European Commission
United Nations Development Programme

Joint Task Force on Electoral Assistance

Thematic Workshop

Information Technology and Elections Management: Informed Decisions for Sustainable Outcomes

Summary Report

European Commission – United Nations Development Programme Thematic Workshop

Mombasa, 5-9 March, 2012,
hosted by the Independent Electoral and Boundaries Commission, Kenya

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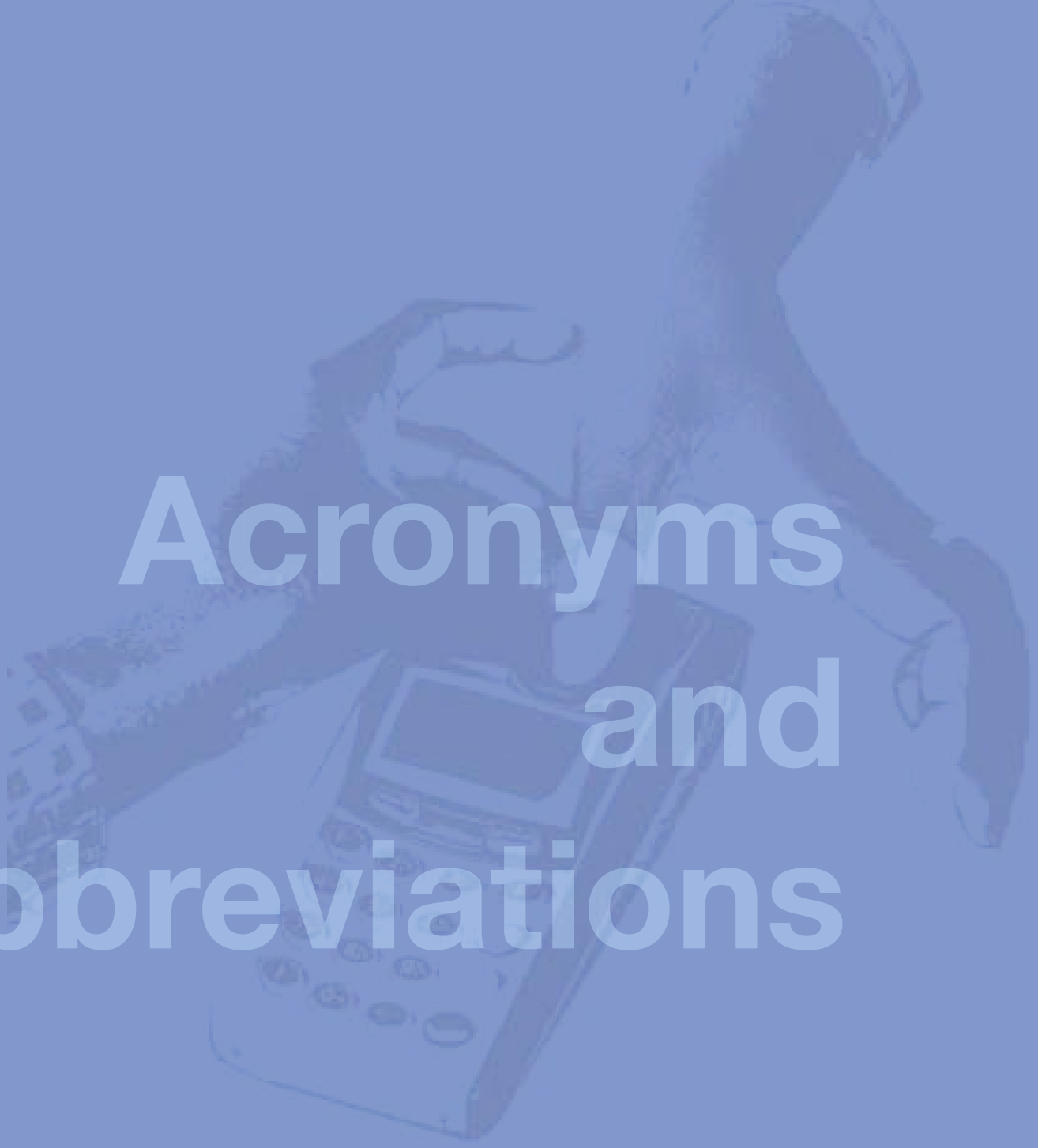

Acronyms and abbreviations

AFIS	automated fingerprint identification system
EMB	electoral management body
EVM	electronic voting machines
EVR	electronic voter registration
ICT	information and communications technology
IT	information technology
OMR	optical mark recognition
PVT	parallel vote tabulation
RMS	results management systems
VR	voter registration

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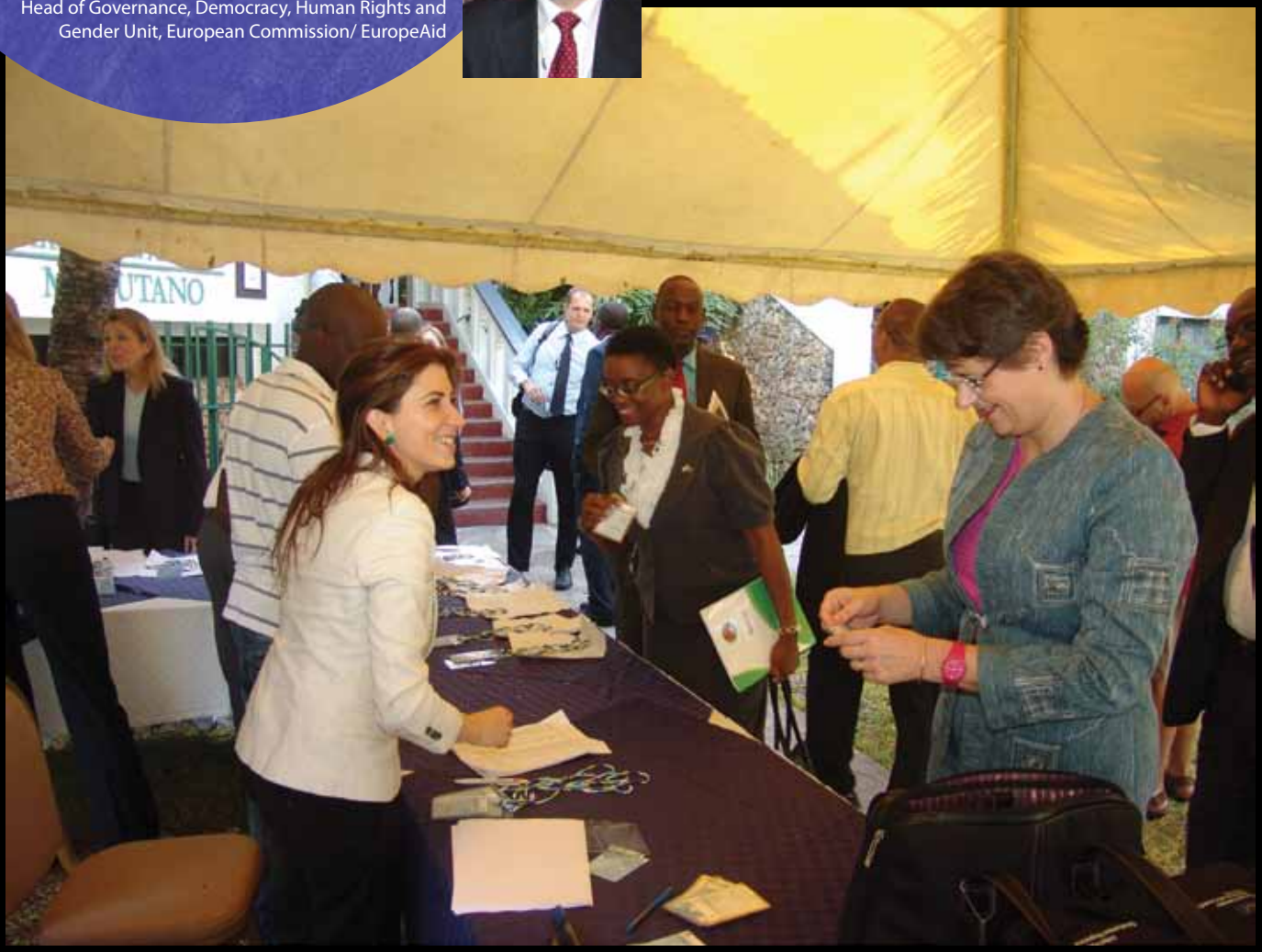
"Throughout the Workshop, several participants stressed that a given technology is nothing but a methodology. Even the most sophisticated technology can, at any point, be doubted in a context where trust is lacking between national stakeholders. The lesson learned in this case, to gather from several country experiences, is that ultimately, dialogue and transparency are key to reinstate long-lasting trust"

Jean Louis Ville
Head of Governance, Democracy, Human Rights and Gender Unit, European Commission/ EuropeAid



Introduction

The United Nations Development Programme (UNDP) and the European Commission, under the auspices of the Joint EC-UNDP Task Force on Electoral Assistance (JTF) and with the support of the UNDP Global Programme on Electoral Cycle Support and the UNDP Country Office in Kenya, organized a five-day thematic workshop in Mombasa, Kenya titled 'Information Technology and Elections Management: Informed Decisions for Sustainable Outcomes'. The workshop, held from 5 to 9 March 2012, was hosted by the Independent Electoral and Boundaries Commission (IEBC) of Kenya. It gathered some 230 participants from more than 60 countries, including representatives of electoral management bodies (EMBs), European Union (EU) and UNDP staff, and personnel from other international and local organizations, to discuss, reflect upon and assess the impact, successes and failures related to the introduction of information and communications technologies (ICTs) into electoral processes.

The idea behind the workshop was to give representatives from a wide range of stakeholders in electoral processes the opportunity to share their experiences and lessons learned. Participants came away with comparative information and data, and analyses of timelines and costs, that are expected to allow them to make informed decisions in the future about introducing or updating technology into their electoral processes.

Specifically, workshop presenters compared the use of ICTs in voter registration exercises, with a focus, in particular, on the sustainability and effective use of electronic systems with biometric data analysis functionality ('electronic voter registration', or EVR, for short). The workshop also examined possible synergies between voter registration and civil and other population registration systems, including national ID card systems. Also discussed was the issue of result management systems (RMS) and the more controversial topic of e-voting, with possible advantages and

Over the past decade, EMBs worldwide have relied increasingly on ICTs to improve the accuracy, security and integrity of their electoral processes. This trend has been particularly noticeable in regards to voter registration, results management and, more recently, the introduction of electronic voting. Appropriately-introduced technology can add major benefits to an electoral process. But technology cannot replace a lack of trust in the framework of a country's electoral process, nor, by itself, build that trust.

Niall McCann
UNDP Senior Electoral Assistance Advisor
Coordinator Joint EC-UNDP Task Force on Electoral Assistance

In the evening a selected group of participants met to formulate recommendations based on the days discussions. The group included representatives from the EMBs of Côte d'Ivoire and Kenya, the UN Electoral Assistance Division in the Department of Political Affairs, the EU Delegation in Zimbabwe, the European External Action Service and both UNDP and European Commission representatives from the Joint EC-UNDP Task Force in Electoral Assistance. The text prepared by the sub-group was then put to the plenary session on the final day of the conference for debate and discussion before a final list of recommendations was approved. That list appears at the end of this conference report.

Gianpiero Catozzi
Electoral Assistance Advisor, Joint EC-UNDP Task Force on Electoral Assistance

disadvantages of both considered. And finally, the workshop prioritized the importance of conducting thorough feasibility studies regarding the introduction of all ICTs (including e-voting) in electoral administration.

The workshop adopted a mixed methodology of theory and practice. The morning sessions focused on general principles and theories; a total of 32 presentations were delivered in plenary sessions. The afternoon sessions were dedicated to country-specific case studies presented exclusively by representatives of EMBs. Twenty-two country case studies, with at least one from every populated continent, were presented in different group sessions.

A sub-group of participants met nightly to compress each day's discussion and come up with a series of workshop recommendations. Sub-group participants included representatives from the EMBs of Côte d'Ivoire and Kenya, the UN Electoral Assistance Division in the Department of Political Affairs, the EU Delegation in Zimbabwe, the European External Action Service and both UNDP and European Commission representatives from the Joint EC-UNDP Task Force in Electoral Assistance. The text prepared by the sub-group was then put to the plenary session on the final day of the conference for debate and discussion before a final list of recommendations was approved. That list appears at the end of this conference report.

About this report

This summary workshop report mirrors the chronological order of the workshop, covering the topics by the separate days of the workshop and culminating in the workshop recommendations. The report does not list the verbatim proceedings from each presentation or each session. Instead, it summarizes the discussions and the subsequent contributions from the floor in order to provide a more digestible summary.

The annexes of the report contain the final workshop agenda and the list of participants. A sister e-learning course on ICTs and elections management that draws heavily on the discussions from the workshop has been developed by the EC-UNDP Joint Task Force. It, along with other e-learning courses developed (or in the course of development) by the JTF, are accessible at the following website: http://elearning.ec-undp-electoralassistance.org/

As noted previously, more than 20 country case studies were presented at the workshop. They are available online at http://ec-undp-electoralassistance.org/index.php?option=com_content&view=article&id=170&Itemid=176&lang=en

Note on terminology:

'Information and communications technologies', shortened to ICTs when used in the plural, is the term used throughout this summary report to cover all technology used in electoral administration, including, but not limited to, both computer hardware and software; communications technology such as mobile phones and SMS applications; e-voting systems, including specialised voting machines; internet applications; and sensors capable of enrolling biometric data of citizens.

It is important to note that this report is intended solely to present a summary of the discussions that took place at the workshop. In no way should this text, or the recommendations adopted by the workshop, be taken to represent the official position of either the United Nations or the European Union.

"The idea behind the Workshop was to give representatives from a wide range of stakeholders in electoral processes the opportunity to share their experiences and lessons learned. Participants came away with comparative information and data, and analyses of timelines and costs, that are expected to allow them make informed decisions in the future about introducing or updating technology into a given electoral processe"

Teresa Polara
Electoral Assistance Specialist, European Commission/DEVCO


ICT and elections

Voter Registration (VR) Typologies and Principles

VR typologies and update strategies

When a voter register is not automatically generated from a national citizen database such as a civil registry or a national identity card database, the process of actively registering voters is one of the most complex, time-consuming and expensive operations of electoral administration. Because it involves making decisions regarding voters' eligibility criteria as well as voters' access criteria—e.g., should VR be open to internally displaced persons (IDPs), out-of-country residents, carried out by mobile teams or only in fixed VR centres, etc.?—voter registration can also be the most controversial segment of the electoral process. In order to avoid conflict and enhance the legitimacy of the election, particularly in post-conflict countries, the voter registration process has to be inclusive of all key stakeholders, transparent, and well understood by the population.

Prior to any examination of technology and its role in voter registration, it is appropriate to consider voter registration in a broad manner, including both the broad parameters and some principles of a credible voter registration process.

Conceptually, a voter list is a simple list of names (and sometimes addresses) of voters at a particular polling station that is used on Election Day. In practice, however, creating a voter list that adds value, and which is accepted across a wide spectrum of stakeholders, is quite a challenge. A balance must be struck between the mechanisms that exclude ineligible individuals and the necessary level of service delivery to ensure that the greatest possible number of eligible voters can participate

Ronan McDermott
ICT Expert, Joint EC-UNDP Task Force on Electoral Assistance

Why register voters?

Why do EMBs conduct VR? Simply put, they do so in order, on the basis of the legal framework, to ensure that those who are eligible are facilitated to vote, while ensuring that those who are ineligible do not vote.

The following observations are notable in this regard:

- **Electoral management bodies**, for example, in addition to the preparation of voter lists for use on election day, need sufficient underlying data in order to make detailed operational plans (e.g., where to send additional polling materials such as extra ballot papers). In some countries and circumstances—such as post-conflict scenarios and where census data are missing or obsolete—accuracy depends on fresh boundaries being demarcated or new constituencies drawn up. Without voter registration, it is impossible to calculate voter turnout. Where such analysis is possible (i.e., where useful data are captured during voter registration), EMBs and other stakeholders can identify under or over-representation by, for example, women, youth or minorities, thereby allowing for focused remedial action or voter mobilization messages.

- **Political parties** use voter registration data for a number of purposes (membership lists, canvassing, strategic campaign planning, validation of the accuracy of the data, candidate selection and nomination processes).

- **Civil society, domestic and international observers** and the **media** all avail of voter registration data as part of the transparency that is essential to a properly conducted election process.

- **Registered citizens** can be more confident that, having taken the time to register to vote in an earlier exercise, they will be able to vote when they show up at the polling station on election day. All stakeholders should, as a result of an effective and transparent voter registration process, experience greater confidence that the electoral event(s) conducted on this foundation have integrity.

The disadvantages of voter registration are comparatively simple, though important: VR takes time and costs money (often, quite a lot of money). As much as 50 percent of electoral budgets, in some circumstances, can be consumed by voter registration—a statistic that often shocks those unfamiliar with elections management.

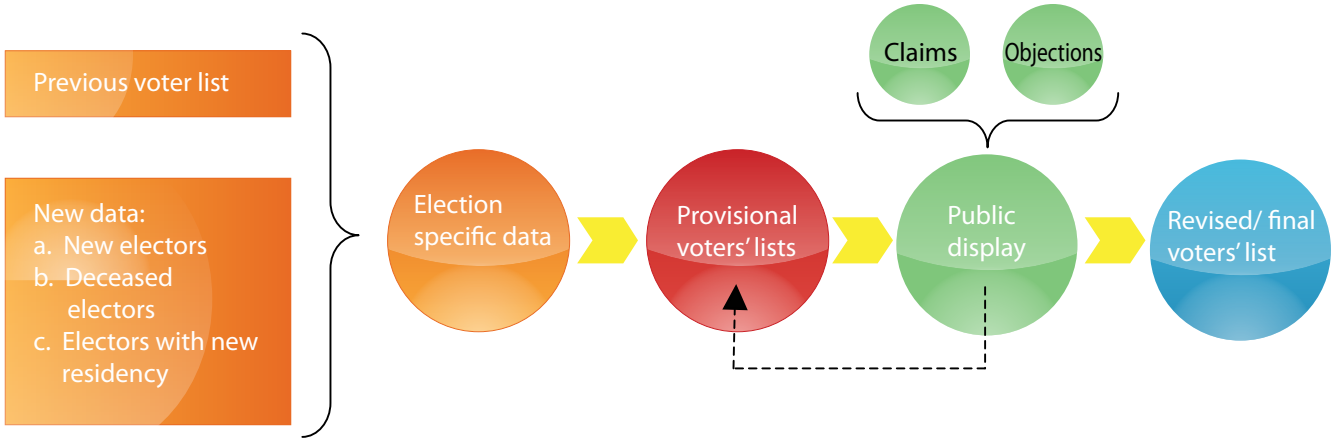


Figure 1. Simplified voter registration data flow
Source: Presentation by RMcDermott at the ICT thematic workshop

Some parameters of voter registration

Time and space: when and where is voter registration conducted?

VR can be conducted afresh for each major electoral event, or else a voter registration process is continuous. If continuous, it means the EMB is regularly accepting (or actively capturing) new registrations, amending details of citizens who have relocated or changed their name via marriage, and removing from the list the names of those voters who have died or migrated or who have been otherwise disqualified from voting. Where the EMB is fully responsible for all aspects of voter registration, the chronological options are therefore described as periodic voter registration or continuous registration.

Where another agency (such as a civil registry body or municipal authority) is the source of the data, the EMB may seek an extract of that other agency's data at any time in order to prepare voter lists.

