOTO LIMPO

Costs of Electronic System

ELEIÇÕES - 2002 A 2012

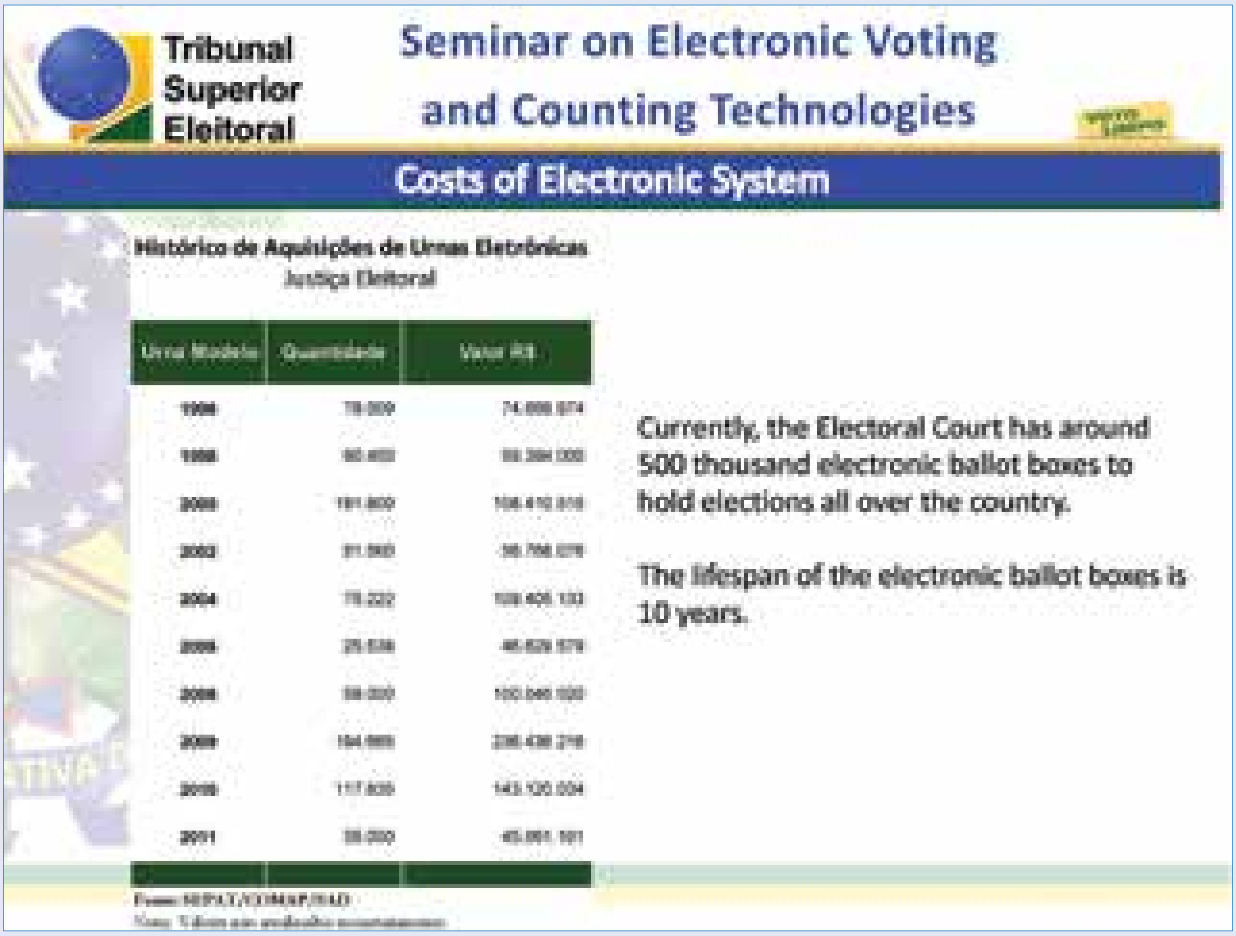
Em Reais

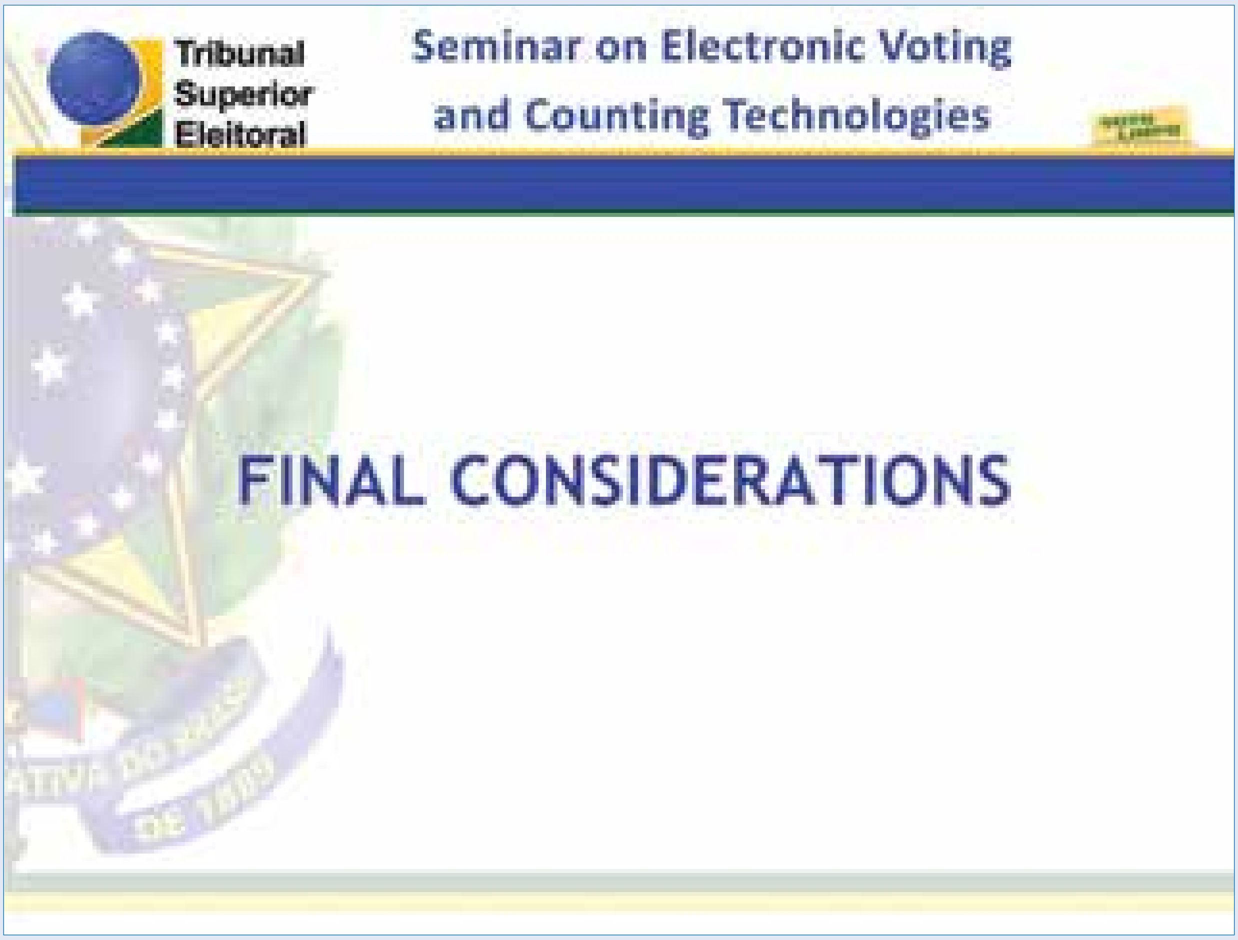
EXERCÍCIO	GRUPO DE DESPESA	VALORES EMPENHADOS*	
		PLEITOS ELEITORAIS*	ATUALIZAÇÃO E MANUTENÇÃO DO SISTEMA DE VOTAÇÃO E APURAÇÃO
2010	1 - PESSOAL	147.592.983	-
	3 - OUTRAS DESPESAS CORRENTES	314.680.271	85.435.739
	4 - INVESTIMENTOS	6.199.852	179.557.434
	TOTAL	468.282.287	264.993.173
2011	1 - PESSOAL	3.990.758	-
	3 - OUTRAS DESPESAS CORRENTES	15.783.630	40.796.667
	4 - INVESTIMENTOS	-	45.435.119
	TOTAL	19.774.388	86.231.786
2012	1 - PESSOAL	207.291.226	-
	3 - OUTRAS DESPESAS CORRENTES	272.722.611	84.851.837
	4 - INVESTIMENTOS	2.640.302	31.397.297
	TOTAL	482.561.939	116.249.114

Notas:

*Valores até 31.12.2012 (Serli Aberto).

*Contém valores descentralizados ao Ministério da Defesa para apoio das Forças Armadas durante as eleições.


Tribunal
Superior
Eleitoral
Seminar on Electronic Voting
and Counting Technologies
Costs of Electronic System
Histórico de Aquisições de Urnas Eletrônicas
Justiça Eleitoral
Currently, the Electoral Court has around 500 thousand electronic ballot boxes to hold elections all over the country.
The lifespan of the electronic ballot boxes is 10 years.


Tribunal
Superior
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Seminar on Electronic Voting
and Counting Technologies
FINAL CONSIDERATIONS

