Observing the Use of Electoral Technologies:

A Manual for OAS Electoral Observation Missions

General Secretariat of the Organization of American States (GS/OAS)

José Miguel Insulza
Secretary General

Albert R. Ramdin
Assistant Secretary General

Víctor Rico Frontaura
Secretary for Political Affairs

Pablo Gutiérrez
Director
Department for Electoral Cooperation and Observation

Organization of American States ———————————————————————————

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1. Introduction

The OAS work on electoral cooperation and observation as well as its research and analysis of the subject suggests that the countries of the region are increasingly using new technologies in the administration of elections. From computer programs used to register candidates or handle other types of election-related procedures to modern systems for the transmission of results and the use of electronic voting machines, very few processes have been devoid of the use of these technologies.[1]

In light of the growing use of information technologies in elections in the region, the OAS Department for Electoral Cooperation and Observation (DECO), as part of its process of systematizing and standardizing Electoral Observation Missions (OAS/EOMs), has been developing a series of methodologies to help the Organization improve its observation tools. The goal is to help strengthen member states' electoral systems as well as the institutions that run them.

The SG/OAS has a recognized and longstanding track record in observing elections. There has been a growing need in this area to modernize observation methodologies and techniques through the design and application of a standardized methodology, one that is specially created for situations in which technology plays an important role in the electoral process.

In a highly automated electoral process, new administrative mechanisms are established that make it possible to guarantee the free exercise of the right to vote. The implementation of such mechanisms must be progressive and gradual, and must guarantee the security and confidentiality of the vote, the identification of the elector, the integrity of the results, and the transparency of the electoral process.

Generally, one of the principal issues in the use of electoral technology is electronic voting; however, it is worth noting that before ballots can be cast electronically, it is essential to successfully handle other phases that may also have technology components. These include the registration of candidates and political organizations; inclusion in the voter registry; electoral mapping; the modernization of all necessary documents for the electoral process; the consolidation of a technology infrastructure and reliable, secure communications; the incorporation of the preliminary election results transmission system to transmit preliminary election results; the effective publicizing of new systems among all users, especially among electors who have the most difficulties assimilating and using the new tools; and the updating of regulatory standards.

One of the benefits of using information technology in the various phases of an election is that it can speed up the process, even making it easier for voters with disabilities to cast ballots, and also cuts down on the time required for the transmission and presentation of results. The incorporation of technologies into the process of voting seeks, among other things, to bring agility, transparency, reliability, and security to the electoral process.

Both in terms of electronic voting and the use of technology in the various stages of the electoral process, it is important to keep in mind the following factors, among others: a) the differences among electoral systems; b) the political system in each country; c) the level of confidence in electoral management bodies; and d) the degree to which voter information and education is adequate for the effective use of the technology being implemented.

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[1]   Organization of American States. The 2005-2006 Electoral Cycle in the Americas: A Review of the OAS General Secretariat. 2007, p. 19.

As part of the process of standardizing and systematizing the work of the OAS in the electoral arena, and to complement other manuals already designed by the OAS/DECO,[2] this manual covers aspects that should generally be considered in the observation of elections in which technology is a factor. The following section describes the work methodology for the EOM Core Group in general and its information systems specialists in particular. The third section reviews the various aspects in which information technologies can be used to organize and run elections in the context of the three stages of a process: the pre-electoral stage, the day of the election, and the post-electoral stage. The fourth section, meanwhile, contains a glossary of terms related to the use of technology in the electoral context, and the last section includes the "Observation Questionnaire for a Highly Automated Process," a standardized tool designed to gather information on this topic and other annexed documents.

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[2]   These include: A Manual for OAS Electoral Observation Missions, along with the manual entitled Methods for Election Observation: A Manual for OAS Electoral Observation Missions, among others.

2. Methodology

This manual is intended for long and short-term observers, in particularly the Core Group who are technical staff who are specialized in various key topics related to the electoral process, as well as the mission's information systems specialist. As was mentioned previously, this manual complements other manuals for OAS Electoral Observation Missions which describe, in detail, the objectives of an OAS/EOM, what is observed, in favor of establishing methodologies that allow a more integral observation.

Early on in the process of setting up a mission, the Core Group (under the coordination of the information systems specialist) and the long-term observers should conduct an analysis of the situation regarding the use of technology in the electoral process that is about to be observed. They should present a report along the lines of the "Observation Questionnaire for a Highly Automated Process" (see Annex 1) to the Chief and Deputy Chief of Mission. Similarly, an executive report should be prepared, along with any complementary documentation that may be appropriate. This report should be used to modify the questionnaires that are traditionally used on the day of elections by OAS observers, so as to include specific points related to the use of technologies.

The "Observation Questionnaire for a Highly Automated Process" is a tool that can be used to register the technological aspects of an election. It consists of a general section that includes topics that all information systems have in common, along with a specific section that includes all the aspects that should be observed and that come into play in an election with these features. The results of this questionnaire should indicate the degree of automation present in the election observed.

Based on the analysis of the degree of automation in the electoral process observed, the EOM General Coordinator, in coordination with the Core Group, will prepare a training session for the short-term observers, in which they are given guidelines and aspects to consider with regard to the process being observed.

In sum, this manual is organized by the tasks that should be carried out during the various stages of the electoral process:

1. Observation during the pre-electoral stage
2. Observation of Election Day
3. Observation of the post-electoral stage

In sum, this is a general guide, and its application will depend on the degree of automation presented in each election observed. To carry out this methodology, it is necessary to conduct a series of activities, which include the following[3]:

- **Gaining a general understanding of the electoral process and the technology being used**
  - Collecting information about the legal framework.
  - Collecting information about the electoral technology (interviews with specialists, visits to installations, review of documents and manuals, opinions of main technology-related actors, press).

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[3]   For a description presented in graphic form, see Annex 2, Technical Analysis Framework.

- **Validating the transparency of the technology used in the pre electoral phase:**

    - Obtaining information about activities for review, certification, tests, and technology audits (done by the electoral management body, political parties, or others).

    - Obtaining information about activities for publicizing and providing training in the use of technology.

    - Observe the quantity and quality of activities for review, certification, tests, audits, publicizing, and training that are conducted.

- **Validating the transparency of the use of technology in the course of the electoral process.**

    - Establish guidelines for technical observation in the field.

    - Observing the official activities of electoral management bodies.

    - Observing the work of the main consolidation center.

    - Evaluating the severity of incidents reported by observers.

- **Providing information to the Mission.**

    - Keeping the Chief and Deputy Chief of Mission and the Core Group informed about the technical aspects of the process.

    - Prepare the training for short-term observers.

    - Filling out forms for the observation of a highly automated process.

    - Preparing an executive report.

    - Attaching supporting documentation.

    - Modifying questionnaires for the day of the election.

    - Preparing training for short-term observers.

3. The Highly Automated Electoral Process

This chapter presents a general overview of the elements of automation that might be observed at each stage of the electoral process. This overview also serves as a guide that will help the Core Group and the observers conduct a preliminary review of these elements and follow up on the development and preparations for the election, paying particular attention to aspects that should be carried out when technology is used.

One of the most important aspects to be observed in each phase is the oversight that should be done by the principal actors in contention, such as the political parties, and by social organizations, as well as the internal auditing systems done by the electoral management body itself.

Best practices in the use of technology include the use of international standards or certifications—such as the ISO (International Standards Organization) benchmarks in the areas of information security and quality management—as well as the periodic implementation of external and internal audits of the electoral registry and of information systems. Observing these practices provides a useful guideline to see whether information and communications technologies (ICTs) are being developed and implemented in line with international standards. Similarly, the observation of the results of external audits, if these exist, can indicate the reliability and integrity of the electoral registry.

In each activity that involves the use of technology, it is also important to observe whether technical and user manuals exist and are up-to-date, and whether the various actors in the process are familiar with them.

3.1 During the Pre-Electoral Stage

This stage is very important in the observation of highly automated elections and is the one that differs most from processes that are largely manual in nature. In general, the ideal is to be able to deploy the OAS/EOMs far enough in advance to be able to observe the process in its totality, even from the time elections are called. In the case of elections that use electoral technology, the information-gathering process should begin accordingly, since the use of information systems and applications require technical tests that are usually carried out before the day of the voting. That allows enough time to make any necessary improvements to the system in question and thus to guarantee that it will function appropriately on Election Day.

To consider the degree and use of technology in each activity in the pre-electoral stage, the following aspects should be observed:

3.1.1. Analysis of the Legal Framework with Emphasis on the Rules Governing the Use of Technology in the Electoral Process

The legal framework is extremely important when it comes to using technology to automate the various stages of the electoral process. Particularly when any stage undergoes significant changes as a result of automation, the use and implementation of electoral technologies should be standardized and regulated.

The legal norms that are put in place may specify guidelines to be able to acquire, develop, and apply technology by the electoral management bodies.

It is particularly important to identify what the law specifies regarding the voting process or electronic voting. It is essential for the OAS/EOM to take into consideration the regulatory framework in observing the use of technology. In this case, the information systems

specialist should obtain and analyze the information with the legal specialist of the OAS/EOM[4].