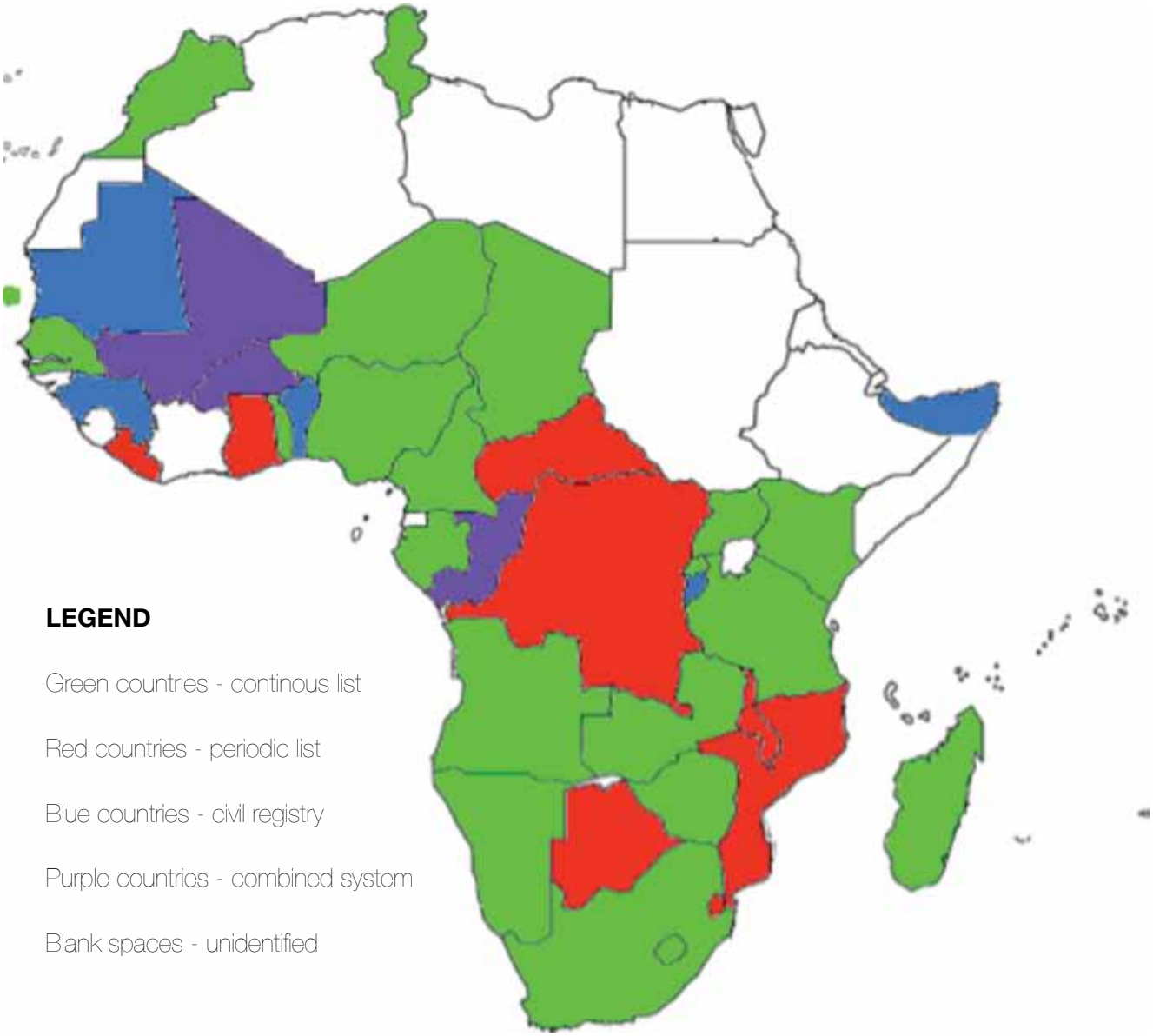


Figure 2. Some VR typologies in Africa
Source: Electoral Institute for Sustainable Democracy in Africa (EISA)

Periodic registration

In this approach, registration takes place in certain timeframe 'windows' (e.g., over a 30-day period). During this period, the previous register is either completely abandoned[1] and eligible citizens are required to register anew, or else the existing register is updated, allowing those who have ascertained the voting age since the last registration exercise, as well as those voters that have changed residency or name, etc., to register or re-register. This approach provides the EMB an opportunity to purge the existing register, where possible, of deceased or otherwise newly ineligible voters.[2] Periodic registration is often conducted prior to a major electoral event, with (in best practice) the resulting provisional voter lists subjected to a public display, otherwise known as the 'exhibition' or 'inspection' period. Corrections, omissions or upheld objections are incorporated and final voter lists are prepared for the electoral event.

Periodic registration, particularly where the previous register has been abandoned and a new register requires construction, has traditionally been seen as more expensive than continuous registration (particularly if rolled-out on a 'full' basis across the country in maximum locations). However, there is growing evidence that the cost benefits of the latter are not as clear-cut. Periodic registration is easier to plan and implement, for example, where there is a fixed election schedule. Where elections are held very frequently, called at short notice or where there is general unpredictability, periodic registration may not be optimal.

However, one significant advantage of periodic registration, particularly a periodic register constructed from scratch, is that the resulting voter lists generally exclude deceased and migrated voters and include younger voters (who have come of age since the previous VR exercise). Typically, periodic registration will be conducted nationwide (often simultaneously)[3] at all locations that will become polling centres. In this manner, the site where the voter registers is often the same one where the voter votes.

Continuous registration

In this model, the EMB establishes local or district offices and usually conducts voter registration throughout the year—though with pauses before electoral events so as to 'close' the register and prepare the voter lists. Some countries conduct an annual revision with the registration offices open for, say, three months of the year, thus blurring the lines between periodic and continuous registration. One of the major advantages of a fully continuous registration is that, in theory, the EMB is ready for an election at shorter notice than with a periodic register that has not been updated or constructed for some time and is unsuitable for a quickly called election.

Continuous registration is believed to offer cost advantages, but this may be because EMBs, governments and development partners underestimate the cost of establishing and—critically—maintaining voter registration service delivery at a sufficiently local level for the registration to be truly continuous.

1 Abandoning is often favoured when there is little trust in existing lists by some key stakeholder such as one or more political parties. In such cases, the legal framework can often mandate the construction of a new register with every periodic exercise.

2 An entirely new register, constructed via a periodic registration exercise, is often the most crude, yet accurate, method to ensure that deceased voters are purged from the voter register.

3 Such efforts are not always conducted simultaneously, e.g., in Tanzania. The registration exercise can be staggered or phased, starting in some provinces or regions before others, in order (usually) to cut down on equipment and staffing costs.

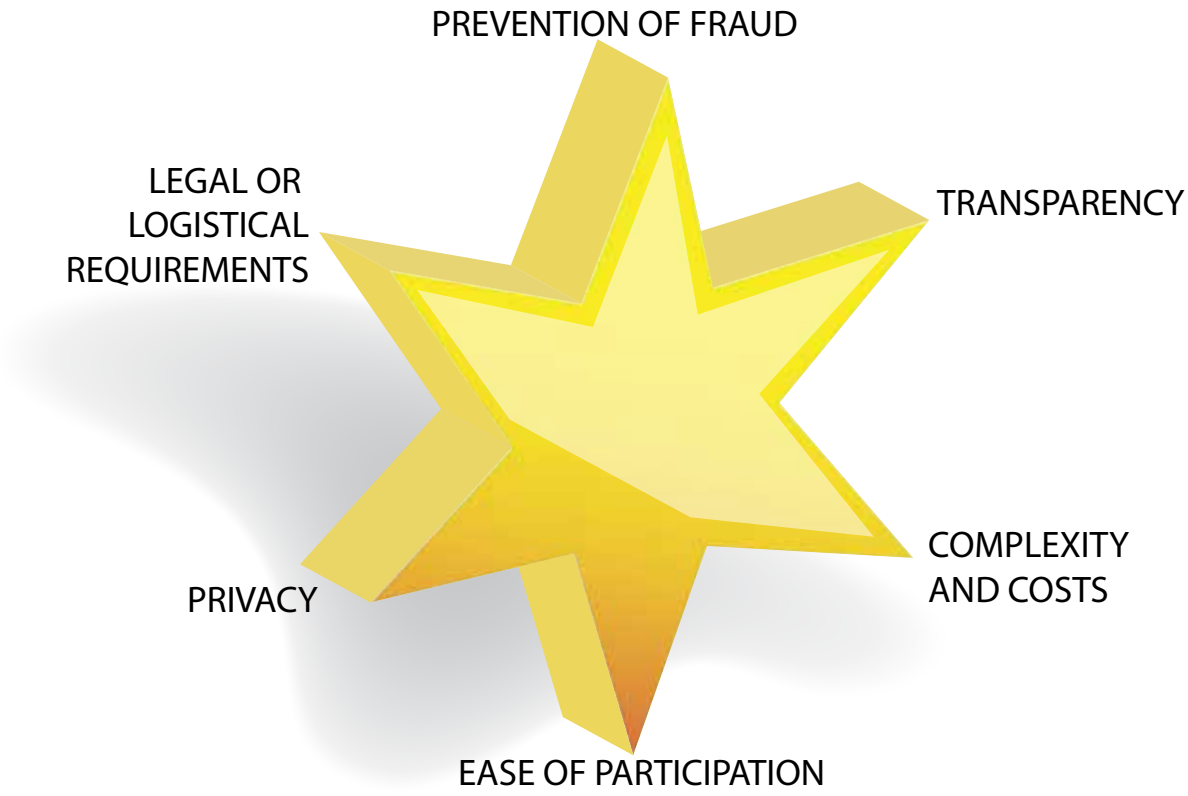


Figure 3. Opposing facets of voter registration

On the first day of the workshop, a representative from the Electoral Institute for the Sustainability of Democracy in Africa (EISA) presented its publication 'Voter Registration in Africa: A Comparative Analysis'.

This highly recommended publication offers a comprehensive introduction to the single most complex process within the electoral cycle. It critically analyses the efficacy and sustainability of different voter registration systems across the African continent.

The first part of the document provides an overview of different voter registration methodologies, including combined civil and voter registration, periodic versus continuous registration and active versus passive registration. It identifies guiding principles for voter registration and introduces the reader to the latest technological developments in the industry, such as fingerprint and face or iris recognition. The challenges of using biometric technology in harsh African conditions are highlighted, and the responsibilities of national EMBs, international donors and other decision makers are critically examined.

The second part of the document offers detailed descriptions of the voter registration systems used in eight countries, namely DRC, Ghana, Liberia, Malawi, Mozambique, Rwanda, Senegal and South Africa. Some have established sustainable and effective systems that provide numerous best practice recommendations, while the lessons learned from those countries with less successful registration exercises are invaluable.

The key findings presented at the workshop were as follows:

- Confidence in the EMB by election stakeholders is crucial
- The use of high-tech VR systems or methodologies does not necessarily guarantee credibility of the process
- Even best designed systems can fail if not well managed
- Institutional sustainability is crucial for sustainable VR
- VR sustainability also depends on costs, storage/maintenance of equipment, human resources, etc.
- Once a high-tech VR has been adopted, it is difficult to revert to a less costly one
- VR that is dependent on civil registers requires relevant government agencies' effectiveness

Some countries technically offer continuous VR service but do so only at a few offices—perhaps constituency, district or even provincial offices. As a result, many citizens, particularly those in remote and rural areas, may not be able to avail of the limited service on offer. This inevitably leads to calls for greater provision of voter registration in the run up to major elections. In effect, many countries that supposedly offer continuous registration may be forced to conduct a full (i.e., periodic) registration for major elections. Cost-wise, these EMBs have the worst of both worlds.

In some contexts and instances where continuous registration systems are in place, voter eligible persons have to travel to a registration location (i.e., a location other than where they would normally expect to vote). If so, it is vital that they are assigned to the correct polling centre. Where polling centres are not yet assigned, sufficient detail must be captured on the individual's place of residence during voter registration to allow the EMB to accurately assign a polling centre later on.

In many countries, the electoral framework provides for a 'permanent voter register' to be created and periodically updated (Tanzania, Madagascar, etc.), which has advantages and disadvantages. Among the advantages are that that it keeps track of data progression, thus allowing for a more comprehensive data analysis (audit); that it is a useful picture of social structure evolution and migration flux; and that it is more sustainable, as it builds on existing work. Disadvantages include the fact that in many cases the existing database is so bad that starting from scratch could be the only way to reach an acceptable level of accuracy. Another disadvantage is that an update of any kind of voter register not accurately linked to a civil registry or other population registration database presents a major shortcoming when it comes to deregistering the deceased.

Voter registration based on a national population register or civil registry

This approach is adopted in many countries, particularly in Europe and Latin America. In brief, it is undertaken by the relevant population registration agency, which could be a traditional civil registry that documents all major life events such as births, deaths, marriages, divorces, etc.—or, alternatively, a national ID card database, for example. The relevant agency will prepare an extract of its data and make this available to the EMB, which will subsequently prepare voter lists. (The extract should contain only eligible voters grouped by, for example, age and nationality.)

Supporters believe technology can solve most elections-related problems. Critics believe it can dilute the core essence of democracy.

The challenge is to find an answer that lies in between—one that aims to apply appropriate technology to promote free, fair and credible elections.

Mr. Aneas C. Chuma
UNDP Resident Representative, Kenya, addressing the opening session of the ICT thematic workshop, 5 March 2012

In other countries, the EMB continues to create and maintain its own voter registration databases but will accept inputs from agencies such as registrars of births, deaths and marriage; tax or motor vehicle licensing authorities; and so forth.

From an EMB-centric point of view, basing voter lists on data obtained from another agency is highly cost effective. The same concerns about the completeness, accuracy, uniqueness and integrity of the voter register apply, however, except that in the civil registry model, these quality parameters are often outside the EMB's direct control. Creating voter lists using data from an agency that is, in many cases, less independent than the EMB, can be politically problematic. For these reasons, any EMB that uses data from another agency must ensure that the voter lists are in their provisional form and opened to the widest possible public and stakeholder scrutiny through exhibition (display, inspection, claims and objections, etc.).

An important technical challenge with the use of civil registry data is the correct assignment of voters to the correct polling station. Many otherwise excellent data sources become useless if the EMB cannot overcome this hurdle. Sometimes the agency collecting the data can be assisted by providing electorally relevant location data for use in the civil registration process. If not, the EMB faces an uphill and possibly impossible task in doing the assignment of voters to polling stations. The resulting consequence may be the 'administrative disenfranchisement' of voters who show up on election day only to find their names missing from the voters list—even though their names may be on a list at a nearby polling station.

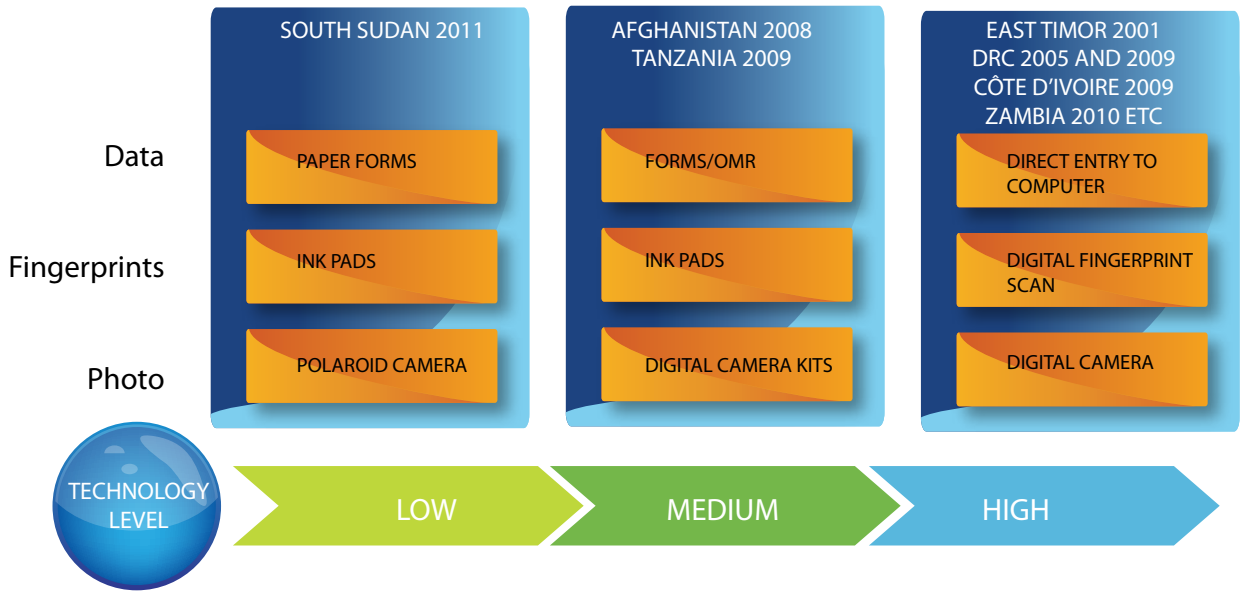


Figure 4. VR methodologies
Source: Presentation to ICT Workshop, RMcDermott)

Who does voter registration?

This question addresses not so much which agency is responsible for voter registration, but rather whether the agency must go to the individual ('active' or state-initiated voter registration) or whether the individual is registered 'silently'. In some countries, for example, the voter is registered to vote as an automatic consequence of, for example, applying for a national ID card or even a driving licence.

Another important facet of this question is whether voter registration is mandatory or voluntary.

In many countries the EMB conducts active, voluntary voter registration. In most of these cases, the citizen is required to offer some identity document in order to be registered to vote. The citizen would have to have previously gone to another agency in order to apply for such identity documents.

Voter registration methodologies

VR methodologies are generally categorized in terms of the level of technology employed: e.g., low tech, medium tech and high tech. There are, however, 'zero-technology' options where lists are created and maintained entirely on paper. Under certain circumstances, such an approach may be appropriate and is certainly relatively inexpensive. Low-technology methodologies are generally meant to refer to situations in which computers are used at central data-processing points to enter either summary data from paper forms, or where the actual paper-form data are entered in order to create an electronic register. New lists are output from the resulting databases.

The medium-tech paradigm usually sees a continuation of the use of paper forms in the field, but with the possible enhancement by using such technology as optical mark recognition (OMR) to allow more rapid processing of forms at the central site. Other medium-technology voter registration solutions may involve the use of digital cameras to capture voter photographs or, as in the South African approach, a barcode scanner that is used to capture the identity document number for later processing.

It's easy to agree on the importance of modern technology. But that debate on technology should not overshadow other critical issues.

Top-notch equipment alone is not the solution to each and every election-related problem.

Briet Lodewijk
EU Ambassador, Kenya, addressing the opening of the ICT thematic workshop, 5 March 2012

It is the deployment of laptop computers at the registration centre that is the defining characteristic of the high-tech voter-registration methodology. A laptop (or similar mobile device with a keyboard) allows the direct data entry by the voter-registration official of the voter's details into a database in the kit. The addition of other peripherals such as printer, digital camera and biometric capture sensor allow rich functionality such as:

- biometric enrolment (face, fingerprint, iris, etc., depending on sensors deployed);
- in-kit automated fingerprint identification system (detecting and preventing multiple registration attempts on this kit);
- facial photo capture, quality control and enhancement;
- scanning of identity document barcodes; and
- printing of voter identity cards in the field.

High technology solutions potentially offer more, but cost more—substantially more. While the cost of laptop computers has plummeted in real terms, other kit components have not followed suit. The low-cost single-finger digital thumbprint scanners typical of early biometric voter registration kits, for example, have given way to 'industrial-strength' airport-like, multi-finger scanners whose cost, in some cases, make this component the most expensive in the kit. EMBs also require highly trained, highly computer-literate registration personnel and other field support staff, and EMBs must also bear the additional operational costs associated with deployment, maintenance and storage of all technology used for this type of VR. The result is that the high-tech approach challenges EMBs financially and operationally, and poses a threat to sustainability and national ownership of electoral budgets.

In response to a question from a participant from Mali, it was stressed that feasibility studies should include legal expertise. A straw poll among workshop attendees suggested many participants had experienced legal problems AFTER a piece of technology had been procured and introduced.

In a mirror-image of this problem, EISA gave the example of the Central African Republic where, because of a lack of capacity (financial and human resource), a law that was passed requiring computerized voter registration could not be implemented.

The National Electoral Commission in Liberia, in its consideration of technology options for its 2011 voter-registration options, chose to harness its existing investment in OMR technology (not only in terms of equipment but also because the commission's field and HQ staff were familiar with it); replace its obsolete Polaroid cameras with digital cameras; and upgrade its existing software and databases. The result—a medium-technology, cost-effective and appropriate solution—was successfully deployed.