Tribunal Superior Eleitoral

Seminar on Electronic Voting and Counting Technologies

The success of the electoral process

ÉPOCA

"Brazil was the first nation in the world to have a fully digital election, and that way will be recognized by historians in the future."

INSTITUTO NEXUS

"The Electoral Justice is the most trusted institution in the country, attests the survey after the 2006 elections."
"[...] 97.7% of respondents approve of the electronic ballot box."

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Seminar on Electronic Voting and Counting Technologies

The success of the electoral process

"[...] the system that is enshrined in terms of agility and also to preserve the will of the voters, the exercise of an inherent right to citizenship that is the right to choose representatives.
It is unimaginable, even in other cultures, to obtain a result considering that universe of voters in such a short period of time and with the utmost security. "

Minister Marco Aurélio
(10.9.2012)

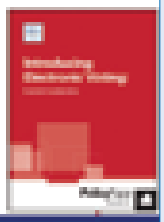

THANK YOU
شكرا
Judge Paulo de Tarso Tamburini
paulo.tamburini@tse.jus.br
ATIVA DO BRASIL
DE 1889

APPENDIX 12

Key lessons from the international experience of e-voting

Types of e-voting systems
Advantages/disadvantages
The E-voting pyramid of trust
Recommendations

IEC of South Africa Seminar on e-Voting
Cape Town, 11-12 March 2013
Peter Wolf
International IDEA