3.1.2. Registration of Political Organizations and Candidates, and Oversight of Election Campaigns

The registration of political organizations and candidates is conducted during the electoral period for which technology can be implemented, specially, for the input, validation, presentation, and auditing of the information. Among the technology tools that can be used are the following:

- Word processor
- Spreadsheets
- Database
- E-mail
- Electronic storage applications
- Internet
- Intranet
- Extranet
- Computer software
- Optical scanning systems
- Security systems
- Biometric identification systems
- Accounting systems
- Budgeting systems
- Auditing tools for data analysis
- Communications

The main activities to be observed include the following:

a) Registration of Political Parties. Political parties must be registered with the electoral management bodies to be legally represented and to be able to participate in an electoral process. A series of requirements must be met in order to register; these include a great deal of information that must be received and processed by the electoral management bodies. In this regard, the use of technology can support and speed up this process.

Depending on the capacity of the political organizations, information may be presented in an electronic format or on paper. The information systems in place should be able to receive this information in either format.

If this is done electronically, the electoral management body should designate a standard format in which the political organizations can present their information to be entered into the system. A Web-based option could also exist, in which the parties themselves directly enter the information into the system.

If a print format is used, which is usually done using templates designated by the electoral management body, the system should be able to scan the information and convert it to a digital format. Another approach is to have trained personnel available to digitize the information and enter it into the system.

Once the electoral management body has the information, it should have the capability to process and validate it. To do that, it must have equipment, systems, and databases capable of managing the information, including biometric identification systems.

b) Nomination of Candidates. Legally recognized political parties may nominate and register candidates for posts that are elected by popular vote. Some countries allow the registration of independent candidates for certain posts.

Once the legal procedures have been met, the registration of the candidates can also be carried out electronically or by using printed forms, both formats should be designated by the electoral management bodies.

There are various information systems for candidate registration that speed up, validate, and store information such as databases, computer applications, and identification and security systems, among others.

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4   For a description of the legal specialist role, see the OAS Manual for Electoral Observation Missions.

These information systems should be able to receive information in an electronic or printed format. The possibility may also be available for political parties or independent candidates themselves to enter the information on the Internet.

c) *Oversight of Political Parties and Election Campaigns*. When standards are in place for oversight, it is usually up to the electoral management body to control and audit the public and private funds received by political organizations to finance their ongoing activities and those associated with election campaigns.

To be able to conduct this activity, procedures should be established to control and audit the amount, origin, and destination of the public and private funds that are used, as well as to standardize the presentation of political organizations' financial information.

Various information systems can be used in support of this control and oversight process, such as accounting and budgeting systems and tools for auditing and data analysis, among others.

d) *Presentation and Publication of Electoral Information*. Many electoral management bodies are required to present and publish election-related information, and they may depend on technology to be able to meet this requirement.

When computer systems are used to capture information from the registration of political parties and candidates and to conduct oversight of funds that are spent, information is available in systematized form. This can be presented to individuals or institutions that need it, either in electronic formats such as CDs and DVDs, or via the Internet so that it can be made available for consultation by the public.

e) *Computer Security*. When technology is used for the registration of political organizations and candidates, mainly when it is done through public networks such as the Internet, the implementation of computer security is essential. This may include such elements as firewalls, electronic signatures, access passwords, and audit logs.

3.1.3. Electoral Registry and the Voter List

The electoral registry is the permanent list of individuals that constitutes the basis for implementing the right of citizens to vote and be voted into office within the framework of a democracy. Registering citizens according to rigorous guidelines contributes in ensuring the integrity of the vote. The voter list, by contrast, is the roll of citizens eligible to vote that is prepared specifically for an election, based on the electoral registry.

The types of technology applicable for the purpose of the registry may include:

- Databases
- Electronic storage devices
- Internet
- Intranet
- Extranet
- Computer software
- Optical scanning systems
- Information security systems
- Geographic information systems (GIS)
- Devices for authenticating and validating IDs
- Communications systems
- Identity cards
- Personal identification numbers (PINs)
- Digitized photographs for facial recognition
- Barcodes or data chips
- Electronic signatures
- Encryption systems

The activities that should be observed by the OAS/EOM include the following:

a) *Electoral Registry Input and Maintenance*. Input and maintenance of the electoral registry requires various processes that in some cases depend not only on the electoral management body but also on other institutions. These may include the institutions that manage the civil registry (in cases in which the electoral management

body does not have that responsibility) or justice-related entities that under the law grant or restrict citizens' right to vote.

Additionally, there are other processes including those involving changes of voter addresses, ongoing information updates, configuration of polling sites and geographical boundaries, and mainly the creation of the voter list or voter rolls.

In some countries, registering to vote is a right but not an obligation; in others, it is compulsory and people are even enrolled automatically when they reach the legal voting age. In this sense, the election law establishes the requirements citizens must meet in order to be registered. The main requirements are being of age, having the required documentation for identification, and enjoying full rights to vote or be elected.

There can be various ways to enter information into the electoral registry system. For example, a) the information regarding new registries or modifications to an existing registry can be sent to another institution that manages the civil registry electronically, b) a citizen could personally go to the electoral management body to register, or c) information is updated through registration brigades and the electoral management body could also undertake campaigns to register citizens and update their information.

The information can reach the electoral management body via different electronic means or on preprinted forms. Information systems must be able to accept and validate this information in whatever form it arrives.

To manage information about citizen registry and the voter list, database systems can be configured with the capability of managing biometric information with fingerprints, photographs, and electronic identification signatures, computer software, communications networks, optical scanning, systems and devices for validating identification, and geographic information systems, among others.

b) *Preparation of the Voter List*. The process of preparing the voter list is another step that the OAS/EOM should observe. The voter registry generally is the result of the registration of voters combined with the purging of citizens who are unable to vote. The purging of voter rolls, in particular, is as important as the registration process. Cross-checking against other databases, such as information on deaths, allows the names of the deceased to be removed; this prevents the over- or under-population of the voter list (correcting for those who were removed but who should be on the list).

In many cases, there will be activities related to auditing the voter list that have already taken place. These should be reviewed to evaluate whether they provide the minimum guarantees to ensure a reliable voter list.

In cases in which a printed voter list is used, the process of its design and printing is a point for observation. If an electronic list is used, the uploading process and the audits of the technology used are activities that need to be analyzed.

Once a voter list has been generated using information systems, it can be stored electronically. The law usually dictates that copies should be turned over to the political parties, and the list may even be published on the Internet.

3.1.4. Electoral Mapping

This refers to the graphical representation of electoral data corresponding to a particular geographic area. Electoral mapping allows for visualization of the boundaries of various electoral units (sections, districts, municipalities, states), as well as the location of the voting centers. In particular, specialized computer programs can be used in the procedures to create and administer mapping information. Such programs may include:

- High-resolution and high-capacity computer equipment
- Specialized printing using a plotter
- Specialized mapping tools (such as MapInfo, ArcView, ArcGis)
- Geographic information systems (GIS)
- Global positioning systems (GPS)

- Satellite images
- Programs and databases
- Electronic storage devices
- Internet
- Optical scanning systems
- Communications

The following processes should be observed in terms of the use of technology for the creation and maintenance of electoral mapping:

a) Electoral District Boundaries. One of the main activities of electoral cartography is drawing electoral districts—territorial subdivisions that group together communities around an electoral configuration.

The information for each of the defined electoral districts may include:

Population figures: the number of residents per community, classified by gender and age.

Location: the position of each community within the territory in relation to other communities. Using the criteria for location, it is possible to learn whether a community is a center where people from other places converge or whether it is isolated.

Availability of services: indicates whether services such as communications or electric power are available in a community and whether it has adequate sites (schools, halls, health centers, or sports facilities) where voting sites could be located.

Level of conflict: indicates conflicts that may exist among rural communities, as well as people's perception, in both urban and rural areas, of aspects related to citizen insecurity.

Electoral administration: considers problems that could result from the location of decentralized voting centers, in terms of the organization and administration of the electoral process.

Distance: establishes whether communities are close to or far away from the municipal seat. This criterion can be used to establish, to the extent possible, that no potential voter should be farther than a determined number of kilometers from a voting site.

Means of transportation: recognizes how people get around within the area and under what conditions (on foot, regularly scheduled buses, by boat or air).

Types of routes: analyzes routes by categories (trails, roads that are impassable in the rainy season, cobblestone roads that can be traveled at any time, paved roads, or water or air routes).

Costs of mobilization: evaluates the economic cost of travel among communities and to the municipal seat.

Electoral organizations may find this information through other institutions with responsibility and specialization in the subject, or they may have their own electoral cartography area. In the latter case, they need to have adequate information systems and equipment and carry out the field work necessary to be able to input and maintain the information.

b) Geographical Codes or References. Geographical codes or GEO-references are used to locate a citizen within a territorial subdivision according to his or her residence. This type of code is used to facilitate voting to the elector.

Each defined electoral district is assigned a GEO-electoral code, and this code is complemented by another that groups communities with their respective electors. These codes are also used to group and define voting centers and polling stations.

c) Geographic Information Systems (GIS). These are work tools that manage information using input from databases related to various types of reference points in land and space. They have considerable capacity to conduct demographic analyses.