Greater lead-in times, and proper operational planning, are essential elements for the effective roll-out of EVR systems. For instance, sometimes high-tech solutions imply lengthy processes that do not match electoral deadlines and/or can easily lead to mistakes. For example, in both the Democratic Republic of Congo (DRC), in 2006, and Nigeria (2010), it is alleged that the full de-duplication process was not completed prior to voting day.

Pakandame Sambiani- Konkadja
Président sous-commission Finance et Administration de la Commission Electorale Nationale Indépendante Togo

The challenges of maintaining a voter registry…

…are significant, and even well-resourced countries can struggle to succeed. Can you identify the country described here?

- At least XX million eligible citizens remain unregistered—more than 24 percent of the eligible population.
- More than X.X million deceased individuals are listed as voters.
- Approximately X.XX million people have registrations in more than one state.
- About XX million records have incorrect addresses, meaning either the voters moved, or errors in the information make it unlikely any mailings can reach them.
- "These bad records are not leading to fraud but could lead to the perception of fraud" (Report author)
- "Part of the problem is that it is difficult for us to be proactive. We have to rely on the voters." (Elections administrator)
- "It's not clear that it has a uniform partisan effect…but it is now pretty clear that Party A wants to enact measures that make voter registration easier, and Party B fears that would be an invitation to fraud." (Academic)

The country in question is the United States. Sources: Pew Centre report, 14 February 2012. Also, based on quotes (on the Pew Report) in a New York Times article from 14 February 2012. Sources (accessed 30 November 2012):

www.pewstates.org/research/reports/inaccurate-costly-and-inefficient-85899378437

www.nytimes.com/2012/02/14/us/politics/us-voter-registration-rolls-are-in-disarray-pew-report-finds.html

Voter registration update strategies

Voter registration databases have a very short shelf life. After all, a voter register that is 'closed' for new entries on one day will already have errors the next day, as some citizens will reach the voting age that day. Primarily for this reason, where periodic registration is the methodology of choice, EMBs seek to conduct voter registration as close to the electoral event as possible. As soon as a final voter list is published, the underlying data begin to diminish in completeness and accuracy due to issues such as the following:

- death of registrants
- coming of age of young citizens
- change of personal status (e.g., marriage)
- change of address
- migration.

The EISA 'Voter Registration in Africa' publication states that "population statistics for African countries show that unreported deaths alone can lead to a voters' roll inaccuracy of 10 percent within one electoral cycle of about five to six years." (p. 23)

In many countries, deaths go unreported, or, where reported, no protocols exist for the reliable sharing of information on deaths with the EMB. It is clear, therefore, that maintaining a voter register is a significant challenge.

Continuous registration, considered the antidote to this problem, is neither cheap nor simple. Establishing a network of offices nationwide and staffing these locations is expensive. Continuous registration may simply not be able to keep pace if the volume of transactions annually does not correlate with demographic shifts (deaths, birth rates from 18 years ago, migration). The typical scenario is that continuous registration is offered in name only, is poorly resourced and, when the next major electoral event approaches, the deficiencies in the voter registry emerge in the political arena. The response is frequently a nationwide exercise to update the register or conduct complete fresh registration. Ultimately, there is minimal difference in cost between the two; therefore, many EMBs opt for a fresh registration in order to exclude deceased voters, which is something an update cannot guarantee.

Any decision on whether to update an existing expensive database or abandon it and create a new one should be based on solid information, not speculation or guesswork. EMBs should consider mechanisms such as:

- data-driven evaluation of VR databases (computer tests);
- field surveys or audits of VR data (list-to-people and people-to-list checks); and
- comparison with other datasets (census, household surveys, etc.).

In other words, EMBs should gather empirical data on the condition of their voter registration databases.

A question was raised several times during the plenary discussions at the workshop about how shared use of high-technology assets (EVR kits or similar) could be achieved. The following were among the experiences shared and ideas floated:

- **EMBs have borrowed or leased EVR kits from EMBs in other countries**
- **Development partners could consider investing in a number of kits that would be available to multiple countries for specific voter registration exercises**
- **Reducing the cost of high-technology voter registration by developing open source voter registration software applications that any EMB can use.**

General guiding principles in the use of technology for voter registration

Relevance

The most overarching and critical element of any election technology—be it low-tech, medium-tech or high-tech—is the extent to which it is regarded as appropriate and relevant to the context in which it is applied. Electoral technology must generally empower local stakeholders. Key decisions on the choice of technology should, where practical, involve stakeholder participation and reflect their views and other related contributions. The relevance of any technology applied to electoral administration significantly determines the overall credibility and quality of the entire electoral process.

The relevance (or appropriateness) and credibility of any electoral technology are further enhanced by the following other principles/values: responsiveness, integrity, effectiveness and sustainability. Each is discussed below:

Responsiveness

When deciding on the choice of technology, especially for the purposes of voter registration, the following questions (which underpin the principle of responsiveness) are important:

- What is the problem that the new technology is intended to address?
- What is the best way to apply such technology?
- What are the costs and benefits?
- Who are the beneficiaries (and potential beneficiaries) of such technology?
- How responsive is the technology choice to the political, legal and institutional frameworks at play in the country?
- What has been the level of consultation and participation of the beneficiaries and stakeholders in the choice of the technology?

Many of these questions can best be answered by a properly resourced feasibility study (discussed later in this summary report).

Integrity

The integrity of election technology is another key principle when deciding on the technology choice. The integrity issues to be considered include the following:

- the level of security (tamper-proof and free of manipulation) offered by the type of technology chosen;
- 'accuracy and completeness', meaning the extent to which the choice of technology is able to contribute to enhanced quality of the entire electoral process by minimizing errors, including omissions and/or multiple entries; and
- election technology must be accessible, inclusive, versatile and reliable.

Effectiveness

It goes without saying that the choice of election technology must engender maximum output with minimal input (money, time and other resources).

This means the following:

- 'value for money' in the choice of technology, i.e., achieving optimum balance between quality and costs;
- timely implementation of technology and avoiding delays which may compromise the election calendar; and
- relevant use of the technology beyond one electoral phase, one electoral cycle, and potentially even beyond the use of one institution (e.g., the EMB) for electoral purposes only.

Sustainability

In this context, sustainability is:

- Institutional: is the EMB (or other institutions) fully equipped to embrace and use the new technology?
- Socio-economical: can the country afford and sustain the new technology?
- Political: does the political environment support the new technology?
- Environmental: is the new technology friendly to the environment and related ecological considerations?

Sustainability in the use of technology for electoral purposes means using resources today in a way that meets the needs of the current generation without compromising the ability of future generations to meet their own.

Lamin Lighe
Technical Consultant, Electoral Management Body - Liberia

Conclusions

The opening session of the thematic workshop revisited some fundamentals of voter registration. The two basic approaches are periodic and continuous, although some countries use a hybrid of the two. The other parameters relate to whether the EMB initiates the active registration process, or whether registration is 'silent' via registration with other agencies, and whether registration is voluntary or mandatory.

Within the typologies, national authorities decide on what, if any, level of technology to employ. An 'all-paper' system, or one where the only computing is done at the national EMB data centre, is considered to be 'low-technology' (and, as the South Sudan case study clearly demonstrates, a viable and appropriate option in many cases). The introduction of digital cameras or optical mark recognition forms in the field (and the appropriate data centre applications to process the forms and images) are considered to be a 'medium-tech' approach. 'High-technology' VR solutions are characterized by direct electronic data entry in the field, usually via the deployment of laptop computers and some type of biometric sensor (most commonly a fingerprint scanner).

Whatever level of technology an EMB may consider and propose to the national authorities, the principles of relevance, responsiveness, integrity, effectiveness and sustainability must apply. This is critical for the final choice to be the most appropriate and credible.

The workshop case studies, the excellent EISA 'Voter Registration in Africa' publication and the remainder of this summary report confirm that there is indeed no technology 'silver bullet'. What works in one country may not work in another. What works for one electoral event may not be sustainable and may not be available for the next event.

Readers are encouraged to participate in the EU-UNDP Joint Task Force on Effective Electoral Assistance eLearning course where this and other relevant subjects are explored further. The course is available at http://elearning.ec-undp-electoralassistance.org/course/view.php?id=7.

'This event will hopefully contribute to render electoral processes more efficient, as it has provided EMBs and electoral practitioners with practical advice and cautionary pointers on how to make informed decisions on the sustainable introduction of technology into electoral processes.'

Raquel Rico-Bernabé
Electoral Assistance Specialist,
Joint EC-UNDP Task Force on Electoral Assistance

Voter Registration Policy Framework, Context

FROM THE CONCEPT NOTE: *Another significant change that may see an increase in the use of EVR in the future is the potential synergy and eventual merging of voter registration with civil registration. Such synergies may allow for a regularly updated permanent register and help to justify, in the long term, the initial cost of electronic registration (whether conducted by EMBs or other state agencies).*

As many of the participants commented—and to which the ICT thematic workshop recommendation 13 refers—the task of establishing the identity of citizens is not normally that of an EMB. Accordingly, the optimal sequence is for voter registration to come after civil or other national population registration. The EMB is thus mainly concerned with two things: i) determining the voter eligibility of the individual on the basis of an identity previously determined by a civil registry or other national population registration agency, and ii) ensuring the correct association of the voter with a polling centre where he or she can cast a ballot.

Different circumstances naturally should be taken into account. For example, there are many developing and post-conflict countries where the civil registration function may be non-existent or highly incomplete, neglected for years or, worse, may have become (or be perceived as) partisan. A common consequence is that large numbers of citizens lack registration in the civil registry and/or are without different certificates and identity documents. In these situations the EMB becomes a de facto ID issuing agency and, in some cases in recent years (e.g., DRC, Togo), has been one of the only national agencies to be reaching a large share of the population and issuing any identity documentation on a systematic basis. (And in these cases it is notable as well that the EMB-issued voter cards include a photograph of the individual and offer uniqueness thanks to biometric de-duplication.)

A further complication is in countries where the electoral law mandates that a specific certificate/ID document is required in order to register to vote (e.g., Kenya, Nepal and Zambia). Such laws could potentially disenfranchise otherwise eligible voters, who, for whatever reason, do not have that document. A good practice in this case could be to keep the requirements simple and linked to recognition by local communities.

In other countries with accurate and complete civil registries, EMBs often utilize the data in those registries for extracting lists of eligible voters for electoral purposes. This step makes sense for reasons of cost-effectiveness and time. The two key challenges with the approach are i) the assignment of voters to polling stations and ii) ensuring that the resulting voter lists have the necessary stakeholder confidence.

Digital identity: food for thought

On the Internet in the private sphere, no proof of actual identity may be required to access a variety of private services (such as an email address). Even in some elements of the e-commerce or e-government sphere, retailers or government agencies may not sometimes care about the actual identity of the person paying a bill, as long as the bill itself is paid with a valid credit card (e.g. for TV licences). For national registers that hold personal data of citizens, however, such as voter or other national population registers such as national ID card databases, it is essential that the data on the identity of each individual is accurate. And this is where the limits of biometrics are exposed. Biometrics, in a standalone voter registration exercise, can only assist in detecting whether I have registered more than once, but they cannot detect, for sure, who I am actually am.

Clement Aganahi
Independent IT Expert

As more and more EMBs look to technology, and in particular consider the use of biometric data, to address challenges of detecting multiple registrants, it is appropriate to consider some of the issues that are emerging in the twilight zone between technology and identity.

Digital identity operates in three spheres, as shown in Figure 5.

Oddly enough, on the internet in the private sphere, no proof of actual identity may be required to access a variety of private services (such as an email address). That

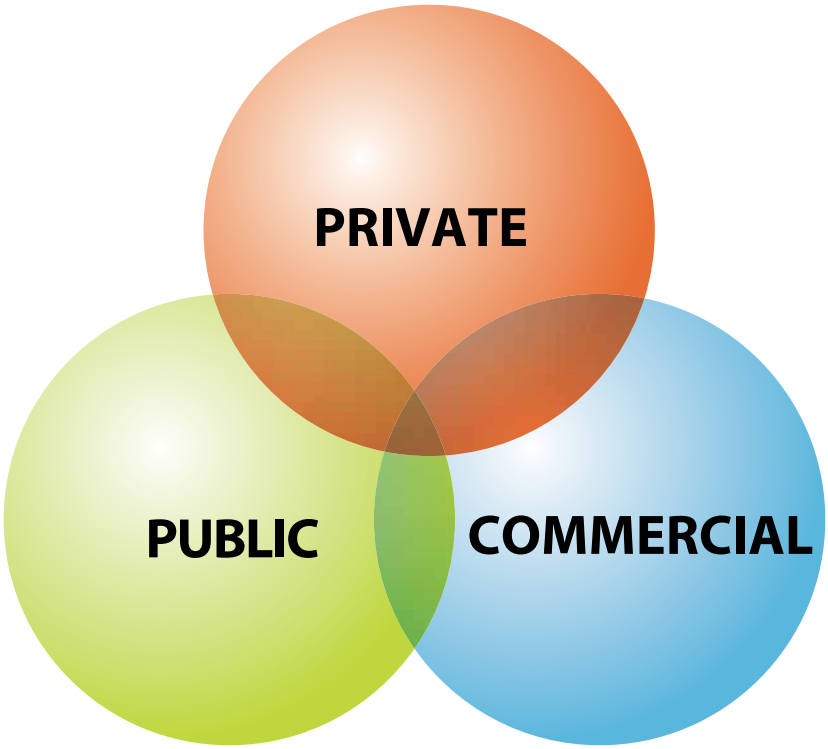


Figure 5. The three spheres of digital identity
Source: Presentation by UNDP to the ICT thematic workshop

is, someone can create an identity online in the name of 'John Smith' and no attempt is made to determine if indeed that online identity belongs to a real John Smith ("on the Internet, nobody knows you're a dog.")

Much of the 'grand bargain' between the new internet search and social networking titans is based on the exchange of personal information in return for services most people want. Such services include relevant search results to find useful results on the increasingly clogged information superhighway (for example, by using Google) or to facilitate convenient and function-rich social interactions (for example, through Facebook). It is more important to these companies to properly *target users with advertisements than to properly identify individual users.*

Identity becomes more important where actual money is involved. E-commerce, for example, involves payment and therefore it is vital that the credit card information provided to an online retailer is indeed that of the specific person making the purchase. A half-way house is online payment for utilities or public services; a TV licence website, for example, may not care who pays for the licence at a given address as long as it is paid for.

However, it is the public sphere, particularly in relation to governments, where the most stringent identity requirements are to be found. Governments are generally the primary issuers of the most trustworthy credentials for individuals' identity (e.g., passports). Governments are usually the first to introduce new digitized identification and authentication systems into e-government and other public service relationships with citizens—for example, biometric national ID 'smart' cards with multiple data fields and biometric data. There are naturally advantages to the use of digital identity. These include:

- improved efficiency and effectiveness in public service provision,
- consistency and uniformity in accessing public services,
- increase in information security and privacy,
- enhanced role in fighting identity theft and in the fight against crime more generally, and
- increased public confidence.

On the flip-side, possible concerns, particularly in the data protection field, include:

- merging of datasets, thereby creating possible 'single point of failure' in individuals' dealings with government,
- risk of government 'profiling',
- greater ease of scrutiny by state security services,
- loss of independence of government institutions, including EMBs, and
- potentially some degree of disenfranchisement.

Particularly in the last decade, the landscape for digital identity has changed due to what one participant described as a "perfect storm" of new technologies (data mining, biometrics, digital eavesdropping), heightened security (facilitated by legislation to allow its use) and worried governments. Negative outcomes are possible where these technologies are used by regimes that do not prioritize the data protection of individuals. Even in democratic societies that do prioritize data protection, with the rule of law and functioning systems to give oversight and accountability, the level of potential government control over identity gives cause

Further reading

'Digital Identity Management: Enabling Innovation and Trust in the Internet Economy', OECD Working Party on Information Security and Privacy, 2011, available at www.oecd.org/sti/interneteconomy/49338380.pdf

'Information Revelation and Privacy in Online Social Networks (The Facebook Case)', ACM workshop on privacy in the electronic society (WPES), 2005, available at www.heinz.cmu.edu/~acquisti/papers/privacy-facebook-gross-acquisti.pdf

'Managing Citizen Identity Information in E-Government Service Relationships in the UK', Routledge, 2009, available at http://e-government.vuw.ac.nz/Publications/Mang_citizen_ID_info.pdf

for concern. Note that in the United Kingdom, for example, a proposed national identity card scheme was scrapped following the accession to power of a new government in 2010. The new government's decision was made in response to growing public concern, but did not occur until after several years of work and large sums of money invested.

EMBs that collect data from people must be clear on the following:

- whose data is collected,
- what precisely is collected,
- what purpose the data will be used for,
- how long the data will be retained,
- who has access to the data,
- who can alter the data, and
- what rights individuals have with respect to the above

As mentioned later in this report, where a country lacks the necessary legislative framework relating to data protection, privacy and transparency, an EMB that pioneers digital registration in a country—and this describes many EMBs that deploy EVR with biometric analysis functionality—may have to 'trailblaze' (i.e., be the leader) on such policy matters. This is no easy feat with an election deadline looming.

EMBs, governments and their development partners should be holistic in their assessment of the broad identity paradigm into which a given technology will be inserted. This involves consideration of whether the paradigm is voter or civil registration.

From identity to a voter register

Demographers and electoral administrators look at populations in different ways. In a voluntary voter registration paradigm the EMB generally hopes for the highest possible participation but often considers an 80 percent to 90 percent turnout a great success. A demographer, seeking to create a population register, aspires to 'no omissions and no duplications'—i.e., 100 percent. Demographers, too, may not be concerned with geographical subdivisions to the same extent as EMBs. Both voter and civil registries face the same challenges of completeness and accuracy: population files were vividly described as "alive" by demographer and workshop presenter Louis Lohlé-Tart. That description is based on the recognition that people are included as they get older (when they reach age 18, for example, though civil

registries normally include newborn babies); that people die and are removed (or not, as the case may be); that people move from one place to another (including across national boundaries); that people change their names, etc. In some instances, individuals' eligibility to vote may also alter.

The concept of time is a relative one: what constitutes 'real time' in an air-traffic control system may be tens of milliseconds, while in a civil registry or national document archive 'real time' may mean months (Louis Lohlé-Tart once more offering a vivid example during the workshop). Despite this, the cost of maintaining a population register or civil register or voter register means significant investments. Authorities may consciously or unconsciously suppress registration (in a voluntary paradigm) by groups they perceive as hostile. Similarly, authorities may favour locations or populations, thereby distorting the resulting register.

But what of identity?

The value of an identity document is well known as an incentive to participate in either civil or voter registration. Indeed, according to several presenters and participants, many attempts by 16- or 17-year-old persons to participate in voter registration are not motivated by a desire to commit electoral fraud, but instead to obtain a precious ID card.

Some of the elements necessary for a comprehensive registration system include:

- a system of mandatory registration that is separated from specific events (such as an election),
- identity authentication,
- secure data to ensure consistency,
- secure archiving,
- specific geographical connection,
- ability to be updated in real time, and
- linking information concerning the same person (perhaps across multiple agencies), but with measures in place to ensure that data linking the citizen cannot be accessed by unauthorised officials or abused in any way.

Similarly, an EMB may not welcome the creation of a voters list based on data extracted from a civil registry if the supplied data cannot easily allow for the correct assignment of voters to polling stations, which is a fundamental requirement for voter lists. The next section of this chapter explores these issues further.

From a demographer's perspective, a voter registration system is not an ideal starting point for a civil registry, though the exclusion of anyone below voting age is just one of several factors.