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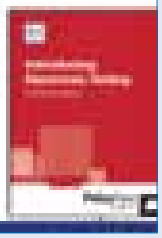
Types of E-Voting Systems

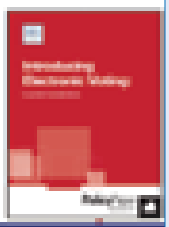
Voting Machines

Internet Voting



Key Differences

Voting Machines	Internet Voting
* Controlled Environment	* Uncontrolled Environment
* Only Voting Channel	* Additional Voting Channel



International IDEA

Types of Voting Machines

PCOS/ Ballot Scanning	DRE/ Direct-Recording Electronic

Voting Machines, Options

Paper Trails

Pyhsical Evidence

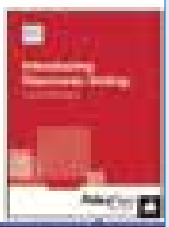
Certification

Types of E-Voting Systems

Electronic Ballot Printers

Types of E-Voting Systems

The Indian Voting Machine



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E-Voting Systems, Options

Access to Source Codes

E-Voting Systems, Options

Voter Authentication
-
Electronic Poll Books

Examples of Major E-Voting Experiences

Internet: Estonia,
Norway, Swirzerland, Canada

Voting Machines:
US, Brazil, Venezuela, India, Philippines,
France, Belgium, Spain, Peru

Some Trends

Feasibility studies, piloting and testing in many countries

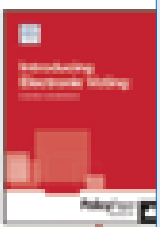
Paper trail & Ballot scanners

Europe:
Internet voting more than Voting Machines,
Very gradual, reluctant implementations

Potential Benefits of E-Voting

More Automation – Less Human Intervention

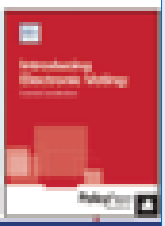
- **Faster availability of results**
- **Elimination of human error and related inaccuracies**
- **Elimination of some types of fraud**



Potential Benefits of E-Voting

Service for voters – More (valid) votes

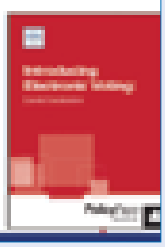
- Confirmation of vote/invalid warnings
- Improved accessibility
- Increased convenience for voters
- Better service for (all?) citizens



International IDEA

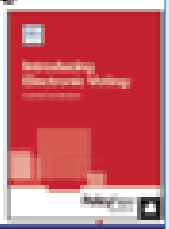
Why is it so controversial?

- Breaks away with the most central rituals of an electoral process
- Reduces enormously human control and transparency throughout the process
- Places the system knowledge in the hands of few