Solving many issues related to electoral organization—such as district divisions and the location of voting centers and electors—requires access to different types

of information that may be related due to geography or spatial distribution. GIS technology contributes to finding solutions, as it can store and manipulate information using geography and can analyze patterns, relationships, and trends contained in the information, all in the interest of contributing to better decision-making.

d) Global Positioning Systems (GPS). These systems use satellite technology to establish the precise location of a place on the ground, using latitude and longitude coordinates. Such information is an important part of geographic information systems, as it can give the exact location, within a particular area, of places such as electoral districts, communities, and voting centers so that these can be codified geographically and located on a map. Such systems can even be used to monitor transportation routes, information that is useful for tracking the organizational aspect of an election.

3.1.5. Means of Disseminating the Voter List

Once a voter list has been generated for a particular election, based on the electoral registry, it is necessary to inform the public, mainly so that potential voters will have information about where to cast their ballots. Information may include the district, municipality, voting center, and polling station—even the page and line on the voter list at the polling station to which each elector is assigned.

Electoral processes increasingly make information on voter lists available electronically. Such technology may include:

- Internet
- Mobile units (with equipment and systems for consultation)
- Kiosks
- Call centers
- Interactive CDs
- Interactive voice response (IVR)
- Text messages by cell phone

a) Internet. In this case, the information is usually located on the Web page of the electoral management body, with the option of being able to access the information by entering the number of an identification or identity document. When confidential information is included, such as a photograph, the system may require the elector to enter a password.

b) Mobile Units. These use computers containing the voter list with an application for consultation that can print out information for a citizen about where to vote. These systems are installed on mobile units that travel to various parts of the country.

c) Kiosks. These are also equipped with computers containing the voter list with an application for consultation that can print out a ticket to give to the citizen. Kiosks are installed in fixed modules similar to automatic teller machines, and are usually placed in retail centers, universities, companies, and municipalities.

d) Call Centers. In this case, information is provided via the telephone. This process uses an operator who provides voting location information once the elector provides a personal identification number during the phone call.

e) Interactive Voice Response. This option, which also uses the telephone to give out information, is an interactive voice response system installed on a server that contains the voter list. This is an automatic process that gives the voting location once the elector enters a personal ID number during the phone call.

f) Interactive CDs. The voter list can also be downloaded onto CDs, which can be distributed along with software that allows for consultation. In these cases information is encrypted using security methods. This methodology works for any segment of the population with access to public or private locations equipped with computers: for example, universities, political party offices, businesses, radio stations, or homes.

g) Text Messages. This method uses cellular phones to send and receive text messages. The voter list is downloaded to a server to which a cell phone service provider has access. Citizens send a message and personal ID number, and get information back about where they should go to vote.

It is important to observe whether the electoral management body has a system for collecting statistics and following up on the use of each of these methods. It is equally important for the OAS/EOM to have access.

3.1.6. Electoral Organization

The electoral organization department within the electoral authority is the organizational entity in charge of planning, coordinating, and implementing preparatory activities for the electoral process. Its principal activities include acquiring and distributing voting materials, goods, and supplies; contracting and training support personnel; coordinating and training other temporary electoral entities and political party poll watchers, according to the electoral legislation; and designating and installing the voting centers and polling stations.

The technology programs and tools that may be useful in the administration of election logistics may include the following:

- Word processor
- Spreadsheets
- Databases
- Project and activity administrator softwares
- Presentations
- E-mail
- Internet
- Inventory control systems
- Barcode systems
- Radio frequency identification systems (chips)
- Optical reader systems
- Financial administration system
- Personnel administration system
- Communication systems
- Geographic information systems
- Global positioning systems

a) **Election Planning.** The electoral management body generally develops a detailed project and comprehensive plan of operations for the election period. This makes it possible to see that all relevant tasks have been identified and dates assigned for them to meet the legal deadlines; that various interrelated activities have a logical timeframe; that responsibilities have been assigned so that various interdependent logistical operations can be duly completed; and that objectives have been established to monitor and measure the progress of these activities.

These more detailed plans can be developed using planning software. Computing systems for planning and monitoring constitute one of the best contributions technology has made to the electoral process and to election logistics.

b) **Personnel and Training.** One of the main mobilization exercises for the electoral management body in terms of the organization process is to ensure that there are enough personnel available and that they have been adequately trained to carry out their duties. In this stage of the process, the electoral management body may use computer systems for personnel management, salaries, and training. These can help simplify the massive task of recruiting, mobilizing, and paying personnel.

c) **Material, Equipment, and Inventory.** Along with contracting personnel and selecting polling stations, the planning, design, acquisition, and distribution of election materials and equipment is another key aspect of the work of election organization, to guarantee that everything is in order for the day of the elections.

The OAS/EOM generally observes whether the process of supplying the electoral management body with election materials has been done effectively, in a way that helps maintain public confidence in the integrity of the electoral process. The electoral management body may use automated inventory systems with barcodes; optical scanning capability can simplify the ordering process of materials. Radio frequency identification systems can also greatly simplify the process of packing and distributing materials to the polling stations.

d) **Election Ballots and Precinct Voter Lists.** Election ballots constitute the electoral tool by which the voting citizen expresses his or her will. According to the nature

of each election, the voter uses one or several ballots. The precinct voter list, for its part, contains the list of designated electors at a particular polling place, and it helps the polling station officials control the voting process.

Depending on the degree of automation of the election, the ballots and precinct voter list may be printed or generated electronically. In observing the process of printing these materials, it should be noted that the printed format may use security paper with special composite colors and watermarks that hamper easy reproduction. Normally these ballots are printed by a printing company outside the electoral management body. In the case of an electronic format, security measures such as encryption and secret passwords may be used.

e) Distribution of Materials. To ensure an efficient distribution of materials and equipment, the electoral management body should carry out certain tasks. These include, among others, detailed planning of the schedules for delivery and pickup of the materials, as well as the transportation methods and routes that will be used; adequate means to sort and distribute the large volumes of supplies in specific shipments to each voting site, avoiding waste of materials but ensuring that all voting sites have enough supplies for the voters; adequate security for the specific environment in question; appropriate storage so the supplies of election materials and equipment can remain in good condition; and a thorough system for tracking the movements of all election materials and equipment throughout the distribution and pickup chains. Among the tools the electoral management body may use to control the distribution of materials are GIS and GPS equipment and call centers.

f) Monitoring Systems. Computer software for monitoring allows the electoral management body to analyze more easily the degree of preparation and progress of election logistics. The electoral management body may use systems based on spreadsheets or project management to coordinate the geographically dispersed administrative

offices, coordinate the work of those responsible for operations, and monitor election preparations and logistics.

g) Voting Sites. The determination of the voting sites needed and their locations is among the basic information that should be given to potential voters. GIS programs that show voting sites are generally used as a tool for the electoral management body to determine their location and plan logistics accordingly.

h) Communications Systems. Election operatives require an extensive network of installations for communications between the electoral management body and the polling stations, as well as with other participants in the electoral process such as security and emergency entities, political parties, and candidates. Technologies used in this aspect of the organization of an electoral process include telephone communications systems, cell phones, the Internet, e-mail, and faxes, among other things.

3.1.7. Electronic Voting

Unlike traditional voting with paper ballots, in electronic voting the citizen uses an electronic system (such as a computer) to cast his or her vote. The vote is recorded, stored, and processed by a computer.

The expression "electronic voting" refers to the casting of a ballot through an electronic instrument (electronic ballot box or computer), although the term is often used to include every process that allows for the exercise of the vote, the count, the registry and control of the voter's identity, the recounting of ballots cast, the transmission of results, and the assigning of offices up for election.[5]

Electronic voting can be done via a voting machine or electronic ballot box; these are considered on-site voting systems. Voting by Internet is considered a remote voting system.

For election purposes, the following types of technology may be considered in electronic voting:

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[5]   The Globalization of Electronic Voting: Miguel Ángel Presno Linera, professor of constitutional law, University of Oviedo. www.uniovi.es/constitucional/mi-emb/presno.htm.

- Computer equipment
- Interactive software
- Local Area Networks (LANs) and Wide Area Networks (WANs)
- Communications technology such as telephones, data, faxes, radio, television, microwaves, and satellites
- Internet
- Electronic ballot boxes
- Electronic voting systems
- Optical scanning systems
- Biometric identification systems
- Databases
- Audiovisual applications
- Information security systems

a) Electronic Voting Systems. There are different types of electronic voting systems; among the leading ones are:

- Direct-Recording Electronic (DRE) systems
- Voting and counting systems using optical scan ballots (OSB)
- Internet-based systems

b) DRE Systems. These systems record votes using a digital voting ballot presented on a screen equipped with electronic components that can be activated by the voter (usually buttons or digital touch screens). They process the data using computer programs, and record voting data and images of the ballots in their memory. After the election, they produce a tabulation of the voting data, which can be printed out. The system can also provide a way to transmit the individual votes or ballots or the voting totals to a national computing center. Typically, the ballots are counted as they are cast, and the results are printed after the close of the polls.

If such systems are connected to a public communications network, the voting data can be transmitted in the form of individual ballots as they are cast, or on a periodic basis as packages of data throughout Election Day, or as a final package at the end of the election.