Louis Lohlé-Tart
Demographer, ADRASS Belgium

Linkages with civil registries and other national databases

As many of the case studies (Cape Verde, Egypt and Tunisia, to name three) demonstrate, many countries do create voter lists based on civil registries. Indeed, as reflected in the recommendations of the workshop, many participants clearly suggest that the long-term, preferred approach is to create a reliable and continuously updated civil registry—and only when that has been achieved should discussions commence on it being used as the basis for voter lists commence. However, it must be noted that there are countries, such as Bangladesh, where comprehensive voter registries are evolving into civil registries. In 2002, Côte d'Ivoire sought to create both a voter and civil registry at the same time. Cape Verde invested heavily (approximately €25, or US$32, per voter) but its policy makers see this as a once-only investment because the resulting system has e-government applications that go well beyond just voter registration.

Two recent and significant examples of the use of civil registry data as the basis for voter lists are those of Egypt and Tunisia. As can be seen in Figure 6, a critical input to the Egyptian recipe is the list of polling centres from the EMB. Without this, it would have been impossible to assign voters to polling centres for the May-June 2012 elections.

The inquiry services shown in Figure 6 refers to the significant transparency and integrity mechanisms put in place by the Egyptian EMB as well as its allied state agencies, including the Ministry of State for Administrative Development and the Egyptian Police Service. These include traditional channels where paper lists were displayed (police stations and courts, for example) as well as modern channels such as:

- a dedicated website where voters can look up their registration details,
- SMS service,
- a call centre with 1,300 seats,
- a special Smartphone application, and
- a 'gadget' application that could be embedded into other websites allowing third-party stakeholders to offer voters the opportunity to look up their details.

In 2002, Côte d'Ivoire sought to create both a voter and civil registry at the same time

Moktar Lam
Governance Specialist UNDP
Côte d'Ivoire

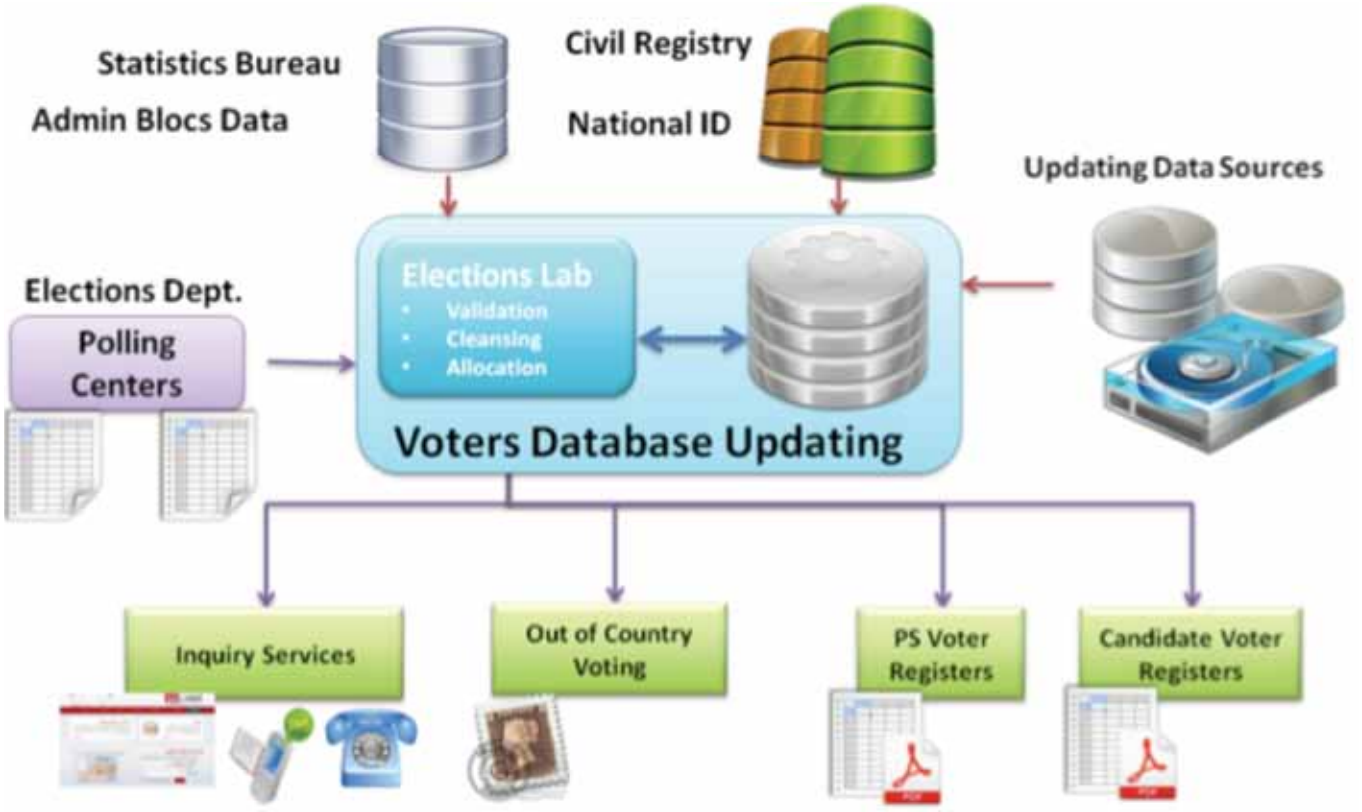


Figure 6. Egypt's voter database based on civil registry and national ID databases
Source: Egypt case study presentation at the ICT thematic workshop

The total number of enquiries through the modern channels was in excess of 42 million. Given the voting population of just over 50 million, this represents a significant achievement, even allowing for the extraordinary circumstances of the 'Arab Spring' and the events of January and February 2011.

Tunisia, too, had to create a voters' register in a very tight timeline for the first, post-revolution elections of 23 October 2011, based on civil registration data that featured unstructured address data and no native polling station or electoral area data. Using an approach like that of Egypt, with a similar emphasis on transparency and the use of the internet and modern technologies to maximize voter engagement with the process, the Tunisian EMB succeeded in inviting 84 percent of voters to present themselves to register or check their details, while a further 15 percent were registered 'automatically' by the migration of data from the sources mentioned in the case study—the Commission Nationale Indépendante Tunisie (CNI) and the Ministries of Interior, Defence and Justice. The Tunisian approach is illustrated in Figure 7.

A comment was made, and questions raised, as to the challenges of using data sources that include or are characterized by religion or ethnicity. These questions were not directly addressed in plenary, but the point was well made and serves to emphasize the challenges facing EMBs when they seek to use external data sources for electoral purposes.

Data protection, privacy, legislation

Just as participants in the thematic workshop recognized that EMBs are not primarily in the 'identity' business, it is also not the work of an EMB to make legislative or regulatory provision for data protection or privacy. Such legislative frameworks are properly the work of parliaments and other agencies of the state. However, EMBs sometimes may need to step in where there is no civil registry or national identity body, or where there is no law relating to protection and privacy of data. In such cases, the EMB must be proactive and attempt to adopt appropriate standards and best practice.

The right to the protection of personal data is a subset of the right to privacy. In his presentation to the thematic workshop, Dr. Mouhamadou Lo, the head of the Personal Data Commission of Senegal, described the principles of privacy as follows:

- principle of legitimacy,
- principle of purpose,
- principle of proportionality,
- principle of security and privacy,
- principle of respect for the rights of persons, including
    - the right to information
    - the right of access
    - the right of opposition, and
    - the right of correction or deletion.

AUTOMATED SECURE EXCHANGE AGREEMENTS WITH THE RELEVANT STRUCTURES

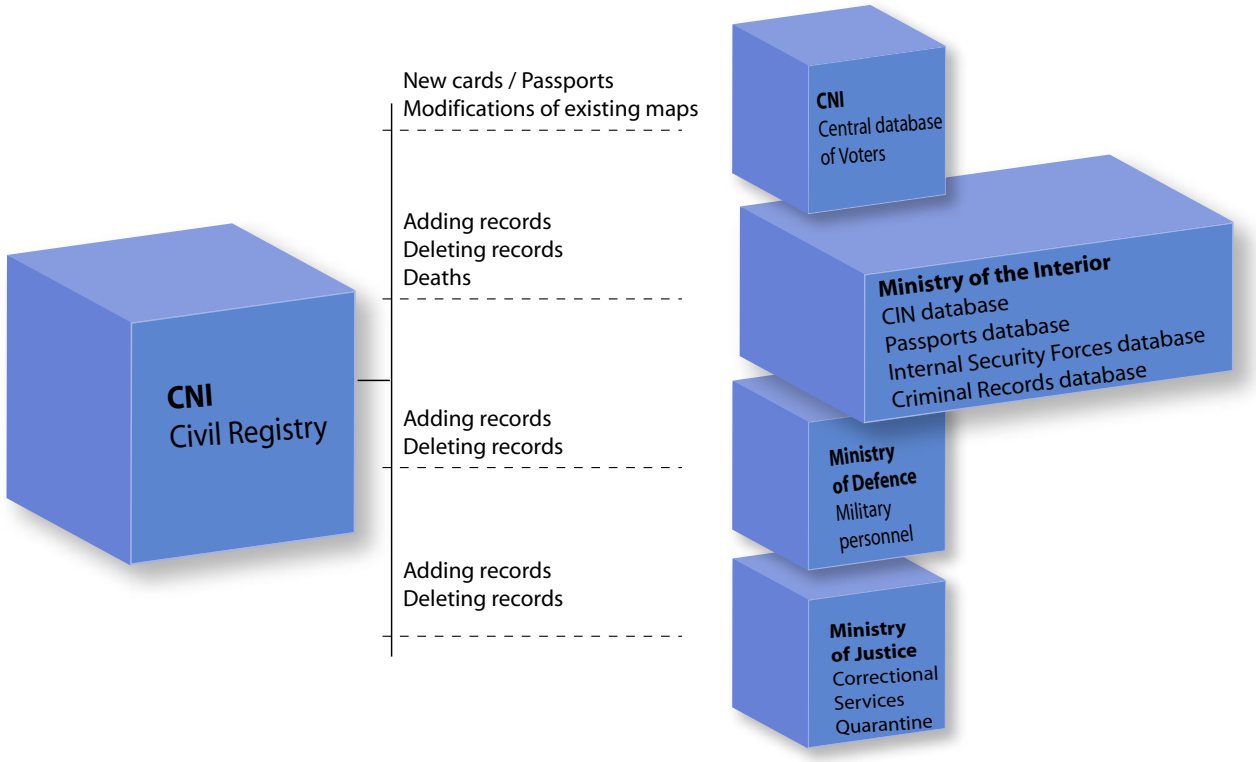


Figure 7. Use of multiple data sources for Tunisia's VR database
Source: Presentation by Commission Nationale Indépendante Tunisie (CNI) at the ICT thematic workshop

Box 1. Resources to support integrity

La protection des données personnelles est un impératif mondial:
(*The protection of personal data is a global imperative*)

International:

- Déclaration Universelle des droits de l'homme (Art. 12) (*Universal Declaration of the Rights of Man (Art. 12*)
- Principes directeurs pour la réglementation des fichiers informatisés contenant des DCP (ONU – Résolution 45/95 du 14 décembre 1990) (*Guidelines for regulation of computerized personal data files (UN - Resolution 45/95 of 14 December 1990*)

Europe:

- Convention 108 du CE du 28 janvier 1981 pour la protection des personnes à l'égard du traitement automatisé des PCP (*Convention 108 of the EC of 28 January 1981 for the protection of individuals with regard to automatic processing of personal data*)
- Directive N° 95/46/CE du 24 Octobre 1995 relative à la protection des personnes physiques à l'égard des traitements de DCP (*Directive 95/46/EC of 24 October 1995 on the protection of individuals with regard to the processing of computerized personal data files*)

Afrique:

- Acte additionnel A/SA.1/01/10 de la CEDEAO du 16 février 2010 relatif à la protection des données à caractère personnel (*Additional Act A/SA.1/01/10 ECOWAS of 16 February 2010 on the protection of personal data*)

Data protection is a global imperative and should be given effect through appropriate laws and regulations

Mouhamadou Lo
Head of the Personal Data Commission of Senegal

Data protection is a global imperative and should be given effect through appropriate laws and regulations. The typical institutional framework is to have an authority on data protection (a government agency, an independent entity or otherwise). While there is a need for electoral data to be in the public domain to some extent, a distinction should be drawn recognizing that some personal data are more sensitive than others.

It is clear from the workshop discussions, and from the case studies, that the extent to which EMBs make the contents of their voter registration systems public varies widely across the world. There are strongly held opinions either that voter registration data should not be made public or that it should be completely in the public domain. The debate is by no means characterized by EMBs on one side and data protection or privacy advocates on the other. During the plenary discussion, a participant from Nepal stressed the need for balance between, on one hand, the reasonable demands for transparency in electoral processes and the right to privacy of the citizen on the other. (He described this as a 'delicate mission',)

This debate contrasts starkly with the almost universal consensus on the need to maintain the secrecy of the ballot, as discussed in the section of this report on electronic voting. It is appropriate to discuss the transparency of voter registration data in the broader context of data protection and privacy as, in many countries, EMBs are forced to operate in a legislative vacuum. The EMBs in this situation must set the standards themselves. This presents EMBs with additional responsibility and effort—just as EMBs are not the natural agency to deal with identity, they are also not meant to be data protection agencies.

An important distinction must be made between confidentiality and integrity. If a voter record—for example, a voter's name, address and date of birth—is in the public domain, that data are clearly not confidential. But it is essential that the EMB ensures that the data have integrity. This means that the data have been properly collected (based on reasonable identity documents or authoritative testimony by community elders) and that they have been open to stakeholder scrutiny, such as during a display or exhibition period. Ensuring integrity also means that any changes to the data are only made by authorised officials and are subject to internal and external oversight.

There was a suggestion from workshop participants for an international body that would provide advice and support to countries in this regard. Dr. M. Lo's presentation (originally in French) included the resources listed in Box 1, all of which may address the information gap that motivated the suggestion.

Finally, the following websites offer links to significant resources on data protection and privacy:

UNESCO's Privacy Chair
http://unescoprivacychair.urv.cat/

European Commission's Portal on Data Protection
http://ec.europa.eu/justice/data-protection/index_en.htm

Technology and national ownership

Pontius Namugera, director of technical support services at the Electoral Commission of Uganda, in his presentation defined national ownership as "the involvement of the electorate and stakeholders in the entire electoral process, owning up the outcome and commitment to support it over time." This is an interesting definition because it says nothing about technology, nothing about who purchases technology, from whom, or in what manner. It suggests that national ownership can be achieved even if a technology has been purchased using funds from a development partner, or is of a sophistication not common in public services in the country in question.

The unfortunate reality for many EMBs is that once the election event that drove the introduction of a given technology has passed, things can calcify quite quickly. Participant after participant noted one or many of the following issues, most of which were also reflected in the case studies.

> *The international staff providing technical assistance (whether vendor employees or personnel provided by development partners) pack their bags and move on to the next project, the next country, the next contract. Warranty and support periods expire. Software licences expire. IT staff at the EMB, who may have gained valuable experience under difficult circumstances during the election cycle, may depart for greener pastures in the private sector, or elsewhere in the public sector; indeed, some participants complained of both vendors and development partners luring EMB IT staff away. All too often, the vision of sustaining the investment by moving, for example, from periodic to continuous registration is not realised because the necessary resources (financial, human, infrastructure) are not available or because the political will is not there. Sometimes an EMB is locked into a particular solution and can only continue to use a system by maintaining a commercial relationship with a particular vendor. In the worst-case scenario, an EMB cannot access its own data or reuse its own resources at all because the vendor is no longer in business or because the individual or team who developed the software is no longer available. In no sense does an EMB in these scenarios 'own' the solution.*

The four principle issues in ownership are as follow:

Planning

As illustrated in Figure 8, the relationship between time and national ownership is a direct one. Good planning ensures adequate time for the introduction of technology. Good planning also involves stakeholder consultation.

Procurement

Case study after case study refers to procurement taking longer than anticipated. Procurement failure erodes available time, damages stakeholder and development partner confidence, and inhibits national ownership.

Trust

Trust and national ownership are two sides of the same coin. An EMB that enjoys great trust can introduce a technology that will, by association, be trusted. Conversely, a technology that lacks trust or loses trust will, inevitably, damage the trust enjoyed by the EMB. Equally, an EMB that does not enjoy great trust is not likely to significantly improve in this area simply by adopting a technology that inspires trust. The increase in trust that can initially derive from such adoption is usually short-lived, as key stakeholders tend to quickly question the way the technology is used, the transparency of the process or the final results.

Sustainability

If a technology is appropriate and its introduction has been planned, properly procured and enjoys stakeholder trust, there exists the possibility that, even if ongoing costs are significant (as they frequently are with technology), sufficient resources may be made available—from the national government, development partners or a combination of both. Still, socio-economic considerations relating to whether the country can afford and sustain the new technology should influence the national decisions.

To summarise:

the more time an EMB spends on all aspects of its technology, the more control and ownership it has. There are exceptions to this; for example, some EMBs have, over time, developed an in-house software development capacity. This is more likely in large countries where the domestic ICT sector has reached a critical mass and suitably experienced and skilled personnel are available. A country with 'deep pockets' or generous donors may still not achieve national ownership of its electoral processes if it adopts a last-minute, procurement-heavy approach to electoral technology.

A country with 'deep pockets' or generous donors may still not achieve national ownership of its electoral processes if it adopts a last-minute, procurement-heavy approach to electoral technology.

Pontius Namugera
Director Technical Services, Electoral Management Body - Uganda

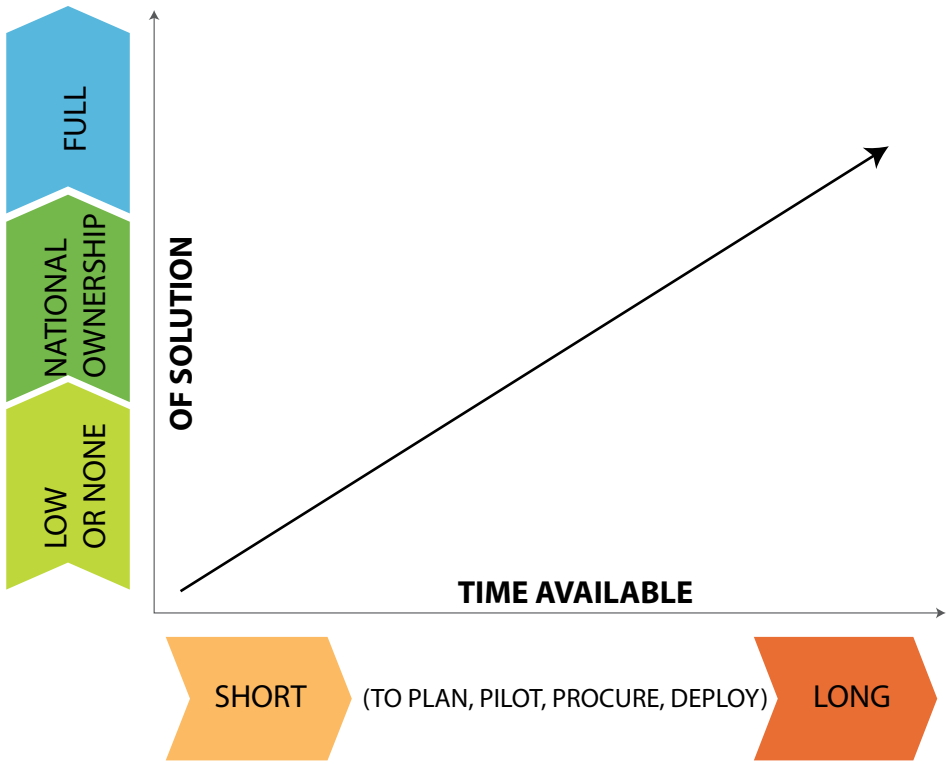


Figure 8. The relationship between time and national ownership
Source: Presentation by UNDP at the ICT thematic workshop

‘Moving up the Technology Ladder’

A number of developing countries have lately adopted EVR systems with biometric data collection that can increase the uniqueness of resulting voter lists. In other words, the use of biometric data can address the issue of duplicate registrations. Electronic voter registration can, in some circumstances, improve the quality of service provided to voters (i.e., when it has been properly planned and addresses shortcomings that were evident with less high-tech methods). However, EVR is not the only solution available to attain these enhancements. For instance, a low-tech paper-based system could be improved without having to resort to electronic registration. Sophisticated technologies need properly trained staff and effective operational support and maintenance structures to have a chance to succeed.