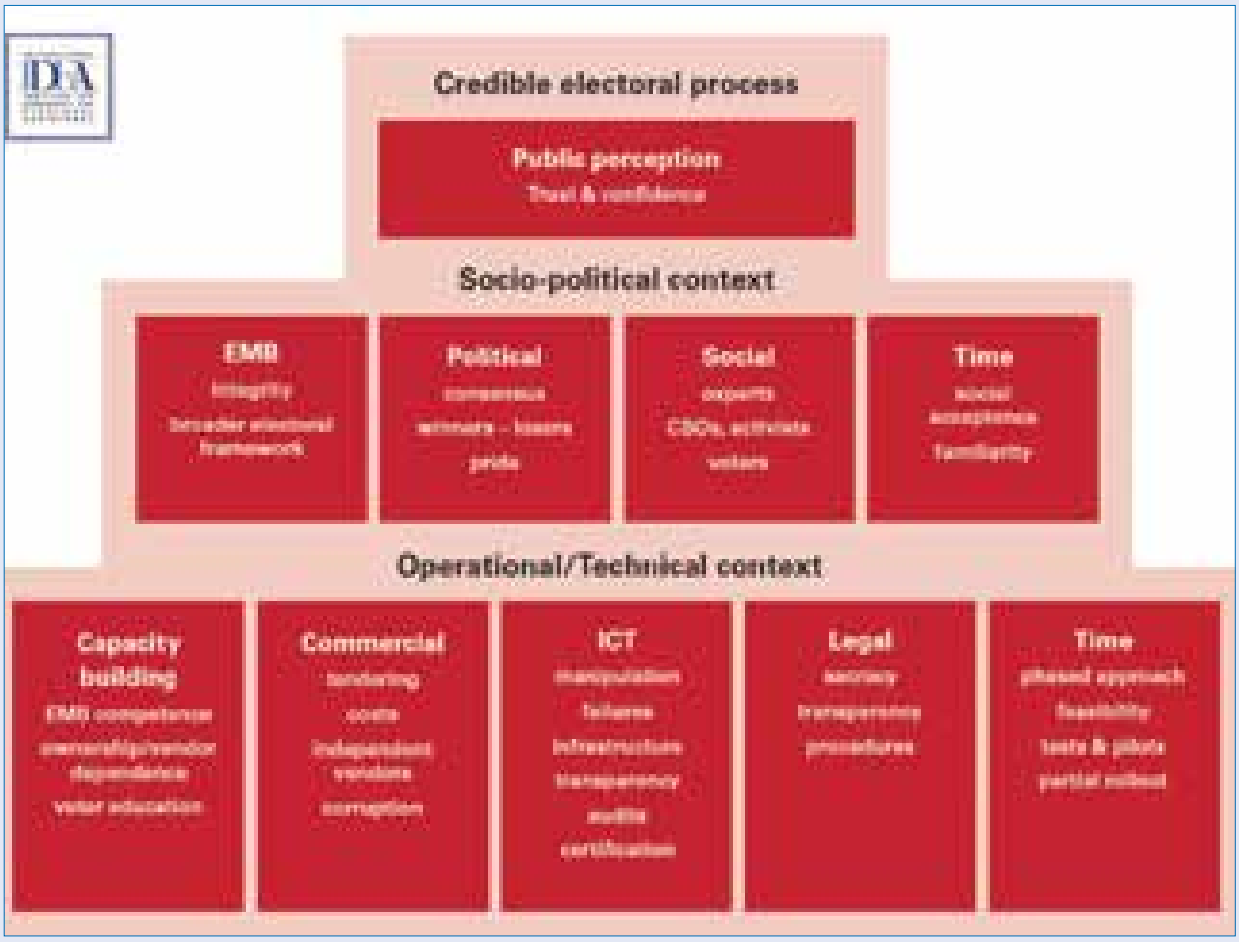


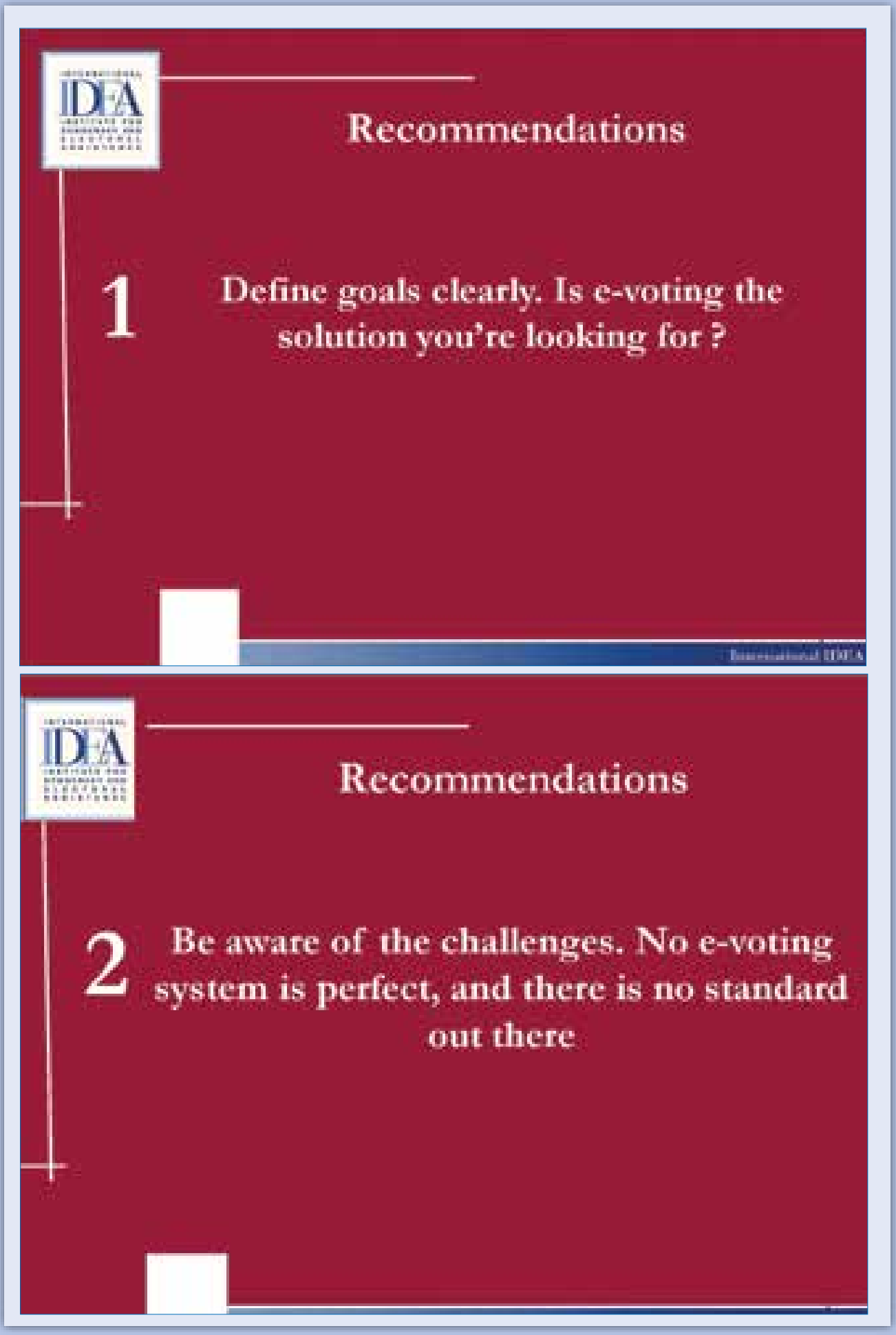
The challenge

- E-voting is the most complex of the electoral technology upgrades –touches the core of the electoral process
- An opportunity to solve some old electoral problems, but also opens new ones.
- Many of the new problems are not of technical nature