The technological systems and equipment that may be used in this system are: electronic ballot boxes, computers, touch screens, visual systems, biometric identification systems, and communications networks.

In this type of electronic voting system, observers should make sure that the identification system and the voting system are not connected or interlinked, in order to guarantee the secrecy of the vote.

c) OSB Voting Systems. These systems, which use specially designed paper ballots, have an application for optical counting that identifies the ballots and records the votes, tallying them in the memory of the machine or computer.

These systems can be used with electronic ballot boxes with optical readers that can handle ballots that are specially designed to be read electronically. On the reverse side they have a band or mark that allows the vote to be recorded, recounted, and tallied electronically, and subsequently sent to the data processing centers.

In traditional, paper-based voting systems, votes are counted using a manual count. With the advent of vote counting systems that use optical scans or electronic tabulation, the electoral management bodies generally use systems that identify the handwritten marks on cards or ballots and count them electronically.

The types of technology that can be used for optical scanning are:

- Optical Mark Reader (OMR)
- Optical Character Recognition (OCR)
- Intelligent Character Recognition (ICR)

1. Optical Mark Reader (OMR). This device reads images of the electoral ballot and converts the symbols or images into data. This technology detects the absence or presence of marks on the ballot. The computer programs used by the OMR scanner recognize the meaning of the various marks and convert the scanned images into readable information for the computer based on the location of the marks.

One of its principal uses is for reading barcodes, to be able to quickly identify the tracking information and voting marks on the ballot.

2. OCR Scanning Systems. These systems take scanned images and use computer software to recognize the shapes of the characters that are printed or handwritten, such as numbers or letters. It stores these as information that can be read by a computer.

Since different types of letters have different shapes, the OCR systems must be programmed to recognize that a particular number or letter can take different shapes. OCR systems can also be programmed to recognize handwriting; however, given the infinite variety of styles, this is a much more complicated task.

3. ICR Scanning Systems. ICR systems use computer software to apply logical intelligence tests to the scanned characters and turn them into information that can be read more reliably by a computer.

ICR systems apply rules of spelling, grammar, and context to scan the texts in order to conduct "intelligent" evaluations of the correct interpretation of the information. This allows a much more precise conversion of the scanned texts, especially handwritten text. ICR programs require fast, efficient computers.

These systems still face some challenges in terms of reliability. However, they are particularly appropriate for capturing formatted information. They are also being evaluated for their ability to capture handwritten numbers on ballots used in more complex electoral systems, such as that of the alternative vote or the single transferable vote. For this type of system with optical readers, the main thing that should be observed is the certainty with which the system can read and identify data and marks on the ballot.

d) Internet-Based Voting System. This type of voting is done from remote areas, including from abroad (voting can be done from any computer connected to the Internet, such as in a house or office), or traditional voting centers can be used, with equipment and voting systems connected to the Internet.

The essential challenge posed by electronic voting on the Internet is the ability to guarantee that votes can be cast freely and in secret, as well as possible attempts to commit fraud through manipulation or substitution of the voter's identity or alterations in the transmission of the votes or in the recount.

Servers with authentication and voting systems are developed and installed on Web pages, and these are used to manage the information. Voting is done the same way as on a screen, which displays the information related to each candidate up for election. The way in which votes are counted is totally automated, and once a selection is made, the vote goes into the electoral records.

The main challenges in this type of system are the ability to reliably identify the voter, which may be done using a personal identification number (PIN) or an electronic signature, and the protection of the information through encryption. Thus information security plays a fundamental role in minimizing the risks of this type of voting.

e) Aspects that should be considered and observed in different types of electronic voting. As part of their observation efforts, the OAS/EOMs should take into account whether electronic voting systems include the following aspects:

1. *Authentication:* This means ensuring that only those who can legitimately vote do so.
2. *Uniqueness of the vote:* The voter must cast his or her ballot only once, and the result of that vote cannot be modified.
3. *Anonymity:* The voter cannot be associated with the vote, thus guaranteeing the secrecy of the ballot.
4. *Impossibility of coercion:* The voter should under no circumstances be able to demonstrate or reveal how he or she voted, thus impeding the massive purchase of votes and the exercise of pressure or coercion on voters.
5. *Accuracy:* The system should be able to record votes correctly and securely.
6. *Verification* (traceability): Every voter will be able to obtain a receipt from the voting system guaranteeing that his or her vote will be included in the final tally. This receipt should be deposited

into a ballot box for verification or for subsequent election audits.

7. *Impartiality:* All votes must permanently remain secret until the voting process is completed. This avoids having partial results affect the decision of voters who have not yet exercised their franchise.

8. *Ability to be audited:* Procedures should exist to be able to verify that each and every vote has been counted.

9. *Reliability:* The systems used should always work securely with no losses of votes, even in extreme cases.

10. *Flexibility:* The equipment involved in electronic voting should be flexible in terms of the formats that are used (languages, possible election to different bodies, or different types of voting ballots) and should be compatible with all types of platforms and technologies.

11. *Accessibility:* Individuals with functional limitations or disabilities should have the necessary access to vote.

12. *Ease of use:* It should be easy for voters to cast ballots even if they have minimum educational or training requirements.

13. *Cost efficiency:* The systems must be accessible and easily reusable.

14. *Ability to be certified:* The systems should be able to be put to the test by the electoral authorities, political parties and social organizations so that they can be certain that the systems meet the established criteria.

15. *Invulnerability:* The systems must block manipulation at every level (both internal and external).

16. *Openness:* The electoral authorities and, if such is the case, citizens in general should be able to learn in detail about how the system functions (hardware and software).

17. *Economy:* The system should be competitive with the cost of traditional voting.[6]

f) Steps to cast a ballot electronically. Depending on the type of electronic voting system, the following steps may be taken to exercise the vote:

Step 1: The voter arrives with his or her identification document.

Step 2: The ID number is entered digitally at the polling place and the voter's identity is validated; this could be through biometric means such as fingerprints (In some countries, the verification of identity is done at the voting center using the fingerprint-capture method.[7])

Step 3: If the identity of the voter is verified, the electronic ballot box is activated so the voter can cast a ballot.

Step 4: The system shows the voter each candidate, and the voter selects and confirms his or her vote.

Step 5: Once the vote has been confirmed, the system prints out a receipt for the voter.

Step 6: The information remains stored and encrypted in the system.

Step 7: The voter deposits the receipt in a special ballot box and leaves the polling area.

Step 8: When the polls are closed, the system automatically generates the results of that precinct or polling station.

Step 9: Precincts may be selected for an audit, comparing the results in the system to the printed receipts.

Step 10: Results are transmitted to the national computing center. In some cases, partial results may be transmitted throughout the day, with the total at the conclusion of the process.

g) Tests and Simulations. As in all elections, especially in those that are highly automated, the electoral authorities generally for the process of verifying, tallying, transmitting and presenting the results, conduct tests and simulations with sufficient lead time before the day of the election itself. This helps to verify and prove that the systems and the infrastructure function correctly and to evaluate how

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[6] *Technological Aspects of Electronic Voting.* Luis Panizo Alonso, Secretary of the Observatory of Electronic Voting. University of León. www.votobit.org.mx/ponencias/Luis_Panizo.pdf

[7] The system for capturing fingerprints, known as *capta huellas,* ensures compliance with the principle of "one voter, one vote."

knowledgeable all the actors are about operating and supervising the systems.

During these tests and simulations, the OAS/EOMs observe the different steps in the voting system, as well as the receipt and presentation of the results at the national computing centers. The OAS/EOM notes any problems and deficiencies, in order to follow up on needed improvements, if requested.

h) Contingency Plans. These help avoid interruptions in system activities and protect critical processes—such as those involving elections—from breakdowns or disasters. Contingency plans also ensure the prompt restoration of activities in case of an interruption.

Any process for managing the continuity of service, or contingency plan, should consider a risk analysis, in order to identify those events that could cause an interruption in the process as well as their probable impact on information security. Plans for continuity of service should be tested and updated on a regular basis.

The consideration of contingency plans offers electoral authorities an excellent opportunity to minimize potential problems that at any given moment could interrupt the electoral process.

Contingency plans are so varied that they might include alternate systems similar to the main system or manual systems that have the same objective: to continue with the process. These should be factored in as part of the tests and simulations carried out in the electoral process and observed by the OAS/EOM.

i) Certification of the Electronic Voting System. In some cases, electronic voting systems have a certification system that has been specially designed for this type of process. It is worth mentioning that there are institutions that grant certifications to these systems.

It is important for the OAS/EOM to observe whether the systems used in different countries have any special certification for electronic voting systems, and whether this certification has been granted by an institution that meets international standards in this area.

3.1.8. Preliminary Election Results Transmission System

This system presents preliminary election results, tallying the votes from each polling station, according to what is shown on the official tally sheets generated by the polling stations.