EVR also has significant disadvantages. First and foremost it represents an enormous investment, with experience showing costs of up to US$6,000 (€4,620) per registration kit, to which one should add, most crucially, significant back-end server and database management costs as well as often unbudgeted management and maintenance costs. Kits are sensitive and require enormous logistical back-up that can increase dramatically the cost and difficulty of data collection, particularly in challenging physical environments.

The use of biometric technologies has not, in many instances, proven to be the panacea that it was once believed to be. In the field, obstacles exist that reduce accuracy of this methodology. For example, EVR kits have failed to capture large numbers of digital fingerprints from voters, thereby reducing the available population for subsequent biometric comparison and duplicate identification.

Outsourcing challenges the integrity of the process and the confidence in the EMB, and raises the question of legal responsibility and national ownership. Addressing the question of sovereignty is fundamental in the introduction of ICTs in voter registration. These kinds of advanced technologies requiring highly skilled, thoroughly trained staff often force governments to rely on international suppliers and expertise that might have little interest in capacity building and often retain intellectual property rights over the source code of the software they provide—thus preventing any sustainability of the technology and maintaining the government in a state both of donor dependency and vendor lock-in.

The big picture: strategic planning

ICT solutions, like elections, do not simply happen. Where there is no planning, the most precious of all resources—time—typically runs out and EMBs can be left with inadequate time to effectively implement not just ICTs but the broader electoral process.

In a recently conducted survey,[4] 74 percent of respondents disagreed with the statement "sufficient time is allocated to the evaluation of technology under consideration". Lack of time may be a result of unanticipated electoral events, such as those necessitated by the death of an incumbent head of state, but is more often the result of poor planning.

Given that large public-sector ICT projects typically run late and over budget, it becomes clear that EMBs are at risk of failure if they do not adequately plan for the introduction of technology into electoral processes.

As defined in the International Foundation for Electoral Systems (IFES) publication 'Strategic Planning for Effective Electoral Management', strategic planning is "a systematic planning methodology, over a defined period of time, that facilitates the effective management of a process to achieve a particular goal." (The publication was presented at the thematic workshop by Antonio Spinelli, IFES chief of party in Egypt.)

4 Conducted as part of the 2012 Evaluation of UNDP Contribution to Strengthening Electoral Systems and Processes, available at http://web.archive.org/

Proper strategic planning is 'over the horizon' planning, i.e., working on a three- to five-year timeline. Nepal's electoral body has, for example, a five-year strategic plan spanning 2009 to 2013. Many EMBs and election practitioners know only too well how rarely the opportunity exists to plan three, never mind five, years ahead. Many factors combine to make this difficult, including (to name a few) short budget cycles for both national governments as well as development partners, late political action to put in place electoral legal frameworks, and lack of timely approval and disbursement of electoral budgets. When elections happen following major events like those that characterized the 'Arab Spring', there will also be limited time for strategic planning. Tunisia experienced its 'revolution day' in January 2011 and had to hold elections in October of that year. When responsibility for registration is diffuse (Moldova, for example), or closely linked with civil registries (Mali, for example), planning is challenged by the need to coordinate multiple agencies.

The identification, evaluation, piloting, procurement and deployment of large-scale IT systems for electoral administration takes significant time. Done properly, procurement alone has, in the experience of some UNDP-assisted processes, taken up to 18 months from concept to delivery. Nepal's photo voter list programme commenced in August 2010 and VR took place in February 2012, an 18-month timeline. When an EMB is faced with multiple elections, making time for this can be very difficult. Moldova, for instance, had five elections in a 27-month period (from April 2009 to June 2011). While many of these were unanticipated, other countries have frequent scheduled elections.

In recent electoral cycles Mali adopted short-, medium- and long-term planning horizons allowing prioritization and early successes, as summarized in Table 1.

Such initiatives also take specialist knowledge. Yet when it comes to technology, any knowledge gap can be filled in inappropriate ways and from less than neutral sources including, but not limited to, vendors (whose solution will always be a presented as a 'perfect fit' for the electoral challenge); development partners ("we did this in Country X, why not do it in Country Y"); political parties (sometimes the parties in power, but more often opposition parties who see, partly not unreasonably, technology as the only possible guarantor of electoral integrity); or other stakeholders.

The challenges are not only technology and procurement. Legal frameworks must be assessed for their compatibility with envisaged technologies.

Only through adequate planning will the necessary time and resources (both human and financial) be available to EMBs to effectively introduce technology into their processes.

Table 1. Mali: planning horizons and objectives, starting with civil registry

Short term	Medium term	Long term
• Collect a set of individual data on marital status for each citizen • Establish a national registry of individuals with the award of a national identification number for each person enumerated	• Establish central information consolidation and processing facilities • Modernize the civil registry • Contribute to the production of secure travel documents	• Decentralise service delivery nationwide for improved access • Allow the use of census results for other purposes (voter card, driving license, passport secure consular cards and identity, electoral, social security cards, etc.) • Integrate databases with other agencies (e.g., ministries of transport, health, labour, public service, police and courts)

Technology and voter registration systems

As detailed earlier in this report, a common tendency is to categorise VR technology into low-tech, medium-tech and high-tech approaches. This categorisation is generally focused on the level of technology in the field.

As outlined by the presentation by the UNDP Procurement Support Office (PSO), however, such categorization can lead to the risk of oversimplification. This can manifest itself, in the first instance, as a mistaken belief that all technology is good, and in the second instance, that a specific technology can address all the problems standing in the way of free and fair elections. A concrete example of this 'silver bullet' thinking is when biometrics are offered as a solution to all known problems with voter lists, including such issues as the presence on the lists of ineligible voters, including underage persons. In fact biometrics generally addresses only one issue, that of multiple registrations.

There is no one-size-fits-all approach. What can work in one country may fail in another. What is appropriate for one may be inappropriate for another.

Costs and procurement

Two clear messages emerged from the workshop. The first is that last minute procurement drives up costs significantly. The transparency and competitiveness of procurement are undermined when there is less time available. In the worst case, when time is severely limited, sole-source or direct procurement, though essential, rules out any competition and thus places EMBs at the mercy of the chosen vendor.

The second is that sustainability is almost impossible to achieve where inappropriate technologies are implemented. Any technology (low, medium or high) that cannot, in the medium term, be fully owned, operated, maintained and extended by the EMB is not appropriate. If international technical expertise is essential to the ongoing use of a system, there can be no sustainability. That message is accurate whether the expertise is provided by a vendor or by a development partner such as UNDP, IFES, the Organization for Security and Co-operation in Europe (OSCE) or similar.

It is important not to judge technologies or equipments in isolation: i.e., **they are not the solution on their own, and typically they are not the problem** alone.

The success or failure of a certain technology solution depends only partly on the procured equipment but equally on a range of other factors, such as the performance and responsibility of its operators, the conditions of operation, the technology's 'consumables', economies of scale (or diseconomies of scale) costs, communication and education, logistics, etc.

A persistent, though often unanticipated, challenge that EMBs face is attracting and retaining skilled ICT staff. These two issues combine in a vicious circle to

Figure 9. Beyond technology procurement

Source: Presentation by Victor Margall von Hegyeshalmy, UNDP Procurement Support Office, at the ICT thematic workshop

undermine local ownership, perpetuate donor and vendor dependence and make sustainability a theoretical aspiration rather than a plausible objective.

Since it is difficult, if not impossible, to place a monetary value on electoral integrity, determining the cost-benefit of a given technology is quite a challenge. Is US$XXX million a reasonable price to put on the elimination of duplicates from a voters list? Can €YYY million be said to be a fair price for putting a photograph of each voter on the voter list?

The director of ICT at the Kenyan EMB, Dismas Ong'ondi, summarized the issue in the following way in his presentation at the workshop:

- Advanced technology alone cannot guarantee the integrity of elections without corresponding legal and administrative protective mechanisms.
- EVR costs should be weighed against the contribution to the perceived credibility of the electoral (registration) process. Therefore, cost may not be the PRIMARY factor.

At the heart of procurement is the definition of requirements. The analogy of the restaurant is useful up to a point: if you order lamb and the waiter brings beef, you have grounds for complaint. But if you cannot read the menu—if nothing on the menu is familiar to you—the risk of ordering something that you did not wish to eat is very high. As a result, many EMBs and development partners find themselves doing one of two things: i) ordering what other people have ordered in the hope that it will suffice, or ii) taking the advice of the vendor ('the waiter') and ordering what it recommends. Both approaches are fraught with risk.

To paraphrase Dr. Rebecca Mercuri, an American academic who is a commentator on electronic voting systems, "if you think that biometrics will solve your voter registration problems, then you don't understand biometrics and you don't understand your voter registration problems."

A classic pitfall in the implementation of ICTs for elections management is the assumption that it is a matter for IT departments alone. In fact, all the departments of an EMB must be closely involved from the very beginning of the process. All of the following have important roles to play in the elaboration of the concept of operations, in the definition of requirements, and in the procurement, evaluation, deployment and support of the solution: legal, voter registration (the primary users of any procured solution), operations/logistics, public outreach, training and many other sub-functions.

To illustrate the point, Table 2 below highlights just a few of these other functions and elaborates on their roles:

Table 2. Roles and responsibilities across all key EMB departments

Department	Planning	Procurement	Deployment	Maintenance
Legal	Can the EMB adopt the technology?	Compliance with procurement regulations Contract negotiation	Contract management	Warranty provisions of contract
Operations/ logistics	Bills of quantity, basic logistics parameters (power, weight, etc.)	Evaluation of packing, power, hardware and standards of offered solutions	Support to voter registration operations in the field.	Storage, upkeep, maintenance, upgrade
Voter registration	Definition of functional requirements: how, precisely will the solution be used?	Key drafters of procurement documents Key evaluators of offered solutions Arrangement of pilot or site validation tests	The main user of EVR in the field.	Well-trained staff can reduce support calls.
Finance/ procurement	Is the budget available to introduce the technology?	Key coordinator of the procurement process	Payment of ad-hoc staff	Ensuring ongoing maintenance contracts or service level agreement (SLA) paid.
Voter education	Early messaging on the solution	Design of comprehensive voter education campaign	Effective voter education to maximize participation	Follow-up on continuous VR if envisaged.
Outreach	Stakeholder buy-in, advocacy	Transparency of process, managing the publicity surrounding problems	Stakeholder demonstrations	Continuous registration reforms

Table 2 is far from exhaustive and should be adjusted for each country and set of circumstances so that all departments of the EMB are fully engaged in the introduction of any technology—not just EVR with biometric analysis.

Table 3 below was prepared by presenter Clement Aganahi. It illustrates that although costs per voter can vary widely, the introduction of technology rarely results in a lower spend.

DÉMOCRATIES STABLES: 1-3 $		DÉMOCRATIES EN TRANSITION: 3-8 $		ELECTIONS POST CONFLICT AVEC PRESENCE DE MISSIONS ONU: 8-45 $	
Chile	1,2 $	México	5,9 $	Angola	22,0 $
Costa Rica	1,8 $	El Salvador	4,1 $	Cambodia	45,5 $
Brazil	2,3 $	Paraguay	3,7 $	Mozambique	10,2 $
Benin	1,6 $	Lesotho	6,9 $	Afghanistan	20,0 $
Botswana	2,7 $	Liberia	6,1 $	Haiti	11,0 $
Senegal	1,2 $	Uganda	3,7 $	**Côte d'Ivoire**	**>65,0 $!!!!!**
India	1,0 $	Russia	7,5 $		
Australia	3,2 $				

Table 3. Costs of technology in varying election settings

The reduction in the cost of technology does not seem to have reduced the price of medium- or high-technology kits. This is in part because many EMBs are opting for more sophisticated biometric sensors (for example 4-4-2 scanners or iris cameras) whose high cost offsets reductions in the cost of such components as laptop computers and printers.

An unfortunate consequence of late procurement is that large automated fingerprint identification system (AFIS) solutions that have to be purchased to complete de-duplication in the compressed timelines are typically under-utilized (by as much an order of magnitude) in the post-electoral continuous registration phase when the volume of matching drops off drastically. Therefore, some countries outsource their AFIS de-duplication, an approach that saves money but raises concerns about ownership and sovereignty. For other countries, exporting citizen data and biometrics for such processing is unacceptable. Mechanisms do exist to render the exported data anonymous, so that it has no value, but overall these are sensitive issues and every EMB will have to consider what works best in its country.

EVR: operational and implementation challenges

Even when an EMB has overcome the significant challenge of procurement, and the necessary systems are en route or in-country, the work is far from over.

The task of recruiting suitable staff to act as operators for medium- or high-technology voter registration solutions is considerable. Failure to properly train the operator places at risk the entire investment, and this challenge is even greater given that most training delivered as part of EVR projects will be pitched at staff who have a minimum level of computer literacy. Therefore, proper recruitment is an essential prerequisite. The concept of competitive recruitment is highly recommended. In brief, if an EMB needs 100 staff, that EMB should recruit and train, for example, 120. In the experience of some countries represented at the workshop that have used such an approach, a higher than normal level of concentration and effort during the training by advising the 120 that they will be tested at the end of the training and that only 100 will be hired. (In practice, because of natural attrition, illness, and other factors, many of the 20 who were not hired will actually be called upon as the process evolves.)

It may be that the teachers and civil servants who have typically filled the ranks of voter registration officers in previous exercises lack the computer skills needed. Conversely, the computer literate students and other young persons who often make up the bulk of applications for EVR positions lack experience with the administrative, legal and procedural details that, regardless of the technology employed, still characterize voter registration processes. Where there are multiple officials in a given voter registration centre, it is possible to mix and match to achieve the necessary blend of skills and experience. Where a single person will conduct the entire process in a given centre (for example in Zambia in 2010), proper training is essential. It is important to remember that there will be two distinct aspects to the training: the legal/procedural aspect (classic VR process) and the proper use of the technology. Where staff will be remote from support, it is vital to deliver operators who have a degree of self-sufficiency and can conduct basic diagnostics and troubleshooting in order to keep the process going (particularly in cases of remote deployment, where kits are a long way from the EMB offices).

In many countries, considerable public interest can be generated by the decision to employ high-technology approaches (in particular) in electoral processes. This can offer an EMB a 'head start' when it comes to its motivational messages for voter education. However, enthusiasm alone does not an informed citizen make. There is one aspect of the introduction of high-technology VR kits, for example, that can present a major challenge for voter education. Traditionally, and in particular with lower-tech approaches, VR

The task of recruiting suitable staff to act as operators for medium- or high-technology voter registration solutions is considerable. Failure to properly train the operator places at risk the entire investment, and this challenge is even greater given that most training delivered as part of EVR projects will be pitched at staff who have a minimum level of computer literacy

Brown Kasaro
Head Information Technology, Electoral Management Body – Zambia

exercises take place simultaneously nationwide. All VR centres open on the same day and remain open until the process is complete. However, the huge capital cost of EVR kits often forces EMBs to purchase fewer kits than the number of VR centres, and thus they ***phase*** their EVR field exercises. This means that, even if the VR exercise will take place, for example, over a 90-day period, not every VR centre will be open for the entire 90-day period—the expensive kits will move from centre to centre and spend a couple of weeks in each location. In 2010, the Election Commission of Zambia, whose motivational messaging was a success, found that many potential registrants were not getting the more granular information about when their local voter registration centre would be open. Remedial voter education interventions were required to address the problem.

Also of note is that EVR kits are fragile. Deploying them to remote areas is difficult and providing support, whether logistical (fuel supplies, for example) or technical (swap/repair of faulty components, 'harvest' of data from kits) requires detailed planning and significant resources. Similarly, storage and maintenance of sophisticated equipment is a challenge and requires planning and resources. All case studies during the workshop spoke of the logistical challenges and costs.

An often overlooked issue with the use of AFIS to de-duplicate voter registration data is as follows. Printing voter lists (whether provisional or final) cannot begin until the last piece of data received has been matched, or checked against, all existing data. In previous systems, it was possible to start to print voter lists for a given constituency once all the data for that constituency has been received. With AFIS at the 'back end', however, such printing can only commence after the completion of AFIS de-duplication across the entire data set. This is just one example of new operational challenges that all EMBs should be aware of.

AFIS systems, generally, no longer require special hardware—'special' in the sense that the hardware is specific to this application—and now run on commercially available 'off-the-shelf' servers. However, large AFIS solutions are high-performance, high-availability systems that in order to function optimally need environments that include uninterruptable power supplies and high performance standby generators, air conditioning and humidity control.

The high value of the components of EVR kits makes security an issue. Many EMBs respond by branding—that is, clearly marking all equipment with their logos, thereby reducing (though not eliminating) the risk of theft.

Higher still is the value of the data captured. Modern cryptography means that data can be encrypted while on the kit and in transit, thus significantly mitigating the threat of data manipulation. However, regular backups of data on external devices are essential. Kits must be visited on a regular basis in order to take backups of data and return the backups to regional or central data consolidation sites. This is a costly exercise that is frequently overlooked in budget planning but is essential because the cost of returning to one or more VR centres whose data was lost is much higher. The reputational damage to an EMB that loses voter data is incalculable.

Conclusion

Procurement and deployment of ICT solutions is both expensive and time-consuming. Adequate feasibility studies, as well as proper strategic planning, should ensure that i) an EMB looks over the horizon and makes an informed decision, and ii) that adequate time is allotted for the introduction of new technologies, whether low, medium or high. If an EMB has limited time, the costs—and the risks of failure—increase, sometimes dramatically.

Technology alone is never the solution. EMBs must seek clarity on the problems they face with voter registration if they are to avoid simplistic and expensive one-size-fits-all procurements of a given technology.

EVR can introduce new, hitherto unseen, problems: the phased approach and the need to wait until AFIS is complete before starting to print voter lists are just two examples. More visible, but often underestimated in their impact, are the challenges of procurement, recruitment, operation, storage and maintenance.

High-technology, integrated solutions can bring efficiencies/cost savings as well as enhance integrity. However, achieving both, in a sustainable and nationally owned manner, is a rare thing.


CT and Elections

Results Management Systems and E-voting

The term 'results management' refers to the activities that take place after the counting of votes has finished (usually at the polling station), along with the necessary preparations (planning, development, testing, training and audit). A results management system (RMS) must be accurate, timely, transparent, auditable and robust.

If there is a significant delay or lack of transparency in the transmission of results, confidence in these results and, ultimately, in the entire election process, can be undermined. Whether those results were accurate or not may become irrelevant if a post-electoral atmosphere is sliding into political conflict or worse (as seen in Kenya in 2007).

RMS may involve no technology at all: results may be recorded on paper forms and sent by road to their destination where consolidation and dissemination also take place on paper. Properly designed protocols and the use of quality, tamper-evident envelopes allow paper-based RMS to be highly effective (although sluggish in countries that are very large or have poor road networks). An RMS may also be characterized by the use of sophisticated technology with SMS messaging, satellite phones, scanners, databases, virtual private networks (VPNs) and the internet all playing their part. Typically, RMS will involve a mixture of paper and technology, with paper forms in the polling station and the gradual introduction of technologies as the results move along the path to national consolidation. Of the case study countries, Zambia's current RMS is an example of this middle-ground. Polling station results are recorded on paper forms that move to the constituency counting centre at which point technology enters the process.

Transparency is not negotiable

Transparency on election day begins with the ballot box and continues, in many countries, with counting at the place of polling in full view of party or candidate agents, observers and the public. Copies of results are normally posted at the polling station. Successful results management systems are characterized by further continuation of this transparency through each layer of consolidation and aggregation of results. If results simply emerge from an opaque system or 'cloud', doubts and suspicions may arise that undermine stakeholder confidence, regardless of whether there are reasonable bases for such questions. The antidote to speculation and frivolous allegations is managed transparency.

Arguably, the greatest return on a technology investment an EMB can achieve is in the area of results management. This is because RMS are not, generally, as capital intensive as, for example, electronic voter registration or electronic voting solutions. Much of the hardware is commercial, off-the-shelf (cellphones, scanners); moreover, even where significant communications infrastructure (SMS, mobile internet, satellite) is required, it is needed for a limited period (perhaps only for a week). The software, while far from trivial, can be developed in-house with modest resources. Unlike large-scale biometric de-duplication systems, RMS can and—as is clear from the case studies—should be developed and fully owned by EMBs.