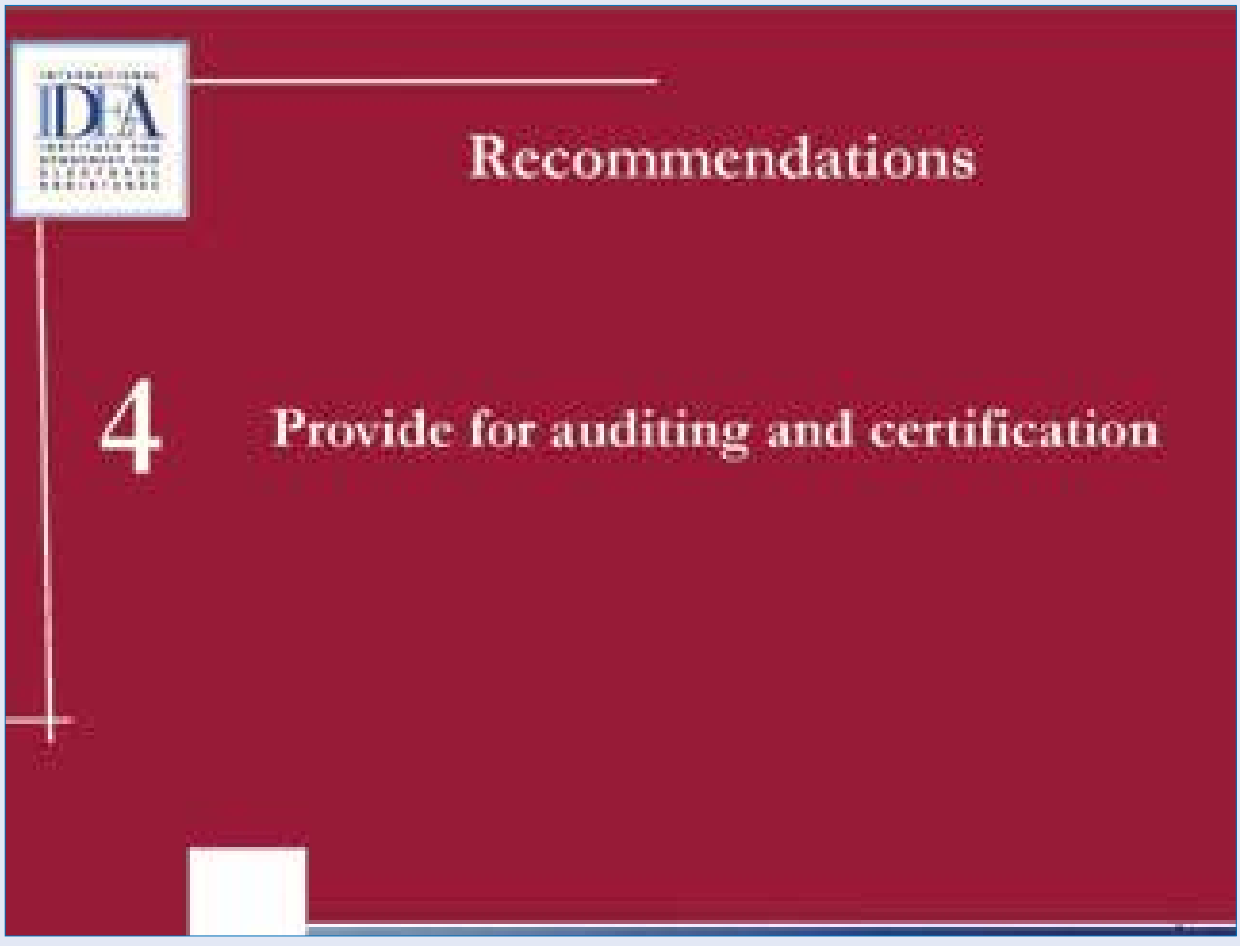


International IDEA

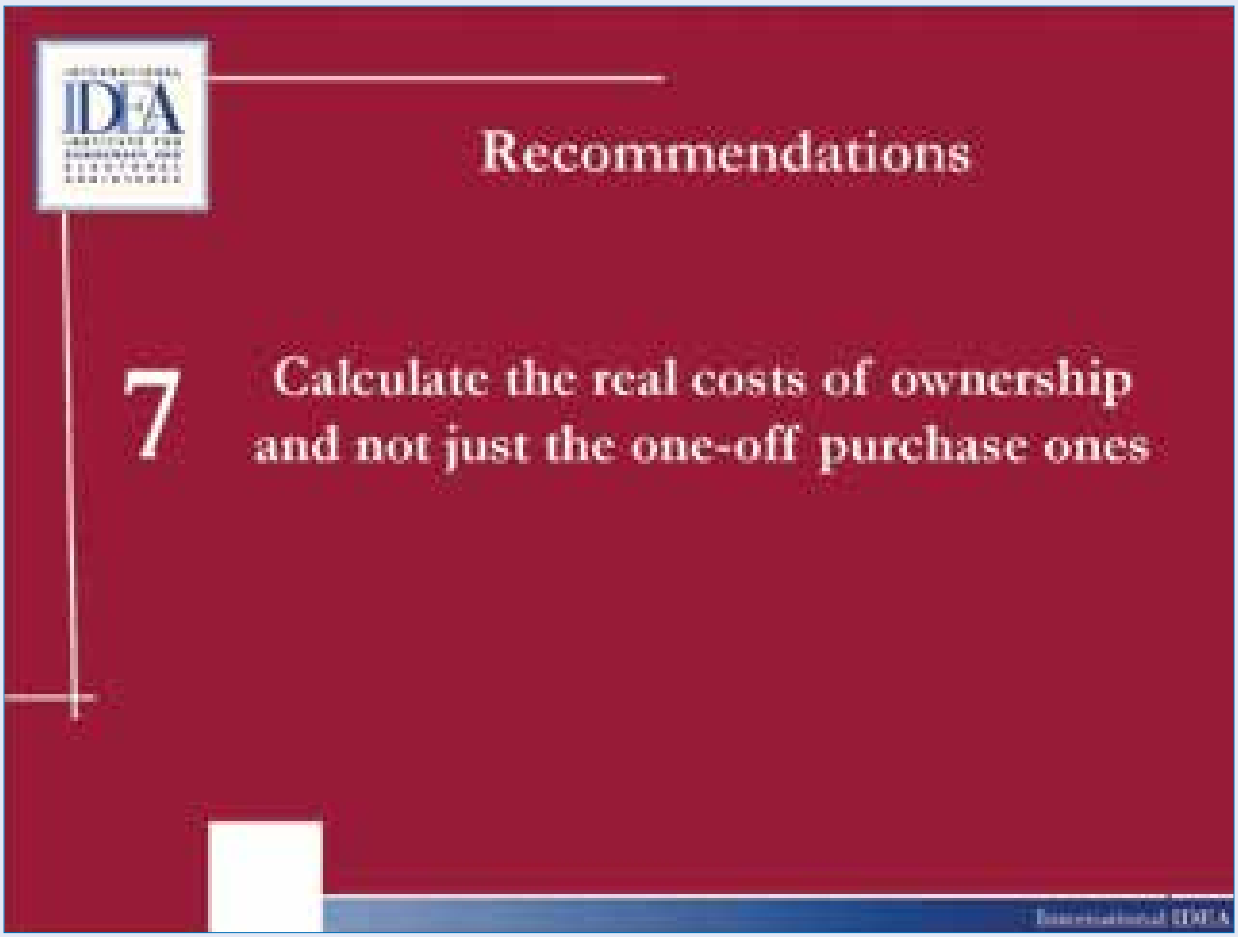


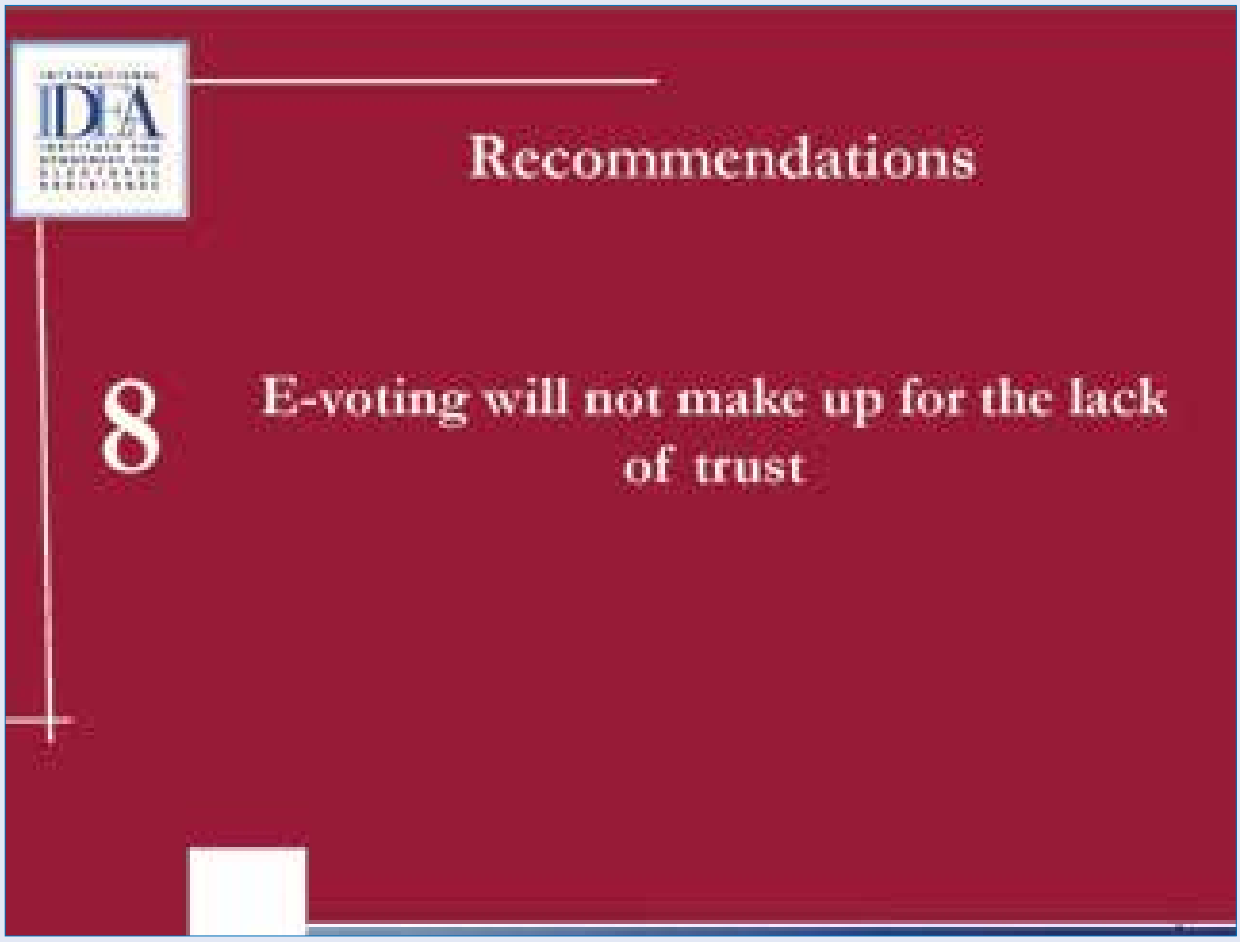

Recommendations
1
Define goals clearly. Is e-voting the solution you're looking for ?
Recommendations
2
Be aware of the challenges. No e-voting system is perfect, and there is no standard out there