This system is normally used with manual voting systems, and the technology that is generally used may include the following:

- Computer software
- Personal computers, scanners, faxes
- LANs and WANs
- Communications systems such as telephones, data, radio, microwaves, and satellites
- Internet, Intranet
- Optical scanning systems
- Databases
- Information security systems

The principal stages of this system are:

- Generation of closing forms and tally sheets by the polling stations.
- Collection and transmission of tally sheets.
- Receipt, digitization, and verification of tally sheets.
- Presentation of preliminary results.

a) Generation of Closing Forms and Tally Sheets. Preliminary results are generated based on the closing forms and tally sheets that polling station officials produce manually. In this regard, it is important for the polling officials to meet all the requirements for filling out the forms clearly and accurately.

b) Collection and Transmission of Tally Sheets. This step requires a group of people in charge of collecting, copying, and transporting the tally sheets from the polling stations to the transmission centers. The process may be simple or it may involve using a checklist with forms for receipt and delivery. The technology that may be used includes faxes, scanners, and a communications system with virtual

private networks (VPNs), employing security elements such as passwords, encryptions, and authentications for a secure transmission.

c) Receipt, Digitization, and Verification of Tally Sheets. This step can be carried out in a centralized or decentralized manner by region, and includes the receipt, validation, input, and verification of the data contained in the tally sheets and their totaled amounts. The technology used could comprise barcode optical readers, intelligent character recognition systems, computers with systems for inputting, verifying, and managing data, security management servers, networks, and databases.

When this process is decentralized, it is important to observe the tests of the communications networks and the systems that centralize the information, to make sure these have enough capacity to guarantee that on Election Day they function correctly and can handle the information load.

d) Presentation of Preliminary Results. In this step, the results of the vote count are presented for consultation by the various actors in the process; normally this data is organized geographically and by election type. The information that may be found includes the digitized tally sheets and a series of reports that can be consulted on giant screens, on terminals with systems for consultation and reporting, and on the Internet. The technology that may be used includes geographic information systems, security systems such as encryption, firewalls, hacker detectors, communications systems, and graphics display software.

e) Tests and Simulations. Generally, electoral authorities conduct tests and simulations of the systems for the transmission of preliminary election results with sufficient lead time before the election. This allows them to verify and prove that the systems work correctly.

During these tests and simulations, the various steps for transmitting, processing, and presenting results should be observed in different places, such as the voting and transmission centers, as well as in the national computing center. Problems and deficiencies that arise should be noted, in order to follow up on any improvements

that may be needed. It is important for the tests and simulations to be done using 100% of the number of tally sheets that will be used on the day of the election so that not only the process is put to the test, but also the systems' capacity to process and store information.

f) Contingency Plans. As with electronic voting, systems for transmitting preliminary results should include contingency plans to minimize the risks and avoid suspension of the transmission of electoral results. Thus it is important to observe whether the electoral management bodies have a contingency plan and that this is put to the test as part of the testing and simulation process.

3.1.9. Information Security

Information security can be understood as the state of any system that indicates it is free of danger, damage, or risk. Dangers or damages are understood to mean anything that could affect the direct functioning of the system or the results it obtains, particularly regarding electoral systems. For a system to be defined as secure, it must have the following characteristics:

1) Integrity: the information can be modified only by someone authorized to do so.

2) Confidentiality: the information can be read only by those who are authorized.

3) Availability: the information should be available when needed.

4) Irrefutability: the source of the information should not be open to question.

Depending on the source of the threats, security can be divided into logical security (for example, everything related to the software and databases) and physical security (for example, everything related to infrastructure).

Information security is achieved by implementing an adequate series of controls including protocols, policies, processes, procedures, organizational structures, and software and hardware functions. These should be

applied to every one of the ICT resources involved in or implemented in the electoral process, which include the following:

a) Personnel. With regard to human resources or personnel involved in using, maintaining, or controlling information systems, especially those used in elections, the electoral management body should periodically evaluate:

1. The personnel assigned to use and maintain processes and equipment.
2. The organization of the information systems unit, if it exists.
3. The strategic and operating plan for training personnel from the institution.
4. The use of information technology standards and best practices.

b) Applications. When it comes to programs or applications used in the electoral process, the following controls should generally be considered:

1. Inventory and description of the application.
2. Control of versions.
3. Control of projects.
4. Control and levels of users.
5. Control of system design, programming, tests, and implementation.
6. Procedural and user manuals.
7. Diagrams for input, processing, and output.
8. Methodology for development and maintenance.
9. Management of support and user requirements.
10. Logical and physical security of the applications.

c) Technology. In terms of the equipment and systems, the following elements are taken into account:

1. Inventory of equipment and licenses, with their description and location.
2. Access controls.
3. Controls against hackers and viruses.
4. Control of maintenance and updates.
5. Contingency plans.
6. Physical and logical security.

d) Installations. In terms of installations or physical spaces, the following controls are implemented:

1. Physical security.
2. Access control.
3. Video cameras.
4. Air conditioning (mainly in the computing centers).
5. Smoke detectors.
6. Uninterrupted power sources.
7. Fire extinguishers.
8. Maintenance of order in the computing center.
9. Alternate site, its security and functionality (mainly for the computing center).
10. Contingency plan.

e) Data. In terms of the data for different applications, the following controls are generally established:

1. Control of inputted data. Inputted information should be evaluated and validated. These processes should also include statistical control charts.
2. Control of the updating process. These processes should consider the statistical control charts and rejections when inputting or modifying data.
3. Control of historical archives for changes and rejections. All movements involving changes or rejections should generate historical archives and logs, for ongoing control and management;
4. Control of outputted information. To control and safeguard information, different types of consultations, reports, statistics, and backup security copies should be contemplated.

OAS/EOMs observe compliance with the implementation and maintenance of the aforementioned information security controls.

f) Intellectual Property of Information Systems. The introduction of information systems to the electoral process presents another important factor: software intellectual property. In a traditional manual election process, there are no copyrights or proprietary information; the process is known to everyone.

By contrast, the introduction of technology into the electoral process may include *products.* If these have been

developed by private companies they could be protected with patents and intellectual property rights.

As part of the work of the OAS/EOM, it is important to observe whether the electoral management bodies have the respective licenses or patents that accredit them to use the information systems or products utilized in the various stages of the electoral process.

The source code refers to the instructions that a systems programmer can write to modify in order to define the logic of a process. The OAS/EOM should find out whether the electoral management body has ownership of the source codes or any type of rights over them, or if the intellectual property rights are owned by the vendor.

It is important to determine the latest version of the systems (hardware and software) that are being observed, and what security mechanisms are in place. In some countries, for example, the source code for the results transmission systems is placed in a deposit box or encrypted prior to the election.

The determinations are made in order to audit the source codes of these systems in case there are concerns that the systems are not working properly or there are errors in the computation of results, and to decide whether such errors are intentional.

g) Information Security. It is important to observe whether the electoral management body is implementing its security systems based on international information security standards and norms. These could include the ISO-IEC 27001 or 27002 on information security, the standard that establishes general guidelines and principles to initiate, execute, maintain, and improve information security, or the COBIT (Control Objectives for Information and Related Technology) international standard.

3.1.10. Information System Evaluation and Auditing

The auditing of information systems can be internal or external. Its objective is to evaluate compliance with the norms and controls for the information system to function; become familiar with and follow up on reports on system-related incidents or events; analyze the

efficiency of the systems; verify compliance with security policies and procedures, and verify that ICT resources are used securely and efficiently. Auditing can be done to a daily process as well as to an electoral process and can, depending on the case, propose preventive or corrective measures in the area of information security.

The auditing process may also encompass an evaluation of the overall information system, including its inputs, processing, controls, storage, security, and information retrieval.

It is important for the OAS/EOM to observe that evaluation and auditing systems are applied in electoral technology projects, especially that the various political actors participate.

3.2. Election Day with Electronic Voting

In some Latin American and Caribbean countries, electronic voting is either being used already or there are plans to implement it. OAS/EOMs that observe these processes should take into account certain aspects detailed as follows.

a) Voting Process at Polling Stations with Electronic Voting. Just as in elections that use manual voting, in an electoral process with electronic voting observers in the respective voting centers and particularly in their designated polling station should pay attention to the opening of the polls, the voting itself, and the closing. They should use this information in filling out the election-day questionnaires.

1. Opening. At the start of the voting process, it is necessary to observe whether the polling station has been configured and has all of its equipment and systems ready. Normally, the president of the polling station initializes and sets the system to zero, entering a password. That puts the electronic ballot box into operation, and a "Report on the Ballot Box Set at Zero" is issued, indicating that the machine does not contain any records before the start of the election.

Following the OAS observation methodology, observers should pay attention to the conditions and time in which the voting process opens at the designated polling station.

2. Voting. During the voting process, the elector arrives with his or her identification document, and one of the polling station officials enters the person's number in the system for validation. If the number is correct and the voter's identity is ascertained, the president sets the electronic ballot box to be able to receive the vote.

The machine may display an electronic list with the photo of each of the candidates or political parties identified by a number or party logo. The voter selects the corresponding candidate, political party or slate of his or her preference, and then confirms the selection. The system may allow for corrections or for casting a blank ballot. Once the operation has been concluded, a message appears on the screen indicating the end of the process.

The trend is that in this type of process, the voting machines print out a receipt, which the voter must deposit in a ballot box. This can be used for subsequent auditing purposes if this proves necessary.

During the day of the voting, observers should pay attention to procedures for voter identification and casting ballots. They should also observe whether voters generally are able to operate the system without difficulty, and note the time it normally takes to cast a ballot.