The use of ICTs for results management is no different from using ICTs in any other aspect of elections management. They are essential to determine feasibility and requirements, and to ensure satisfaction as to the appropriateness, sustainability and transparency of any proposed solution. Several case studies spoke of the need for adequate legal provision for RMS. Sometimes, technology is deployed to provide an EMB with the critical "second channel" for results data, which can permit rapid publication of preliminary, partial or provisional results as well as to validate results that emerge later on in paper form. However, legal prohibitions may exist in some countries, despite this "second channel" being created in parallel with, and not as a replacement to, the existing system. RMS project timelines must reflect the sometimes very long lead times for legislative amendment in many countries.

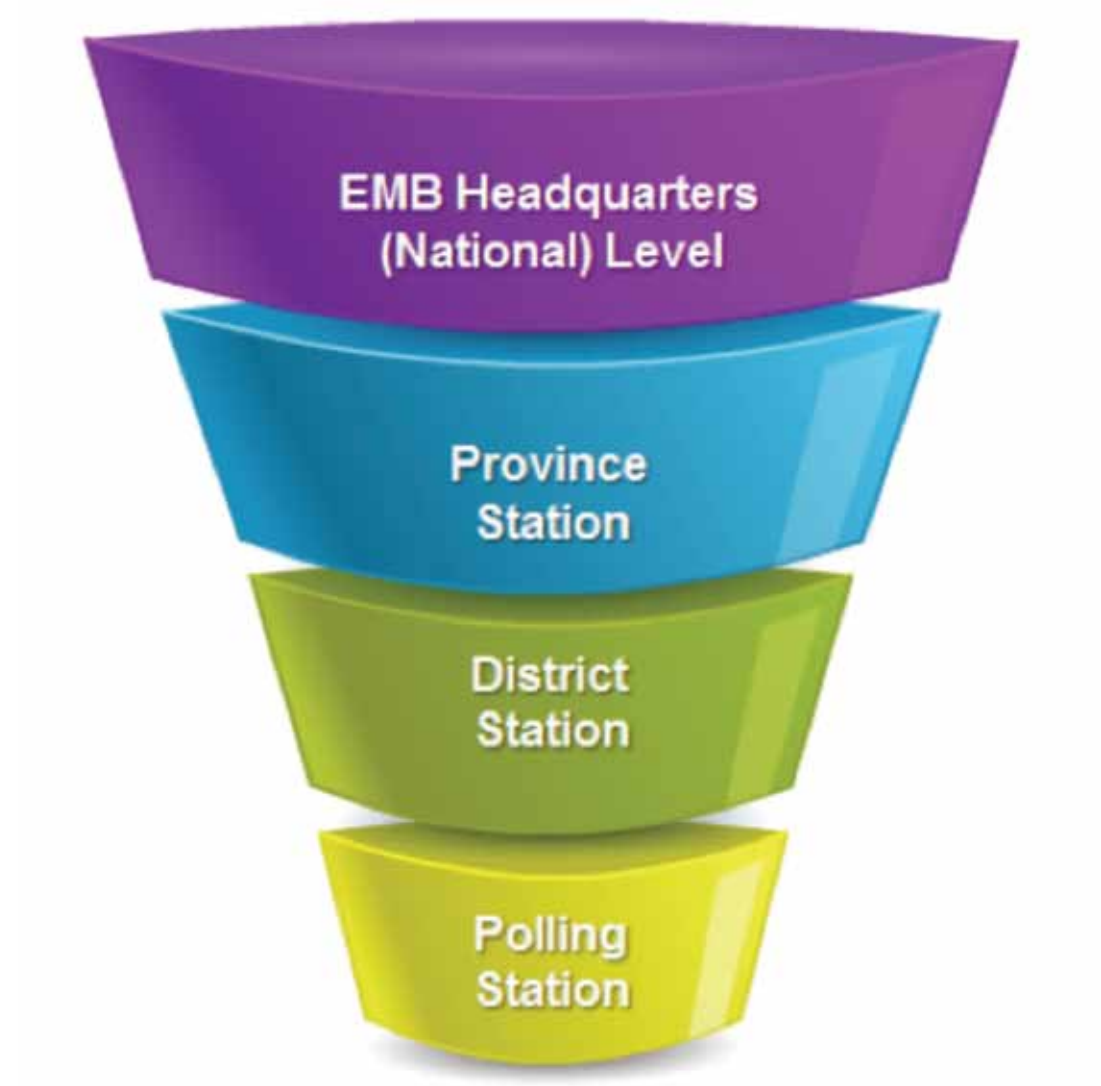
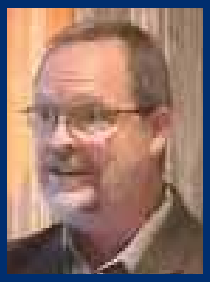


Figure 10. Standard electoral implementation structure
Source: JTF eLearning Course on ICT and Elections Management



Presentation sidebar

The following is from Michael Yard, IFES Kenya country director, who presented on 'Results management—theories/typologies/concepts/scenarios' on the workshop's fourth day:

One of the questions which comes up when results start coming in is whether we share partial results or wait and only release the results when we have a final count. Sometimes the decision to withhold results until they are all in is a solution that's worse than the problem, even if it's done with good intentions. It's critical that we begin to release partial results, as they come in, so that everyone can watch the process and understand how the results are being tabulated.

The question of whether to release provision results also arises frequently—if we release them as they're coming in off telephone, fax, SMS (however we transmit them)—what if they don't match the final official results? If they [provisional and final] match down to the last digit, somebody's cheating. They're not going to match—they're provisional! There should always be some process for people to say they don't like a given result and to ask for a recount in this or that polling station. There should be corrections of math errors. The final results will differ from the provisional results and we need to do a better job of training the electoral world that this is the way things work.

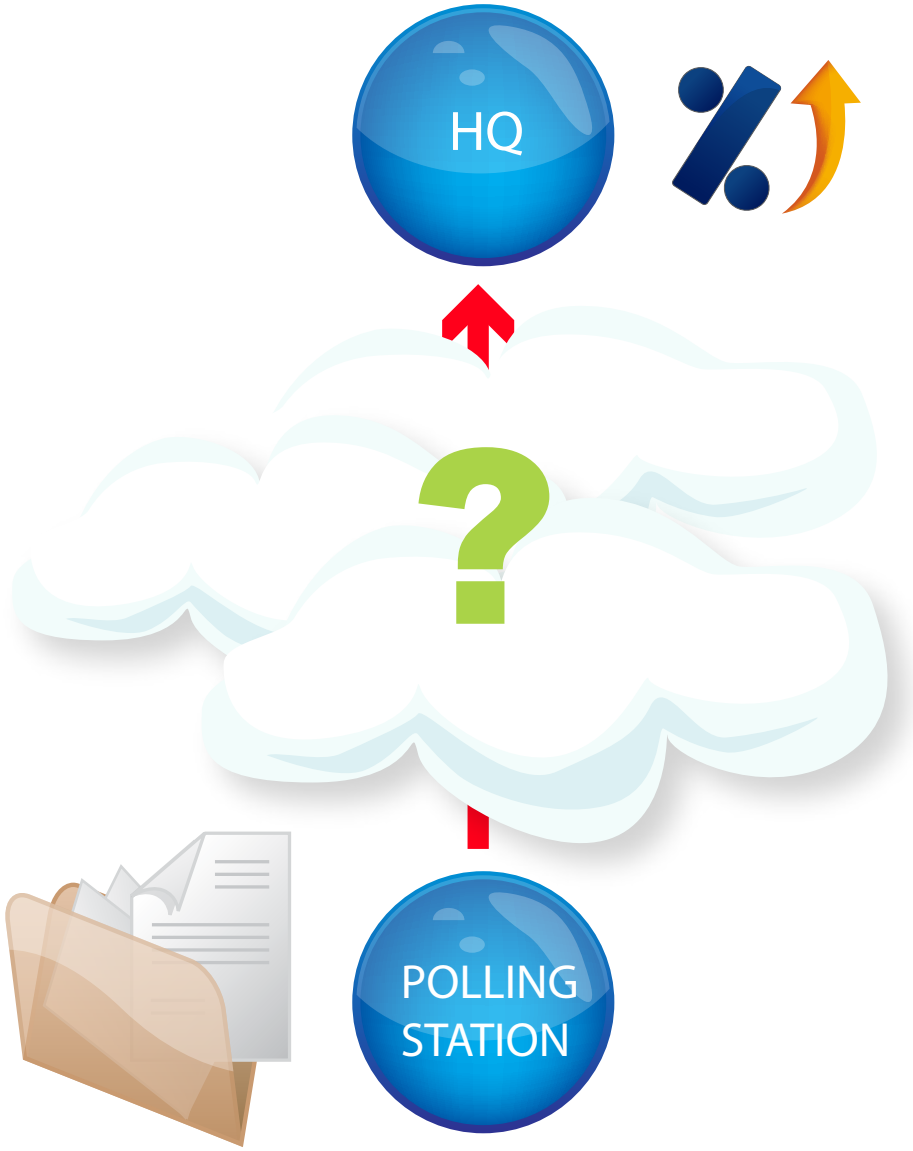


Figure 11. Results emerging from a 'cloud'
Source: JTF eLearning Course on ICT and Elections Management


MTN
MTN

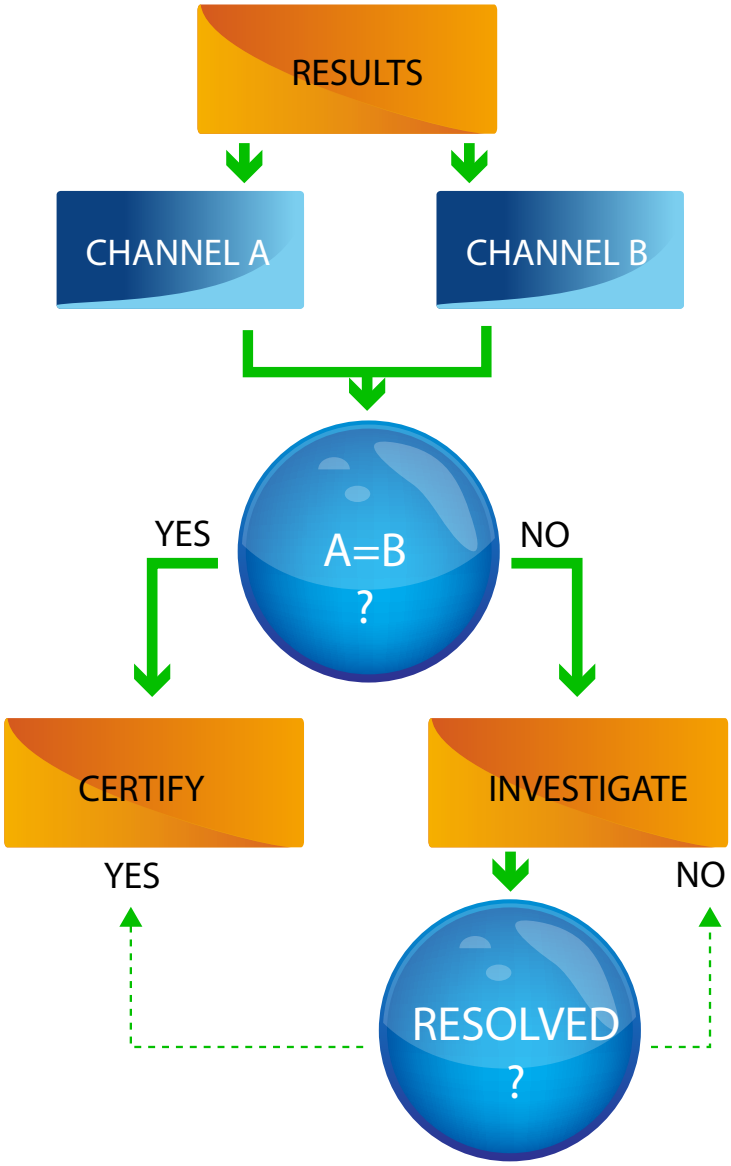


Figure 12. Schematic diagram for results management

Source: JTF eLearning Course on ICT and Elections Management

Slow and measured steps

The 'big bang' approach, where sophisticated technology is rolled out nationwide during a single electoral cycle, may be tempting, but comes with high risks. Unlike voter registration processes (where the length of time available permits some degree of remedial action in the event of problems), an EMB only gets one chance with RMS: the systems must work the first time and completely. It is therefore highly advisable to take a gradual approach to the introduction of technology in RMS. Sufficient time must be allocated for fundamental needs assessments and feasibility studies, for development and piloting of solutions, for comprehensive stakeholder involvement and for incorporating feedback into RMS prior to their use in national elections.

Countries such as Zambia that have a history of incremental technology enhancements are more likely to succeed in the long run. (From an all-paper RMS, Zambia introduced a hybrid OMR RMS before moving to the current paper/electronic system.)

Luckily, thanks to electoral events such as by-elections, referendums and local or municipal elections, technology for RMS can be introduced well in advance of general elections. This approach affords the opportunity to build confidence among stakeholders and to address problems that do arise, thereby increasing the possibility of success later on. Kenya's current RMS were introduced in stages from 2009, at first in by-elections and then in the 2010 constitutional referendum.

Important characteristics of effective RMS that do not involve or require technology include stable polling station schema; clear ownership and accountability of data (chain of custody/provenance mechanisms); complaint and dispute resolution mechanisms; audit systems and investigative/oversight resources. These characteristics can be introduced in advance or in parallel with technology in RMS but they are not optional; technology will not compensate for the lack of these features.

Appropriate technology

IT in election management—whether EVR, electronic voting or results management systems—should be easy enough to explain so that the person in the street can understand them. Voters should not have to outsource trust to a small minority of experts. 'Appropriate' also refers to the suitability of the planned RMS to the local environment. The case studies illustrate how EMBs in Haiti, Kenya, Sierra Leone and Zambia, faced with different environmental constraints, made appropriate choices in their design of RMS. In Haiti and in Sierra Leone, the lack of reliable and sufficient telecommunications networks, coupled with process control and human resource constraints, meant that the EMB in those countries decided to retain paper forms for the movement of results from polling stations to the central, national-level tally centres. Double-blind data entry from the paper forms received centrally is an accuracy-enhancing feature of both the Haitian and Sierra Leonean RMS.

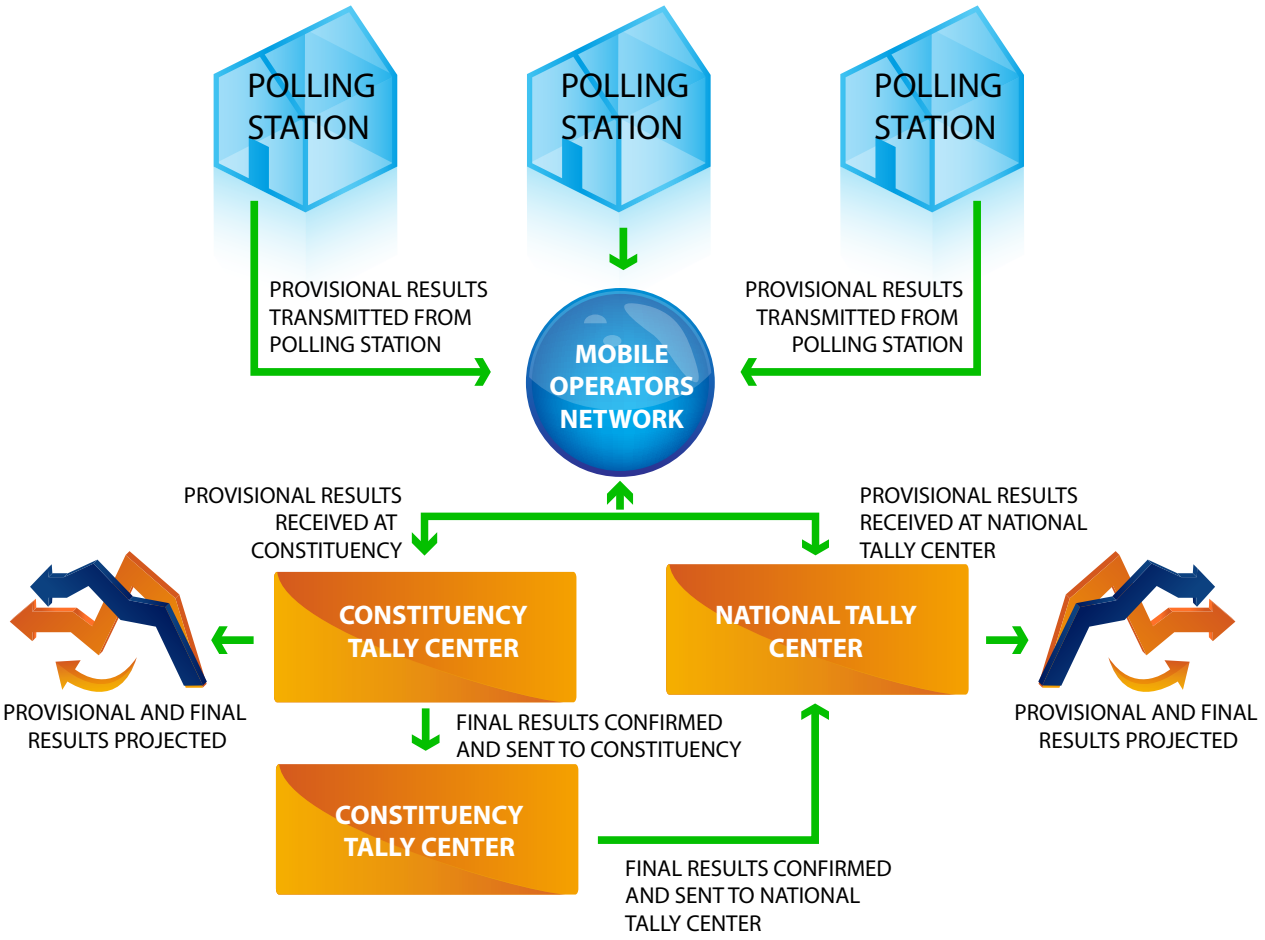


Figure 13. Kenya's Electronic Vote Tally System

Source: IEBC Kenya case study presentation at the ICT thematic workshop

For future elections, Sierra Leone envisages a de-centralization to four regional tally centres because the possibility of secure telecommunications links with this number of locations is increasingly feasible. In Haiti, the prospect of improved telecommunications means that election officials are now able to consider the use of mobile/cellular devices for the communication of results directly from polling stations. These scenarios are appropriate in that they reflect the reality of communications network availability.

As noted previously, Kenya introduced an ambitious electronic vote tally system in 2009 but did so in an incremental fashion—first in by-elections and then in a national referendum. Technical and political lessons were identified along the way, including the following:

- involve and educate stakeholders early on,
- ensure the legal framework is adequate,
- avoid reliance on a single network operator for telecommunications,
- ensure sufficient network coverage, and
- build trust, e.g., by allowing independent testing, certification and code review of RMS components.

Zambia, too, evolved gradually from a fully paper-based RMS to its current hybrid model where paper forms continue to be used at polling stations. Once these forms get to the constituency-level tally centre, the results are entered into a computer system that transmits the results, in an encrypted SMS message, to the national tally centre for further consolidation and validation.

In the past—and the present, at least where adequate polling day mechanisms are still not implemented—significant delays between the counting of results at the polling station and those results being delivered up the layers of consolidation raised frequently justified suspicions of malpractice or manipulation. However, in today's information age telecommunications are available even where there are no roads and where 24-hour news channels and the internet have reduced the gap between an event and the reporting of that event to mere minutes, not hours or days. Many stakeholders now demand instant results not because they suspect foul play, but because they are used to instant information. Even where the measures already mentioned eliminate or significantly inhibit the possibility of manipulation of results, the insatiable demand for instant results means that EMBs are under significant pressure to deliver results rapidly. Further, speedy delivery must happen without compromising integrity or accuracy.