Recommendations
3
Get the buy-in of key stakeholders


Recommendations
4
Provide for auditing and certification


Recommendations
5
Allow enough time for technical implementation and social acceptance
Recommendations
6
Plan for training, professional development and civic education


Recommendations
7
Calculate the real costs of ownership and not just the one-off purchase ones


Recommendations
8
E-voting will not make up for the lack of trust


Thank You!

APPENDIX 13

MERCURY (Second Edition)
20 Mar 2013, p 5

User-friendly e-voting an option for South Africa

Mercury Reporter

SOUTH Africa could soon join countries like India, Brazil and the Philippines in replacing traditional paper ballot-based voting with electronic voting (e-voting).

The director of e-Skills CoLab at the Durban University of Technology, Colin Thakur, recently completed an 18-month study on e-voting to determine the impact it could have here.

He announced his findings at a two-day seminar on the subject, which the Independent Electoral Commission (IEC) held in Cape Town last week.

"The findings of the study were that e-voting is a useful technology to enable democracy," said Thakur.

Controlled e-voting took place in a booth, as opposed to uncontrolled e-voting which took place using the internet, smart phones and fax machines. It incorporated a touch-screen interface, a keyboard, "jelly buttons" and paper ballots that were optically scanned.

Large fonts, bright colours and audio output made this technology user-friendly and elections were considered "free and fair" in the 12 countries that had already used it. It also proved an eco-friendly alternative to traditional voting.

"India used 12 000 metric tons of paper for its 1998 elections, which is a whole forest," said Thakur.

But many countries – such as the Netherlands, Ireland and Australia – introduced and then stopped e-voting. The reasons cited included security concerns, voter dissent and the high costs involved. E-voting would also remove the auditability of an election by taking away the paper ballot and making a recount impossible.

"This would have a huge impact on transparency," said Thakur.

The e-voting machines were also susceptible to "hacks" and initial start-up costs would be high. "We would need over R1 billion to initiate e-voting," he said.

Thakur said e-voting would make make elections quicker and ensure a "direct democracy" in which the government could defer to the electorate on issues such as coal and nuclear plants, dams and rivers and toll roads.

The IEC has not yet made a decision on whether to adopt e-voting.

VOLKSBLAD
12 Mar 2013, p 8

Vraag oor elektroniese stemmery

Jan-Jan Joubert

KAAPSTAD. – Adv. Pansy Tlakula, voorsitter van die Onafhanklike Verkiesingskommissie (OVK), het gister gewaarsku teen die onderuitgate instelling van elektroniese stemmetodes in Suid-Afrika.

Die OVK voltooi vandag 'n tweedaagse beraad oor die wenslikheid van elektroniese stemapparaat in Suid-Afrikaanse verkiesings te besprek.

'n Korter wagtyd vir uitslae en ekologiese regmerkies deur die gebruik van minder papier is groot voordele, het Surendra Thakur van die Durbanse Universiteit van Tegnologie, wat die kwessie namens die OVK ondersoek het, uitgewys.

Tlakula, wat Kenia se pas afgelope verkiesing meegemaak het, het 'n skerp waarskuwing gerig: "Kenia het ons gewys wat misluikte tegnologie aan verkiesings kan doen. Altesaam 70% van die masjiene het op stemdag die gees gegee.

" 'n Neiging bestaan om elektroniese stemmery op die proef te stel, maar mense moet wakker slaap.

"Tegnologie kan 'n andersins perfekte verkiesing sink," het sy met verwysing na Kenia gesê.

Navorsing wat aan die beraad voorgehou is, toon ongeveer 'n derde van die wêreld se demokrasieë gebruik 'n vorm van elektroniese stemmery, met kiesers in Noorwee wat selfs die opsie het om hul keuse per rekenaar te wysig.

Indië en Brasilië, die twee wêreldleiers op die gebied, toon geletterdheid is nie noodsaaklik vir suksesvolle elektroniese stemmery nie.

Verskeie lande, waaronder Nederland, Duitsland, Ierland en Australië, het om verskillende redes onlangs elektroniese stemmery laat vaar, hoewel ander lande (waaronder baie Amerikaanse distrikte) daarmee volhou.

Nadele sluit veral hoë koste, baie bedorwe (ongeldige) stemme en kieserswantroue (dat masjiene gedokter kan word) in.

PRETORIA NEWS (Late Final)
20 Mar 2013, p 13

SA may soon opt for eco-friendly e-voting

SOUTH Africa could soon join the likes of India, Brazil and the Philippines in replacing traditional paper ballot-based voting with electronic voting (e-voting).