If problems arise with the voting equipment or systems, the OAS/EOM observes whether support and replacement equipment are available in a timely manner at the voting center.

3. Closing. Once the voting has concluded, the president of the polling center enters in the password to indicate that the voting system is closed. The system totals the votes by the type of election and candidates, and prints out a report so that each member of the polling station can sign and have a copy of it. The president may print other reports for the party poll-watchers. The closing report is recorded in the system with a digital signature. The system can, through a communications link, transmit the information to the national computing center, which receives the results from all the polling stations. This information may be recorded on an electronic storage unit and then transferred to the headquarters of the appropriate electoral management body as a backup to the information that has been sent.

The OAS/EOM observes not only the closing of the polling station, but also the process of dismantling and packing up the installation and the safekeeping of the systems and equipment to be sent to the appropriate centers.

4. Voter-Verified Paper Audit Trail (VVPAT). At the polling station where the observer is present for the closing, it is important to observe whether an audit is done of the printed receipts and the results issued by the system, and to take note of the result. If an audit is not done at the polling station, it can be observed whether this type of verification was done at any other polling station at the voting center.

b) Receipt and Presentation of Results at the National Computing Center. In an electronic voting process, depending on the form and design of the process of transmitting and receiving results, the results may be received online periodically throughout the day or once the polls have closed. During the day of the election, the OAS/EOM Core Group, and in particular the information systems specialists, should observe the processes by which the national computing center receives information from the different voting centers. They also observe the presentation of results, as well as the monitoring of the voting systems and communications links.

c) Presentation and Publication of Results. Electronic voting generally allows results to be presented quickly. In this type of electronic voting process, the presentation of results happens immediately as the information arrives, in line with the procedures defined by the electoral management body. The OAS/EOM observes the entire progression of processing, presenting, and publishing the election results.

d) Monitoring and Oversight. In an electoral process with electronic voting, it is important to have in place a communications infrastructure, systems that function

well, and timely support in case of problems. Along these lines, the OAS/ EOM observes whether there is a permanent system in place for control and monitoring, as well as the capability needed to provide adequate assistance and contingency equipment when necessary.

3.3. Election Day with the Preliminary Election Results Transmission System

When an electronic voting system is not used, the electoral management body coordinates the transmission of results from the voting centers to the national computing center. Aspects observed by the OAS/EOM are described below.

a) Preliminary Election Results Transmission System. Following the OAS observation methodology, observers at their respective voting centers and mainly at their designated polling station should note the process of closing and vote-counting at each polling station, which is done manually. The process of filling out the tally sheets by hand is observed, as well as the collection and transfer of these forms. The tally sheets form the basis for the steps included in the preliminary election results transmission system, which are: collection, delivery, transmission, processing, and presentation of the results.

b) Collection and Transmission of the Tally Sheets. Once the polls have closed, logistics and coordination are critical elements for the voting centers to be able to carry out this process quickly. Usually for every predetermined number of polling stations, there are collectors who periodically pick up the completed tally sheets so that these can then be taken to the transmission centers. From these centers, the tally sheets are sent to the computing centers via fax, scanner, or secure communication links.

c) Receipt, Digitization, and Verification of Tally Sheets. This process can be done in a centralized or decentralized manner. At this stage, the tally sheets are received, processed, digitized, and verified. Intelligent character recognition systems may also be used to capture the information and be able to conduct the digitization and verification process more quickly.

The OAS/EOM observes the fluidity with which the tally sheets arrive and whether they are processed without problems and without delays.

If the process is done in a decentralized manner, the observation may need to be handled by observers in different regions. If the process is done on a centralized basis, the task may correspond to the Core Group.

d) Presentation of Preliminary Results. Guidelines for presenting the results are determined by election law or by the electoral management body itself. The information may be published as it comes in or it may begin to be presented once a certain percentage of results are in.

It is important for the OAS/EOM to observe whether sufficient information on results is available, such as the digitized tally sheets, so that the various actors can audit the information. The frequency with which the data is being updated should also be observed.

3.4. During the Post-Electoral Stage with Electronic Voting

The final tally is done following Election Day. When electronic voting is used, centralized information is available on the day of the election to be able to verify any irregularity or challenge raised by any political actor in contention.

In the case of a mixed system, the manual voting results are sent, processed, and integrated into the central system, which contains the information from the electronic voting.

At this stage, the electoral management body resolves any challenges that may arise, and based on reports and statistics, generally verifies and sorts the information by regions and type of election. Each candidate is electronically assigned the votes he or she received, and the total votes tallied are printed out. The data includes the number of voters, valid votes, null votes, blank votes, and votes obtained for each election. This documentation is generally included with the final official form signed by the electoral authorities.

In order to guarantee that the final vote tally reflects the will expressed by the voters, the results may be submitted for a security audit conducted by an independent outside party. Once the tally is complete, the electoral management body publishes, through conventional methods and the Internet, a resolution announcing the official results.

3.5 During the Post-Electoral Stage with the Preliminary Election Results Transmission System

When a preliminary election results transmission system is used, the final tallying of votes usually begins a few days following the election and may take days or weeks, depending on the complexity of the election and what is specified in the law.

The definitive vote count consists of an examination of the tally sheets generated at the polling stations, that is, an official review and count of the tally sheets or ballots, as the case may be, to determine the result of an election. This also involves verifying whether the tally sheets are valid and resolving any challenges made by the different political actors.

Information systems may be used to re-enter and re-add the results of each tally sheet, and these results may be compared with those that were presented on a preliminary basis on Election Day, using the preliminary election results transmission system.

Once the final vote count is done, the electoral management body prepares the necessary forms, which attest to the installation of the session, the results, those who participated, and the duly accredited candidates, delegates, and observers.

The OAS/EOM observes whether the official publication of the election results takes place within the timeframe specified under the law, and observes the various means by which the results are published, including the Internet.

4. Conclusions

The modernization and use of electoral technology is a challenge for the bodies in charge of organizing and managing elections, as well as, for institutions that observe these processes, such as the OAS.

As reflected in this manual and based on the work done by the Department for Electoral Cooperation and Observation of the SPA/OAS, the following suggestions are identified regarding the application of electoral technology. These suggestions are made both from the point of view of the implementing country as well as observing institutions, such as the OAS:

1. The incorporation of technology in electoral processes is an independent decision made by each Member State.

2. For an optimal application of technology, it is vital to have transparency, accessibility and to have regulations. In other words, the technology used should guarantee transparency, be accessible to all political actors and regulated by manuals or guidelines indicating its implementation.

3. Accountability is key, especially if the technology introduced is " borrowed." It is vital to determine who will be accountable should the technology introduced not perform according to the levels expected.

4. A training session is necessary for those operating these technologies, as well as for those using them, such as the political actors. These training sessions should be given opportunely.

5. Regarding the last point, political actors should also be present during the trials and tests conducted by the electoral management bodies.

6. In each phase where electoral technology is used, a printed guideline or user manual should be available.

7. In order to implement electoral technology, two basic conditions should exist:

a. Better security, otherwise there will be little incentive to continue towards using electoral technology.

b. The system must be faster than traditional processes.

8. It is vital to design and implement civic education campaigns to inform the citizens about the technological processes they will have to use.

9. It can be helpful to design a communications strategy to inform the media of the aspects of the electoral process that have incorporated the use of technology.

The application of these technologies represents a challenge for the Organization of American States, especially in its work of electoral observation. For an institution that observes the use of these technologies, such as the OAS, some key reflections include:

- The OAS/EOM would benefit from being present in the country to observe the simulations carried out by the electoral management body and to make recommendations, as requested.

- Long-term and short-term observers should be trained on the aspects of the election that require the use of technology and what must be observed (including issues to watch for, how information is collected and transmitted, ect).

- As demonstrated by recent experiences, and to contribute to transparency, the OAS/EOM must disclose to the Member State the procedures (methodologies, manuals, etc.) for the observation of the use of electoral technologies.

- Finally, and in accordance with the Declaration of Principles for International Electoral Observation, the OAS/EOM will coordinate its observations of these technologies with other international organisms that also conduct electoral observation.

The preparation of this Manual for the Observation of the Use of Electoral Technologies is part of a commitment of the General Secretariat, through the Department for Electoral Cooperation and Observation of the Secretariat for Political Affairs, to make qualitative strides in the professionalization of the Organization's Electoral Observation Missions, which are vital technical-political instruments for the hemisphere. This manual aims to contribute to the systemization of electoral observation practices, as well as to the standardization of information that is gathered during OAS Electoral Observation Missions.

5. Glossary

AFIS (Automated Fingerprint Identification System): A computerized system that allows for fast, reliable identification of individuals.

BIOMETRIC ID SYSTEMS: Technological solutions for identifying individuals based on unique features that cannot be changed or transferred from one person to another, such as a fingerprint, iris, cornea, the voice, or the shape of the head, among other possibilities.

CD-ROM (compact disc–read only memory): A compact disc used to store non-changeable information; it can be read by a computer with a CD reader.

COBIT: International standards known as "Control Objectives for Information and Related Technology."

COMMUNICATIONS SYSTEMS: "Communications" or "telecommunications" are terms used to cover all types of distance communications, including radio, television, telephone, data transmission, and computer interconnections.