In the hierarchy of election fraud, results manipulation offers more opportunity to impact the outcome than ballot stuffing, vote buying/intimidation or voter registration fraud. Great impact can be achieved through altering the count at the polling station, but greater still is the impact of altering the count during tabulation. Proper emphasis has been placed in recent decades on inhibiting ballot stuffing using mechanisms such as transparent ballot boxes; full reconciliation of ballot papers; and by the presence, in polling stations, of candidate and party agents and observers. As it has become harder and harder to effect polling-station level fraud, the focus of those who seek to manipulate electoral outcomes has shifted to the results process. Results management systems are a response to this threat. ICT has an important role to play, not least because of the speed of modern communications

Presentation sidebar

The following is from Franklin Oduro, deputy director/head of research and programs at Ghana's Centre for Democratic Development, who presented on 'The effect of parallel vote tabulation' on the fourth day of the workshop:

In my view, nothing stops EMBs from conducting their own parallel vote tabulation (PVT). Indeed, if professional, independent, and non-partisan EMBs have the resources (human, financial and time), they may want to mount PVT as part of their own internal checks and balances, as a mechanism for assessing the trustworthiness and integrity of their polling officials, and as a tool for ascertaining the accuracy of the final official results to be declared. However, for the following reasons, one would hesitate recommending that EMBs undertake PVT:

1. Given the nature of EMBs, their operational structures and the level of bureaucracy, it would be very cumbersome for such institutions to add PVT with similar demands, though on a lower scale, to their main responsibilities.

2. The question of whether EMBs may be able to keep the PVT data confidential prior to the conclusion of the overall vote tallying is another challenge, especially where there is a partisan EMB.

3. In an attempt to verify the accuracy of official election results, the PVT inherently assesses that integrity and credibility of EMBs. Consequently, it would be morally correct for EMBs to stay off PVT and avoid being judges over their own credibility and integrity. It is the electorates who determine how credible EMBs are based on the latter actions and inactions. If PVT is mounted by non-state, non-partisan and independent groups, it can serve as a confidence building measure among electorates.

4. Moreover, when official election results are disputed, PVT can become a credible source of verification. It is only proper that the source of this data for verification is not the EMBs but a credible, non-partisan, and independent civic group. Accordingly, instead of EMBs conducting PVT of their own, they should rather encourage credible civic groups to undertake this assignment by giving them the necessary support."

and the improved accuracy with which properly developed systems can bring to the transmission and consolidation of results. But as with ICT in any other electoral application, the technology must be appropriate, the implementation of the technology must be taken in sufficient time, and stakeholder involvement is critical for confidence. Finally, it must be understood that technology alone is not a panacea: results management systems are ultimately operated by and for people, and thus people who must be recruited, trained and properly supervised.

Parallel vote tabulation

Many EMBs are not familiar with parallel vote tabulation (PVT), though its use by civil society domestic observers is on the increase. The key characteristic of a PVT is that it makes use of a nationally representative random sample of polling stations. Actual results (not exit polls or surveys) from those polling stations are communicated, using a variety of technologies, to a central location for aggregation. Because of the statistical rigour of the sampling and communication of results, national results may be reliably projected by the PVT. In most countries, PVT results are not made public until after the official results, mainly so that there is no interference with the official chain of results announcement.

On the question of the use of PVT by EMBs, it may be said that where RMS include a second channel for the transmission of results, this might be described as a parallel tabulation. However, while it is parallel, RMS will, necessarily, include all polling stations; a PVT, typically, works with only a sample, however representative. The purpose of a PVT is to introduce a check-and-balance mechanism by civil society observers, by reliably projecting in order to flag possible anomalies. Though many stakeholders will project based on provisional or partial results, RMS are not designed to project; instead, they are designed to deliver timely, accurate and auditable results.

Plenary discussion

Though not adopted as a recommendation, there was a suggestion from the floor on the need for a comparative study of RMS (on the lines of EISA's comprehensive study of voter registration in Africa). There was limited time for discussion and most of the questions that arose were clarifications on the presentations.

The recommendation on RMS emerging from the thematic workshop plenary makes no specific mention of information and communication technologies. This may be a reflection that there is little controversy over the technologies utilized in RMS.

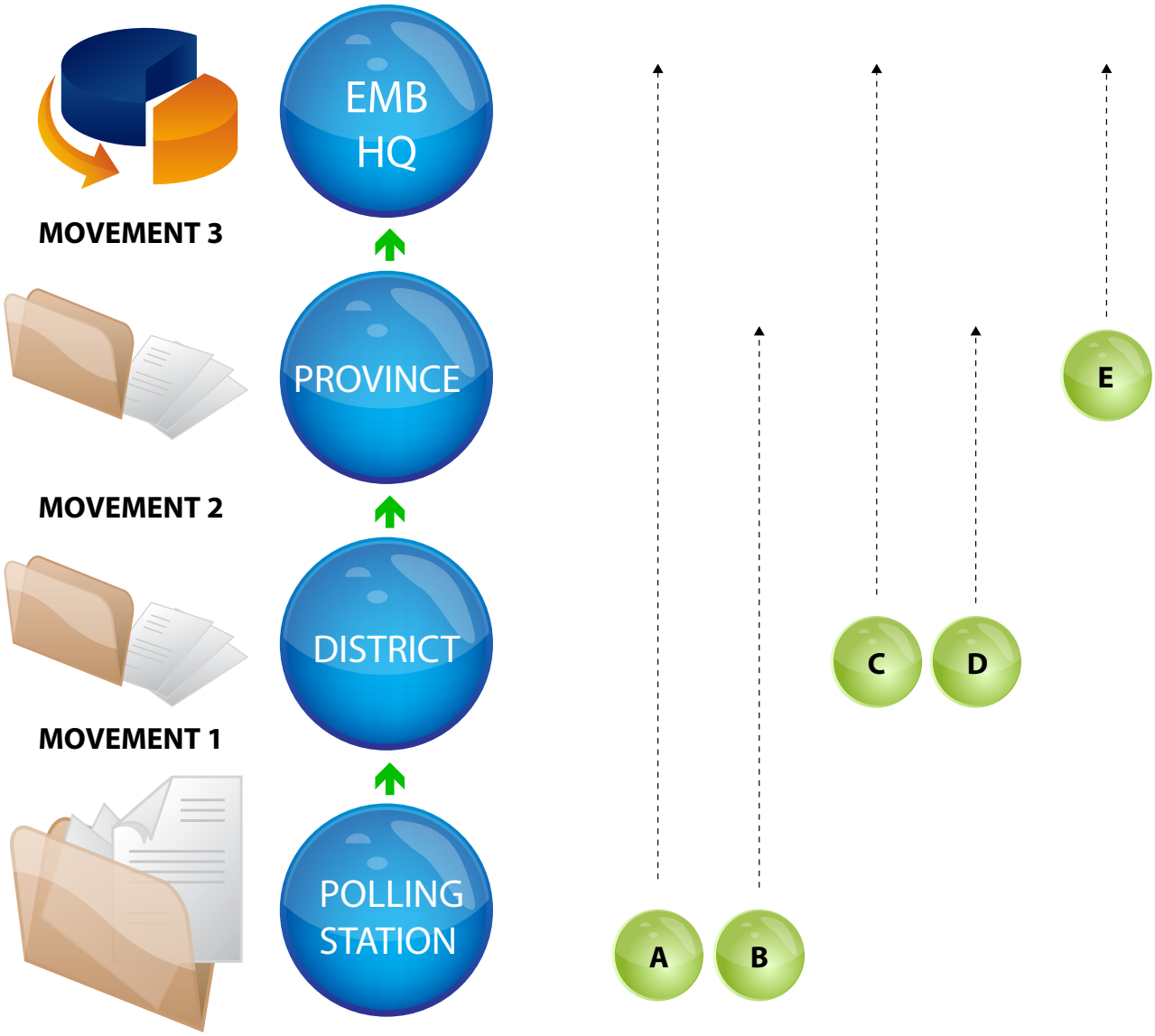


Figure 14. Diagram for PVT at various levels

Source: EU-UNDP Joint Task Force eLearning on ICT and Elections Management

Introduction to the topic of electronic voting

Some countries have introduced electronic voting, while a few more are planning on doing so, for varying reasons. Even those countries who have introduced some form of electronic voting only to later return to manual voting (e.g., Germany, Ireland and the Netherlands) might, eventually, revisit the technology. There is arguably no greater challenge or controversial technological step an EMB can take than to introduce electronic voting machines (EVMs).

The benefits are often clearer than the drawbacks. In the context of a huge country with limited infrastructure, EVMs can indeed present some considerable comparative advantage. Some of the many features of this technology that attract EMBs are an alleged reduction in polling-station fraud; rapid and accurate counting and, in some cases, transmission of results; and the elimination of ballot papers.

Establishing and maintaining stakeholder confidence and trust is one of the significant challenges. Lack of proof that the vote is either recorded correctly, or recorded at all (both in the polling station and in the final aggregation) is probably the single biggest concern around the use of EVMs. Regardless of their actual performance and accuracy, EVMs are possibly more likely to raise suspicion than they are to allow credibility and trust. EMBs must strive to consult, explain and respond in order to offset such concerns.

The theoretical presentations on e-voting drew from recent publications from International IDEA ('Introducing Electronic Voting: Essential Considerations') and IFES ('Election Technology Series: Conducting Feasibility Studies for Electronic Voting and Counting Technologies'.)[5]

Theories and typologies of electronic voting

It is important to understand what drives EMBs to adopt electronic voting and counting technologies. In most cases, the rationale is the assumed reduction of polling fraud. But the technologies offer many other potential benefits, including:

- faster results tabulation and availability,
- reduction in the number of spoiled votes,
- more convenience for voters, and
- greater accessibility, which leads to greater participation.

Cost reduction has been a justification for the introduction of the earliest electronic voting systems. (This was the case in India, for example, which used to use over 800 metric tonnes of paper for each election.) However, the increased complexity and cost of electronic voting systems pushes back the cost benefits. Costs associated with the following could offset any savings achieved in the elimination of ballot papers: adding a voter-verified paper audit trail (VVPAT), making provision for auditing and certification, and recruiting, training and retaining skilled staff to operate and support increasingly complex systems on polling day.

5 Available at www.idea.int and www.ifes.org respectively.

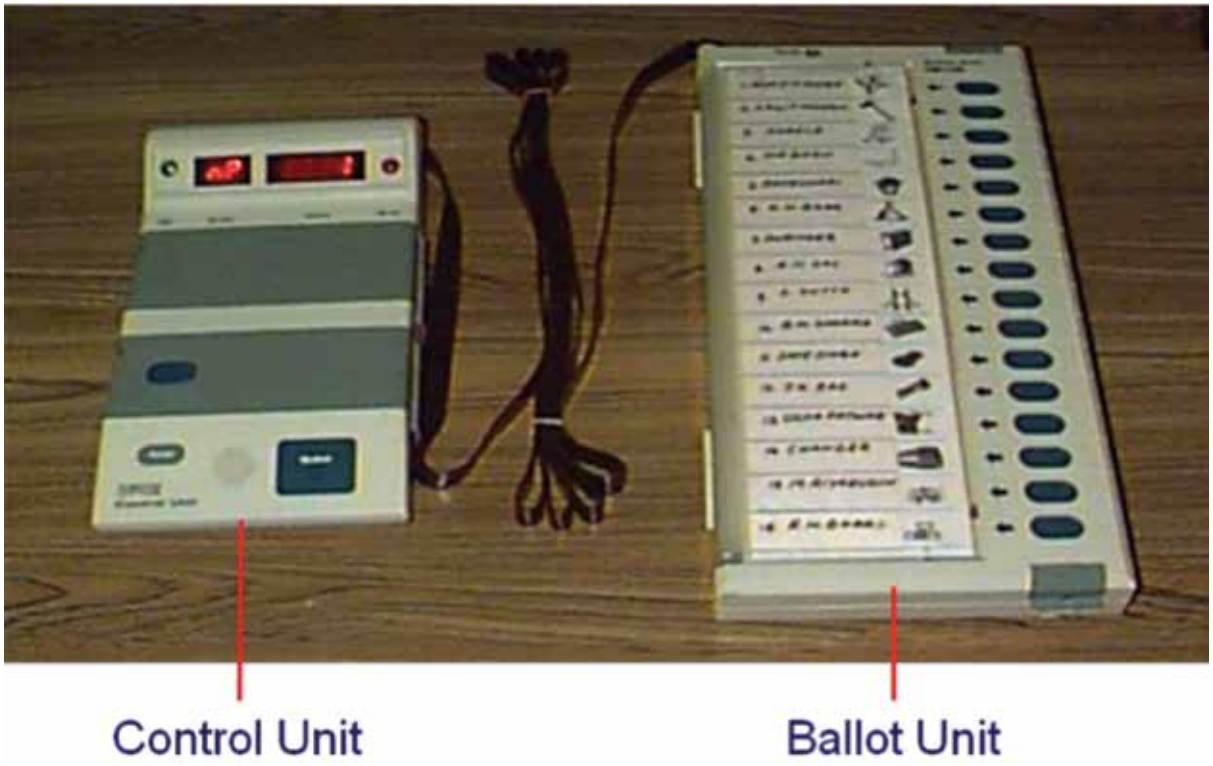


Figure 15. Indian electronic voting machine
Source: Presentation by the Electoral Commission of India (ECI) at the ICT thematic workshop

Electronic voting technologies typically fall into one of four categories. The first three are the following:

1. Direct recording electronic (DRE) voting machines. These machines are in a polling station and voters press buttons or make a selection on a touch-sensitive computer screen. The machines may or may not include a voter-verified paper audit trail (VVPAT).

2. Optical mark recognition (OMR) solutions where the voter marks a special ballot paper (which may resemble a lottery ticket in format) that is then passed through a scanner that reads the voter's choice. This machine can be in the polling station or at a central count location.

3. Electronic ballot printers (EBP) are similar to DRE voting machines but the printed output is the ballot paper which is then placed in a ballot box or into a separate scanner.

As these three technologies are employed within EMB-staffed polling stations, they are often referred to as e-voting 'within a controlled environment'.

The fourth category comprises internet-based voting systems, which allow voters to cast their ballots from computers connected via the internet to the EMB's central servers. In some cases, the computer in question will be in a public kiosk; more often, though, the voters' own computers are used to allow internet voting from home, work or school.

Some important considerations above and beyond the basic typologies include the following:

- Is there independent physical evidence of the vote cast?
- How will the system be independently audited, certified and observed?
- Does the system authenticate the voter?
- Who developed the system—local or international suppliers?

Note:

There is one other current system in use that is a form of hybrid between manual and electronic voting. This is where voters register to receive a downloadable ballot by email that can be printed, such as in Egypt in 2012. The voter then returns the ballot by regular mail in a special envelope that allows the EMB to register receipt of the ballot and to reject any further ballots arriving from the same voter, in the event that the ballot is printed more than once.

Figure 16. Philippines OMR E-voting machine
Source: Presentation by COMELEC at the ICT thematic workshop

During the plenary discussion the question arose as to how a voter can be sure that the vote he or she casts is accurately reflected in the final result. One of the defining challenges of electronic voting systems is that of reconciling the conflicting requirements of transparency (in order to demonstrate that the system is operating fairly and accurately and to allow voters to know that their votes were cast and counted) and secrecy of the ballot (to prevent intimidation of voters and vote-buying). A VVPAT —sometimes referred to as VVAT (voter verified audit trail)—may offer the voters physical evidence of their choices, but may not prove to voters or other stakeholders that the votes were transmitted and counted subsequently. Other technical mechanisms exist that, though complex, can confirm that a given vote was cast, transmitted and counted. Poorly designed VVPATs increase the possibility of vote buying and intimidation. The same may be said for internet voting in uncontrolled environments: how can it be ensured that the person casting the vote is the legitimate voter? How is it possible to know that a voter has not 'sold' his or her vote? Or that he or she is not casting a vote on the internet with a gun to the head (either metaphorically or literally)? By insisting on open source solutions and mathematically provable verifiability, Norway was able to achieve maximum transparency for its Internet voting solution. Also, the Norwegian solution requires a paradigm shift in observation: the EMB can audit the system and share the audit results with third parties, but the individual voters themselves must verify that their votes were properly tabulated and counted. The conditions that prevail in Norway do not often prevail elsewhere, particularly the very high level of trust in elections and those who manage elections but also the low risk of vote buying or intimidation. [6]

Feasibility studies, piloting, planning for success

The following are some key advisory steps for adequate consideration of introduction of an e-voting system:

- Identify the goals clearly. Is e-voting the solution to the problems that the EMB is trying to solve?
- Get stakeholder buy-in. More than any other electoral technology, this is an essential pre-requisite to successful introduction of e-voting.
- Provide for auditing and certification. Allow time for this in both the legal framework and in the electoral calendar.
- Allow enough time for technical implementation and social acceptance. This refers not just to the development time, but also to the human side (training, user trials and feedback).
- Consider carefully the total cost of ownership (TCO)—software updates, configuration of ballots, storage, hardware upgrade, end-of-life costs.

More time should be allocated for the introduction of e-voting solutions than for any other technology in election management. Those systems that appear to have been introduced successfully in large democracies with well-resourced EMBs (particularly Brazil and India) can be distinguished by their incremental and lengthy approaches.

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Technical Manager, International IDEA

6 The problem of family voting, where a family member votes on behalf of or coerces a voter, reportedly was the only real controversy in Norway's Internet voting pilot.

7 Reproduced by permission of International Institute for Democracy and Electoral Assistance (International IDEA) from 'Introducing Electronic Voting: Essential Considerations

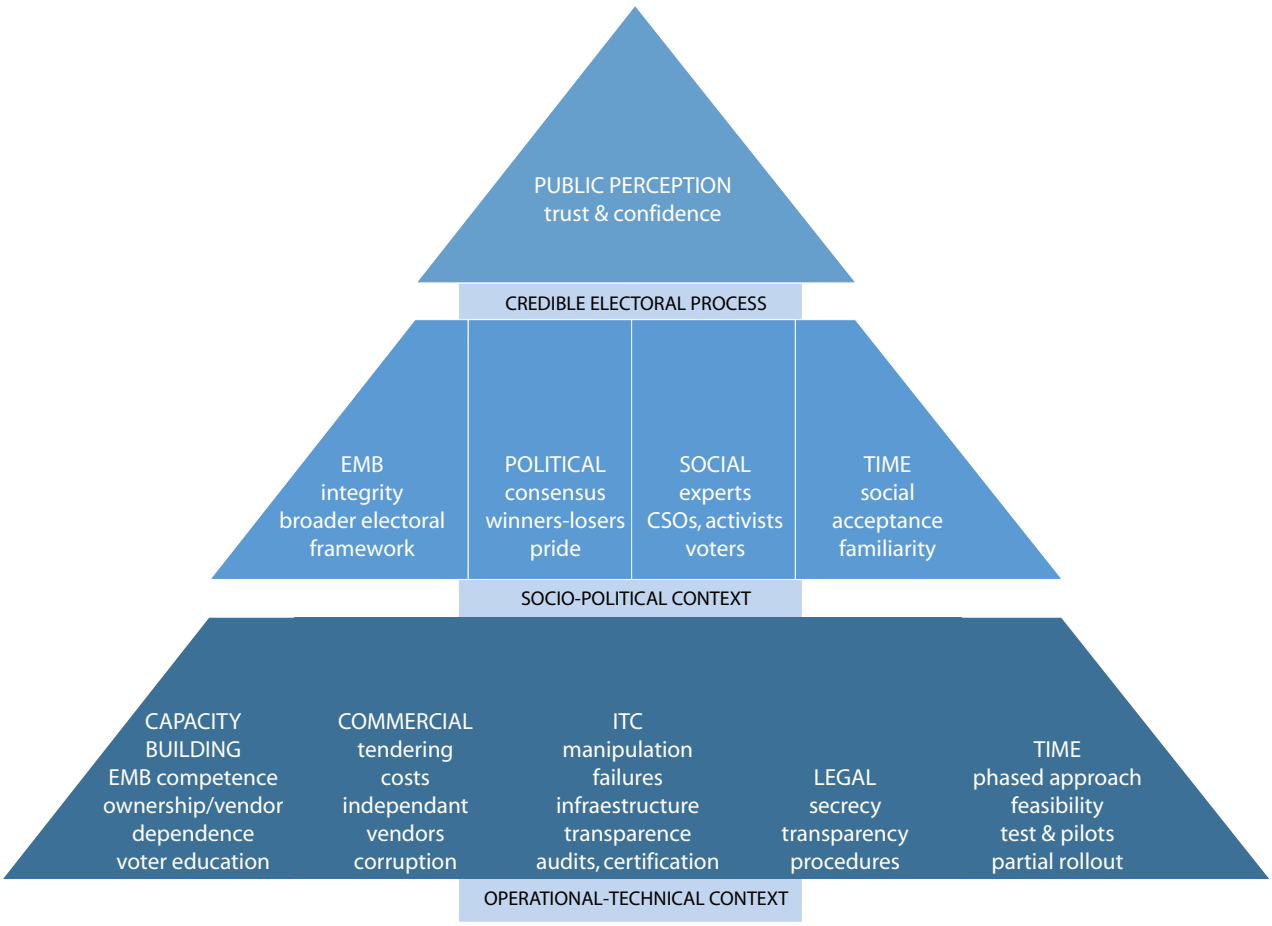


Figure 17. Pyramid of trust

Source: IDEA's publication, 'Introducing electronic voting: essential considerations'[7]

Feasibility studies: the meaningful foundation of informed decision-making

It is important to emphasize that the following discussion of feasibility studies, while presented during the session on electronic voting, is applicable to any technology being considered for electoral processes – VR, RMS, candidate nomination, political party registration and so forth.