The director of e-Skills CoLab at the Durban University of Technology, Colin Thakur, recently completed an 18-month study on e-voting to determine the impact it could have in South Africa. He announced his findings at a two-day seminar on the subject, which the Independent Electoral Commission (IEC) held in Cape Town last week.

"The findings of the study were that e-voting is a useful technology to enable democracy," said Thakur.

Controlled e-voting took place in a booth, as opposed to uncontrolled e-voting which took place using the internet, smart phones and fax machines. It incorporated a touch screen interface, a keyboard, "jelly buttons" and paper ballots which were optically scanned.

Large fonts, bright colours and audio output made this technology user-friendly and elections were considered "free and fair" in the 12 countries that already used it. It also proved an eco-friendly alternative to traditional voting.

"India used 12 000 metric tons (12 million kilograms) of paper for its 1998 elections, which is a whole forest," said Thakur.

But many countries – such as the Netherlands, Ireland and Australia – introduced and then stopped e-voting. The reasons cited included security concerns, voter dissent and the high costs involved. There were other disadvantages involved.

E-voting would remove the auditability of an election by taking away the paper ballot and making a recount impossible.

"This would have a huge impact on transparency," said Thakur.

E-voting machines were also susceptible to "hacks" and the initial start-up costs would be high.

"We would need over R1 billion to initiate e-voting," he said.

Nonetheless, Thakur believed in e-voting.

He said it would make make elections quicker and ensure a "direct democracy" in which government could defer to the electorate on issues such as coal and nuclear plants, dams and rivers and toll roads. The IEC has not yet made a decision on whether or not to adopt e-voting.

The commission's vice-chairman, Terry Tselane, was quoted last week, saying: "We are confident that our democracy has reached a level of maturity whereby we can have a healthy, robust discussion of the complex issues that require consideration before embarking on the journey of implementing e-voting, should we decide to do so."

But Thakur was hopeful the commission would recommend the legislative changes needed to begin the process of testing and piloting e-voting in South Africa. – Staff Reporter

sabc Add., THE
15 Mar 2013, p 3

Electoral Commission wraps up seminar

THE two-day seminar on electronic voting (e-voting) and counting technologies, the first of its kind to be convened in under the auspices of the Electoral Commission, closed yesterday. "Our intention with this two-day seminar is to stimulate debate, not to voice our position with regards to electronic voting and counting," said Terry Tselane, vice-chairperson of the Electoral Commission. – Saca

CAPE ARGUS (AM Edition)
26 Mar 2013, p.9

NEW SYSTEM

E-voting may take place of paper polls

Staff Reporter

SOUTH Africa may soon be joining countries like the US, Japan, India and Russia by doing away with ballot papers and introducing a system of electronic voting.

This follows a two-day seminar on electronic voting (e-voting) and counting technologies in Cape Town.

The purpose of the seminar, held by the Independent Electoral Commission (IEC), was to explore whether South Africa was ready for a new voting system.

"Our intention with this two-day seminar is to stimulate debate. We are confident that our democracy has reached a level of maturity whereby we can have a healthy, robust discussion of the complex issues that require consideration before embarking on the journey of implementing e-voting, should we decide to do so," said IEC vice-chair Terry Tselane.

Arthur Goldstuck, World Wide Worx managing director, believed the country was capable of any advanced system if the political and commercial will was there as it had been successful with pre-paid phones and the Gautrain.

BEELD
13 Mar 2013, p.8

Partye in SA verdeeld oor e-stemmery

Jan-Jan Joubert

Kaapstad. – Die Onafhanklike Verkiesingskommissie (OVK) se beraad oor elektroniese stemmery het gister ten einde geloop met waarskuwings dat stadig oor die klippe beweeg moet word.

Kenners van oor die wereld, van wie sommige e-stemmery steun en ander dit teenstaan, het tydrates gelewer. Uiteindelik was die Suid-Afrikaners verdeeld daaroor.

Partye met sterk steun onder verstedelikte en hoogs geletterde kiesers (soos die DA, OD en VF+) was heel positief.

Partye met sterk steun onder landelike en minder geletterde kiesers (soos die ANC, IVP, UDM en UCDP) het gemaan teen die verandering van die huidige stelsel.

Adv. Pansy Tlakula, OVK-voorsitter, het gemaan 'n mens moet net aan die kiesstelsel verander as daar iets skort.

Tlakula, wat pas terug is van die rampspoedige flirtasie met elektroniese stemmery wat die Kenia se verkiesing gekenmerk het, het aangedui dat sy moeilik aan e-stemmery in Suid-Afrika sal byt.

Hierin is sy sterk gesteun deur veral Patrick Chauke (ANC) en Albert Mncwango (IVP), wat die duur verworwe vertroue in die OVK en die verkiesingsproses beklemtoon het.

Chauke en Mncwango het uitgewys dat verkiesings in Suid-Afrika vrede bevorder, anders as die geweld wat tydens verkiesings in sowel vergelykbare lande uitbreek.

"Daar is niks fout met ons stelsel nie. Moenie daaraan karring nie," het Mncwango gesê.

Daarteenoor het Mervyn Cirota (OD) en kol. Piet Uys (VF+) gevra dat toetsloples met elektroniese stemmery aangepak word.

ELECTORAL COMMISSION
Election House
Riverside Office Park
1303 Heuwel Avenue
Centurion
0157

Private Bag X112
Centurion
0046

Tel: +27 12 654 1000
Email: webmaster@elections.org.za
Website: www.elections.org.za
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