DATA ANALYSIS TOOLS: Software that allows data to be stratified and summarized; searched for inconsistencies or duplications; and easily navigated, combined, separated, and sorted.

DATA CHIP: A device or system used to store or recover data that can be used in personal ID cards.

DIGITAL SIGNATURE: The collection of data associated with a digital message that makes it possible to guarantee the signatory's identity and the integrity of the message.

DRE (Direct Recording Electronic System): A direct recording electronic system for casting and recording ballots used as an electronic storage method.

ELECTRONIC BALLOT BOX: A device or a machine that records and stores the vote; the ballot box and voting machine are often the same device. Optical reader machines in which ballots are placed are also considered electronic ballot boxes.

ENCRYPTION: The technique by which information is protected in a file using encoded language; that is, language that can be read only with the password used in this process.

EXTRANET (extended Intranet): A virtual private network that uses Internet protocols, or public communications and infrastructure protocols, to safely share information with political organizations or other institutions.

FIREWALL: A control used in computer networks to either allow or block communications.

GEOCODE (Geospacial Entity Object Code): A format that identifies locations by using three, four, five, or more digits such as postal codes or other identifiers (depending on the country), making it possible to codify mapping, planning, and deliveries.

GIS (Geographic Information Systems): An integrated system of hardware, software, and geographic data designed to capture, store, manipulate, analyze, and distribute geographically referenced information in all its forms, in order to support planning and management.

GPS (Global Positioning System): A satellite navigation system used to determine the precise location of a place, object, person, vehicle, or vessel across the globe.

HARDWARE: The physical part of a computer and, more broadly, any electronic device. It is a term generally used in a broad sense to describe the physical components of a type of technology.

ICR (Intelligent Character Recognition): A technology that gives scanners and imaging systems the ability to convert handwriting into characters that can be interpreted or recognized by a computer.

ICTs (information and communications technologies): A collection of services, networks, software, hardware, and devices that aim to improve information processing and systems.

INFORMATION SYSTEMS: All applications (processes, procedures), databases, equipment, and physical installations used to maintain information.

INTERNET: A decentralized collection of interconnected communication networks that use the TCP/IP family of protocols, guaranteeing that its heterogeneous physical networks can function as a unified logical network with global reach.

INTRANET: A network of private computers that use Internet technology to securely share any information or program from the operating system.

ISO-IEC 27001-27002 (International Organization for Standardization): A standard that establishes international guidelines and general principles to initiate, execute, maintain, and improve management of an organization's information security.

ISO 9001: Part of the 9000 Series focusing on documentation standards, particularly on a quality management manual, in order to guarantee that appropriate quality management systems are in place.

IVR (Interactive Voice Response): A telephone system capable of taking a call and interacting with the caller through voice recordings and the recognition of simple responses, such as "yes" and "no," among others. The system is designed to provide or capture information through the telephone, enabling access to information services or other operations.

LAN or WAN: A local area network, or LAN, connects computers in a relatively small, predetermined area (such as a home, a building, or collection of buildings). LAN networks can be connected to each other through telephone lines and radio waves. A system of LAN networks connected this way is called a WAN or wide area network.

OCR (Optical Character Recognition): A technology that gives systems that use scanners and imaging technology the ability to convert typed characters into characters capable of being interpreted or recognized by a computer.

OMR (Optical Mark Recognition): A technology that detects the absence or presence of a mark, but not its shape. The software interprets the scanned image and translates it into the desired image.

OPTICAL VOTE READER: An electronic system that uses optical readers to record votes.

OPTICAL SCANNING SYSTEMS: An optical scanning device that combines specialized computer equipment and programs. The equipment captures an image and the programs convert that image into information that can be read by a computer. There are three types of optical scanning technology: OMRs, OCRs, and ICRs.

PIN (personal identification number): A numerical code used in systems to obtain access to something or for identification. A PIN is a type of password known only by its owner.

SOFTWARE: All the logical components needed for a computer to be able to carry out a specific task. These may include information applications such as word processing, which allow the user to carry out any task related to text editing, or system software used as an operating system.

TCP/IP (Transmission Control Protocol/Internet Protocol): Specifications that allow a connection to be established and data to be exchanged.

***VOTER VERIFIED PAPER AUDIT TRAIL* (VVPAT) or *VERIFIED PAPER RECORD* (VPR):** An independent verification system for voting machines that allows voters to verify that their vote was cast correctly and to provide a means to audit the stored electronic results.

VOTING MACHINE: Equipment used to electronically record and tally ballots cast at a polling place. It is made up of mechanical devices and hardware—external and internal—as well as electronic voting software.

***VPN* (Virtual Private Network):** A secure network technology that allows a local network to be extended across a public or uncontrolled network.

6. Annexes

Annex 1. Sample Questionnaires

ORGANIZATION OF AMERICAN STATES (OAS)
ELECTORAL OBSERVATION MISSION (EOM)

Organization of American States

Country: _____ , Date: _____

OBSERVATION QUESTIONNAIRE FOR A HIGHLY AUTOMATED PROCESS (1)

Names of observers in core group: _____
_____
_____

Note: All questions should be answered YES or NO, along with any specific comments that may be pertinent. An executive report on the aspects observed should also be attached, as well as any additional documentation considered relevant.

A	GENERAL INFORMATION ON THE USE OF TECHNOLOGY	Answer (please circle)	
1	**Is there oversight of the following actors?**		
	Political parties	Yes	No
	Electoral management body's internal auditing office	Yes	No
	Civil society	Yes	No
	Other (specify)	Yes	No
2	**Are standards or certifications used?**		
	For information security	Yes	No
	For quality management	Yes	No
	Other (specify)	Yes	No
3	**Have external audits been done since the last election?**		
	Of the information systems	Yes	No
	Of the electoral registry	Yes	No
4	**Do manuals exist?**		
	Technical manuals	Yes	No
	User manuals	Yes	No
5	**Have the various actors been provided with training for this election, or are there plans to train them?**		
	Technicians	Yes	No
	Operators	Yes	No
	Coordinators	Yes	No
	Polling station officials	Yes	No
	Potential voters	Yes	No
6	**Is there enough information available about the process for the various actors?**		
	Political parties	Yes	No
	Potential voters	Yes	No
	Temporary electoral management bodies	Yes	No
	Civil society	Yes	No
7	**Comments**		

(continued)

Annex 1. Sample Questionnaires

Organization of American States

ORGANIZATION OF AMERICAN STATES (OAS)
ELECTORAL OBSERVATION MISSION (EOM)

Country: **, Date:**

OBSERVATION QUESTIONNAIRE FOR A HIGHLY AUTOMATED PROCESS (2)

Names of observers in core group: _____
_____

Note: All questions should be answered YES or NO, along with any specific comments that may be pertinent. An executive report on the aspects observed should also be attached, as well as any additional documentation considered relevant.

B	SPECIFIC INFORMATION ABOUT EACH ACTIVITY REGARDING THE USE OF TECHNOLOGY	Answer (please circle)	
1	**Does the legal framework contemplate the use of technology?**	Yes	No
2	**Is technology used to register political parties and candidates and to control campaign financing?**		
	Are information systems used to register political parties?	Yes	No
	Are information systems used to register candidates?	Yes	No
	Are the following elements captured digitally (please circle)?	Photo/Signature/Fingerprints/Documents/Logos	
	Are information systems used to provide oversight of campaign financing?	Yes	No
3	**Is technology used to prepare the electoral registry?**		
	Is there an information system for capturing and managing the registry?	Yes	No
	Are the following elements captured digitally (please circle)?	Photo/Signature/Fingerprints/Documents	
	Does the identification system contain biometric elements?	Yes	No
4	**Is technology used to prepare electoral maps?**		
	Is there a Geographic Information System (GIS)?	Yes	No
	Is there a Global Positioning System (GPS)?	Yes	No
5	**Is technology used to disseminate the voter lists?**		
	Are kiosks used?	Yes	No
	Mobile units?	Yes	No
	Call centers?	Yes	No
	Internet?	Yes	No
	Interactive CDs?	Yes	No
	Interactive Voice Response (IVR) Systems?	Yes	No
	Text messages via cell phones?	Yes	No
6	**Is technology used in the organization of elections?**		
	Are information tools used to manage and follow the electoral timeline?	Yes	No
	Are information systems used to manage personnel from the temporary electoral management bodies?	Yes	No
	Are information tools (such as PowerPoint or e-learning systems) used to train polling officials?	Yes	No
	Are electronic ballots used?	Yes	No
	Is an electronic voter list used?	Yes	No
	Is an information system for inventory control used?	Yes	No
	Are barcodes or Radiofrequency Identification (RFID) Systems used?	Yes	No
	Are the routes for transporting equipment and materials monitored using GPS?	Yes	No
	Are call centers used to control and manage the organization of the election?	Yes	No

Annex 1. Sample Questionnaires

Organization of American States

ORGANIZATION OF AMERICAN STATES (OAS)
ELECTORAL OBSERVATION MISSION (EOM)

Country: , Date:

OBSERVATION QUESTIONNAIRE FOR A HIGHLY AUTOMATED PROCESS (3)
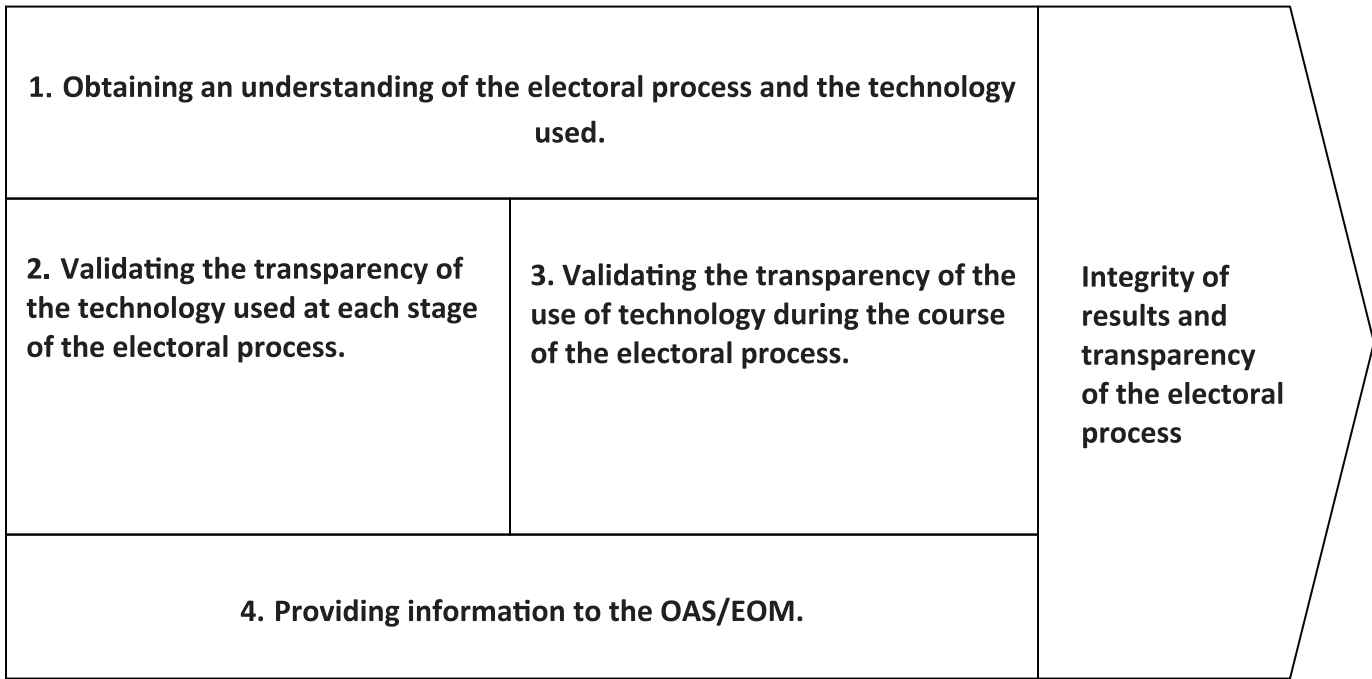
Names of observers in core group: _____
_____

Note: All questions should be answered YES or NO, along with any specific comments that may be pertinent. An executive report on the aspects observed should also be attached, as well as any additional documentation considered relevant.

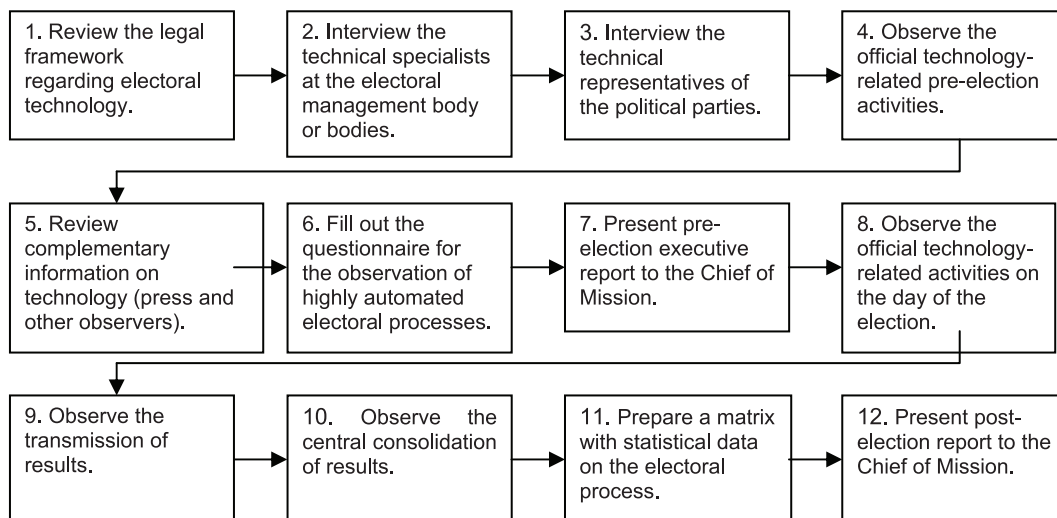| B	SPECIFIC INFORMATION ABOUT EACH ACTIVITY REGARDING THE USE OF TECHNOLOGY (continued)	Answer (please circle)	
7	**Use of technology in electronic voting**		
	Is electronic voting used?	Yes	No
	Note: If "Yes," answer the following:		
	Is it used everywhere (at all polling stations)?	Yes	No
	At the voting center		
	Are citizens identified electronically?	Yes	No
	Is a biometric ID system used?	Yes	No
	Is a fingerprint-capture system used to identify citizens?	Yes	No
	Is voting done electronically?	Yes	No
	Are electronic ballot boxes used?	Yes	No
	Does the electronic system issue a receipt to be placed in a ballot box?	Yes	No
	Does Internet voting exist?	Yes	No
	Are electronic signatures used?	Yes	No
	Are votes tallied automatically?	Yes	No
	Are results transmitted automatically and online?	Yes	No
	Is there an auditing process for the electronic results and the voting receipts at the end of the vote count?	Yes	No
	At the national computing center		
	Are results received in electronic form?	Yes	No
	Are results produced automatically?	Yes	No
	Are results presented automatically?	Yes	No
	How are results displayed?	Terminals Screens Internet	
	Are the results audited?	Yes	No
	Were tests and simulations done, or are they planned?	Yes	No
8	**Use of technology in the transmission of preliminary results**		
	Is a preliminary election results transmission system used to transmit preliminary results?	Yes	No
	Note: If "Yes," provide answers regarding the following aspects.		
	What medium is used to transmit results from the voting centers?	Fax Scanner Terminal	
	How are results received at the national computing center?	On paper Electronically	
	Are the results recorded and verified at the national computing center?	Yes	No
	Are the forms to close the polling stations presented in a digital format?	Yes	No
	How are the results displayed?	Terminals Screens Internet	
	Are the results audited?	Yes	No
	Were tests or simulations held, or are they scheduled?	Yes	No
9	**Comments**		

ANNEX 2. Technical Analysis Framework

The technical analysis framework serves as a guide so the information systems specialist has a route to follow in carrying out his or her activities and observing the various stages of the electoral process, with the support of the other members of the Core Group and the long- and short-term observers in their respective areas.

1. Obtaining an understanding of the electoral process and the technology used.	**Integrity of results and transparency of the electoral process**
2. Validating the transparency of the technology used at each stage of the electoral process. / **3. Validating the transparency of the use of technology during the course of the electoral process.**	
4. Providing information to the OAS/EOM.	

Suggested activities to obtain the above mentioned information:

1. Review the legal framework regarding electoral technology.	2. Interview the technical specialists at the electoral management body or bodies.	3. Interview the technical representatives of the political parties.	4. Observe the official technology-related pre-election activities.
5. Review complementary information on technology (press and other observers).	6. Fill out the questionnaire for the observation of highly automated electoral processes.	7. Present pre-election executive report to the Chief of Mission.	8. Observe the official technology-related activities on the day of the election.
9. Observe the transmission of results.	10. Observe the central consolidation of results.	11. Prepare a matrix with statistical data on the electoral process.	12. Present post-election report to the Chief of Mission.

Description of these activities:

1. Review the normative framework with the purpose to identify the regulatory parameters that exist.

2. Interview the electoral authority information systems specialist to obtain information on the technology scheme being used. This is supplemented with visits to the installations and a review of the documentation.

3. Meet with the political parties information systems specialist to gather views, observations, and recommendations about the process involving electoral technology.

4. Observe activities such as system tests and simulations.

5. The purpose is to be informed about complaints, claims, and analyses reported by the press and to learn the views of other actors involved in the electoral process.

6. Fill out the questionnaire to establish the degree of automation of the electoral process being observed.

7. Compose an executive report describing the infrastructure, threats, vulnerabilities, suggestions, and the general view about the system and the degree of automation.

8. On Election Day observe activities such as the certification of the computing center and the databases being set to zero.

9. Observe the process by which results are transmitted (by any medium, using any type of technology) for central processing.

10. Observe the consolidation of results that could be performed using any type of technology, depending on the country.

11. Compose a matrix with statistical information to have information on the presentation of results, both in terms of the tally sheets processed and the results by election and by political parties.

12. Compose a report indicating conclusions, recommendations, and a general overview of the observation conducted.

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