The following is one useful definition of a feasibility study:

> *"A general term that refers to various types of systematic evaluations carried out to better assess the desirability or practicality of further developing a proposed action. Such studies are typically performed during the planning stages."*[8]

Done properly, feasibility studies are complex, time-consuming and multi-disciplinary. The complexity comes from the need to establish not only the technological feasibility, but also the operational, legal, political, financial, and environmental feasibility. Conducting a feasibility study therefore requires a mixture of the skills and expertise found only in a multi-disciplinary team and rarely, if ever, in an individual. Good feasibility studies take time because each of the elements is inter-dependent, because getting the right people or team to conduct the study takes time and because their work may require follow-up with stakeholders.

Too often, the feasibility study for an electoral technology is conducted by an IT consultant who may have world-class qualifications in and experience of technology, but who will, in all likelihood, lack skills or experience in the other necessary disciplines (e.g., operations, logistics, legal, financial or political analysis). Typically, highly technical people regard most solutions as technically feasible and therefore approach a feasibility study as an implementation challenge. Should an EMB make the mistake of opting to have the feasibility of a particular technology determined by a vendor, that EMB may be sure of a positive report.

The most common flaw in feasibility studies is predetermined outcomes—that is, when the study is conducted on the understanding, tacit or otherwise, that a positive outcome will be delivered. Feasibility studies should always seek to ask whether the technology should be implemented. Only then should the question of how be addressed.

What should an EMB seek and expect from a feasibility study? Firstly, it wants to know if a technical solution exists that would, all other factors considered, deliver the requirements for

"The advantages commonly attributed to e-voting technologies also have corresponding disadvantages, often less publicised: their respective weighting in choosing an e-voting application must depend on the context, otherwise what is generally perceived as a solution might turn into a problem. For example, counting and tabulation speed, with the related elimination of human mistakes in this process, might be offset by lack of transparency and limited understanding of counting procedures. This principle equally applies to all other key features of e-voting"

Domenico Tuccinardi
NEEDS Director

8 Source: www.i395-rt9-study.com/glossary.html.

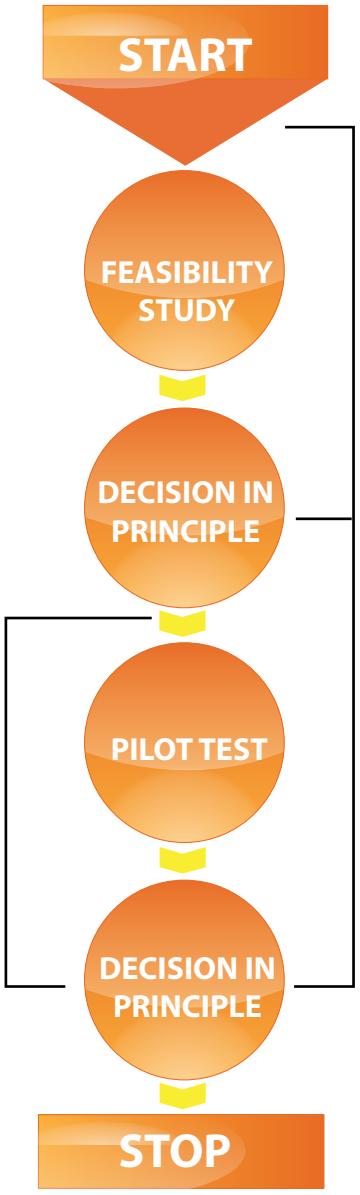


Figure 18. A feasibility study is an iterative process

Source: Presentation by Ronan McDermott at the ICT thematic workshop

the country. As outlined in the presentations during this session, every advantage of electronic voting and counting technologies comes with a counterpart disadvantage. Determining whether, on balance, the advantages outweigh the disadvantages (that is, the 'benificiality') is extremely tough given the challenge, for example, of comparing the price of technology (which is quantifiable, however frequently underestimated) with something as nebulous as the potential increase in electoral integrity due to suppression of retail fraud. Financial feasibility refers not only to the comparison of costs of the old, paper ballots with the new technologies, but also to the capacity of the EMB and the country to procure, deploy, support, maintain and, given the finite lifespan of all technologies, replace any electronic voting and counting technologies envisaged. Even if cost savings over multiple electoral cycles can be projected, the high capital cost of such systems may be too much to bear for a developing country. Finally, a feasibility study must include a comprehensive assessment of stakeholder acceptability. Any significant lack of trust in the EMB should give serious pause to the authors of a feasibility study. As one presenter put it, "E-voting will never make up for lack of trust". The case studies and plenary discussions that followed echoed and reinforced the importance of trust.

International standards should guide the conduct of a feasibility study. There is a growing list of standards and guidelines on electronic voting. Even if they are not legally binding in a country, they are a valuable resource. Not all negative impacts of the introduction of technology that might result in a breach of an international standard are immediately apparent. For example, if, because of limited budget, an EMB is forced to reduce the number of polling stations at which it can deploy electronic voting machines, citizens may be forced to travel longer distances to cast their votes. This may result in decreased suffrage and open the country to an accusation of breach of the International Convention on Civil and Political Rights (ICCPR).[9]

The IFES publication[10] details the categories of potential participants in a feasibility study process. The main player is the entity that mandated the feasibility study; for example, did it arise from a government or parliament, or was it the EMB itself that initiated the study. The list of participants should obviously include not only the EMB itself, political parties and civil society, but also the academia, the local technology sector, the country's development partners (particularly if they will be asked to contribute) and, potentially, actual users.

The IFES publication recommends that a committee, including smaller working groups that focus on specific sub-tasks, should be established for the feasibility study. A key message is that, in order to avoid vendor dependence and skewed priorities, it is essential to manage the relationship with vendors. Dialogue with vendors is inevitable, but must be conducted on the terms of the feasibility study and not vendor-led. Discussions with vendors must also be cognizant of the applicable procurement rules, even if no active procurement is underway at the time of the feasibility study.

How long does it take to do a feasibility study? A good benchmark would be to allow a minimum of six months for an effective one. It is important to bear in mind that the procurement process for major information technology can take up to a year from concept to deployment. The iterative approach that involves revisiting

9 ICCPR provisions relate to, inter alia, suffrage.

10 'Electronic Voting and Counting Technologies: A Guide to Conducting Feasibility Studies', IFES, 2011, available at www.ifes.org/~/media/Files/Publications/Books/2011/Electronic_Voting_and_Counting_Tech_Goldsmith.pdf

the feasibility study as well as the pilot testing (as outlined in Figure 18) may take years. The Norwegian case study recommends three to four years 'from idea to pilot'—and this is just to pilot, not full rollout!

Trust, more trust and loss of trust

Research has shown, and both the case studies and many questions that arose during the workshop bear out, that regardless of the absolute level of integrity a given electronic voting system may demonstrably offer, it is the level of trust that is the primary indicator for the success or otherwise of these electoral technologies. Sometimes, a perfectly trustworthy technology fails because of the lack (or loss) of trust in the EMB.

EMBs or governments that railroad the introduction of such technologies or which fail to fully engage stakeholders (including the sceptics) run a risk of failure. Even well-established electronic voting systems can, long after their introduction, be the subject of questions about integrity and trustworthiness.

Countries such as Germany, Ireland and the Netherlands, which have abandoned or stepped back from the use of electronic voting systems, defy the logic that high technology and high literacy go hand in hand. A closer read of the case studies reveals that the technology alone was not the issue (indeed, it rarely is). In Ireland, a political consensus on the use of electronic voting rapidly dissipated following a failure by the relevant minister to address reasonable concerns raised by competent and genuine stakeholders. The subsequent political row led to the appointment of a Commission on Electronic Voting. This commission rejected the already procured electronic voting system in language that, however indirect, reflected the complete loss of trust:

> *"…the Commission finds that it is 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. The Commission wishes to emphasize that its conclusion is not based on any finding that the system will not work, but on the finding that it has not been proven at this time, to the satisfaction of the Commission, that it will work."*[11]

The Indian electronic voting system, used by more voters than any other system globally, has many embedded technical features designed to inhibit manipulation. However, the integrity of any election conducted using machines depends on the totality of the hardware, firmware and administrative procedures. Given unfettered access, most available direct recording electronic (DRE) machines (not just the Indian one) can be compromised. That over three quarters of a billion voters in India trust their electronic voting systems is a tribute to the Electoral Commission of India's persistence in reviewing the procedures and the specifications.

One issue that arises in regards to electronic voting was highlighted in a question asked during the plenary discussion. Does a voter have the right to leave the electronic ballot paper blank? This is implied in a paper system but must be explicitly engineered into any electronic system.

11 'Interim Report of the Commission on Electronic Voting on the Secrecy, Accuracy and Testing of the Chosen Electronic Voting System', page 7, Executive Summary, Commission on Electronic Voting, Ireland, 29 April 2004, available at http://m.epractice.eu/files/media/media_812.pdf

India, Brazil, the Philippines, Venezuela, the United States, Belgium (about 50 percent) and France are examples of countries where electronic voting is widely used.

Just are there are young people in their twenties today who may never lay their hands on a fixed-line (copper wire) telephone, there are surely babies born today who may never vote using a paper ballot—or do so in a polling station for that matter. The technology of electronic voting and internet voting are nascent and problematic, but their gradual introduction in many countries would appear almost inevitable. The challenge for EMBs is to ensure that this process of evolution from paper ballots to electronic and internet voting is feasible, managed, piloted and trusted.

The Ireland case study ended with a list of considerations for EMBs. They are worth repeating here:

- transparency is not negotiable,
- consensus means more than the absence of dissent,
- do not dismiss stakeholder concerns,
- trust is a delicate thing,
- keep procurement competitive,
- take a broad view of cost benefit,
- consult, consult, consult, and
- learn from the mistakes of others—these lessons are free!


ICT and Elections

Thematic Workshop on ICT and Elections Management

Recommendations at the Conclusion of the Workshop

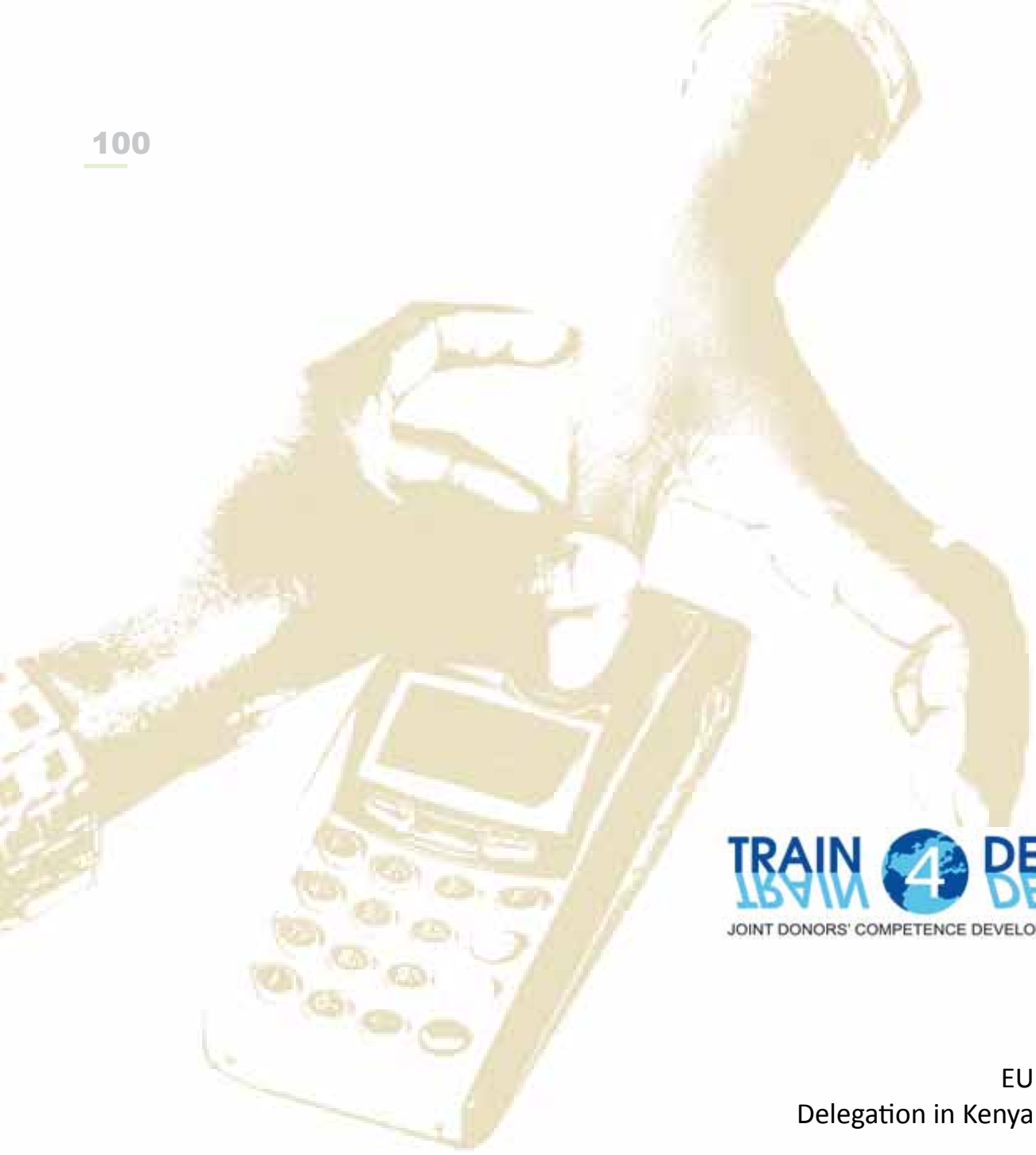
Recommendations

No	Category	Recommendation	Narrative/justification
1	Generic	Do not rely on ICTs to solve structural issues effecting elections.	This recommendation is over-arching and is based on multiple presentations, contributions and case studies.
2	Generic	Electoral laws and amendments should not be specific about the use of technology.	It is the role of the EMB to determine, based on comprehensive feasibility studies, whether technology or a specific technology is appropriate for a given electoral process. When electoral laws or amendments are too specific with respect to technology, EMBs may be forced into adopting inappropriate or unsustainable systems.
3	Generic	Electoral laws should take into account data protection and privacy.	It is preferred that a country has a generic data protection and privacy legal framework. However, EMBs must take these issues into account.
4	Generic	The decision-making process on ICTs must be characterized by early and ongoing consultation with stakeholders	Experience shows that trust and confidence are enhanced by early and wide consultation.
5	Generic	The introduction of ICTs must be preceded by feasibility studies that are: • broad in scope, • comprehensive and • consultative	This refers to nationally conducted and broad feasibility studies—not just needs assessments and feasibility studies conducted by the UN or other development partners.
6	Generic	The introduction of ICTs into electoral processes must be undertaken based on realistic timelines and according to the EMB's strategic plan	Lack of time is a key factor in unsuccessful ICT projects.
7	Generic	A global glossary of electoral terms should be created that will act as a learning tool and a standardised reference resource for those responsible for identifying and implementing ICTs	This suggestion came as a result from a request from the floor at the workshop.

No.	Category	Recommendation	Narrative/justification
8	Generic	Enhance national ownership of ICTs in electoral processes by: • strengthening EMBs' human resources vis-à-vis ICTs, • addressing the problems of recruitment and retention of properly skilled ICT staff at EMBs, • preferring 'build' over 'buy' policies, • considering open source solutions alongside proprietary solutions, • preferring, where possible, open source over proprietary solutions, • developing locally where appropriate, • ensuring all ICT procurement leaves full national ownership and control of intellectual property and data.	This is a consolidation of several recommendations from the floor and from case studies at the workshop.
9	Generic	Enhance sustainability in electoral processes by: • seeking long term cost-effective solutions, • applying appropriate technology, and • encouraging governments to aim at self-funding in a realistic timeframe.	This is a consolidation of several recommendations from the floor and from case studies at the workshop.
10	Generic	Improve the success of ICTs in electoral processes by involving EMBs in all stages of development and testing.	Relates primarily to scenarios where ICT solutions are being procured.
11	Generic	Be fully transparent in the introduction of ICTs in electoral processes, whether developed or procured.	Reflects the many presentations, case studies, comments and recommendations that referred to the need for transparency.

No.	Category	Recommendation	Narrative/justification
12	VR	Explore greater South-South and similar inter-agency and regional co-operation with respect to both hardware and software and the technical expertise necessary for ICTs in electoral processes.	Reflects several suggestions from the floor of the plenary. Any such co-operation should follow comprehensive feasibility studies.
13	VR	The identification of citizens is the responsibility of the state. It is recommended that states fulfil their responsibility for civil registration so that EMBs can fulfil their voter registration mandates. The recommended sequence is civil registry and then voter registration.	Mixes several suggested recommendations from the plenary on the relationship between civil and voter registries and also on the respective roles of EMBs and whatever agency is responsible for civil registration.
14	VR	When linkages are being established between databases at EMBs and other agencies, great care must be taken to design protocols and procedures that ensure that the independence of EMBs is not compromised.	Reflects the concern at loss of independence of EMBs where voter registries are based on data sourced from other agencies.
15	VR	EMBs should conduct regular data quality reviews that benchmark the quality of their voter registration databases.	As recommended by the Indian participant and echoing the VR update strategies presentation on Day 1.
16	VR	Strategic decisions on the continued use of existing voter registration databases must consider empirical information.	Also based on VR update strategies presentation on Day 1.

No.	Category	Recommendation	Narrative/justification
17	E-voting	The introduction of electronic voting technologies should only be considered when: • the issues of civil and voter registries have been resolved, and • there is significant trust in the EMB.	A consolidation of multiple suggestions and recommendations. The issue of trust is highly significant.
18	E-voting	More time should be allocated for the introduction of e-voting technologies than for any other ICT in electoral processes.	Reflects international best practice showing that countries that have successfully introduced e-voting have taken many years to do so and have taken an incremental approach.
19	E-voting	Global e-voting experiences should be researched and documented for the benefit of EMBs considering their implementation.	Reflects the demand for information other than that from e-voting equipment vendors.
20	E-voting	The introduction of electronic voting should be built on four cornerstones: • tight technical security features in systems, • strong administrative and procedural measures, • complete transparency with stakeholders, and • proper storage and security	As suggested by the Indian participant from the floor.
20	RMS	Results management systems (RMS) should ensure that all levels of results—from polling station through every interim consolidation to the national level—should be completely transparent and verifiable by any stakeholder.	Key principles of results management systems.



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