THE
CARTER CENTER

Carter Center Limited Mission to the May 2010 Elections in the Philippines

Final Report

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Final Report

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EXECUTIVE SUMMARY

With the agreement of the Philippine election commission, The Carter Center conducted a limited observation mission to the Philippine elections of May 10, 2010, to assess the impact of automated voting technology on the electoral process. This mission also served as the final pilot mission to test the Center's methodology for observing electronic voting. The first automated voting pilot mission took place during the 2006 Venezuelan elections while the second took place in the United States during the 2008 elections.

Carter Center field staff were based in Manila March–June 2010 and observed the pre- and postelectoral environment with regard to automation. Carter Center staff also conducted interviews with key stakeholders throughout their deployment, including the election commission and other governmental players, technology vendors — including Smartmatic and SysTest — and various civil society organizations — including representatives from the Asia Foundation, the International Foundation for Electoral Systems, and the Institute for Political and Electoral Reform. Seven short-term observers joined the Manila-based team for election day.

Because this was a limited mission, The Carter Center did not conduct a comprehensive assessment of the electoral process and was not in a position to release public statements during the electoral period. The scope of observation was instead limited to the automated election system and its impact on the administration and conduct of elections. The Carter Center assesses elections against the legal framework of an observed country, including both its domestic legislation and international treaty commitments, and in accordance with the *Declaration of Principles for International Election Observation*.[1]

The scope of observation was instead limited to the automated election system and its impact on the administration and conduct of elections.

The move toward automation in the Philippines began in the 1990s, in response to flagging public confidence and fears of electoral corruption that were often exacerbated by the significant delays (up to one month) in results proclamation under a manual voting system. After a series of geographically limited pilots, optical mark recognition technology was introduced on a nationwide basis for the 2010 election.

Despite significant pre-election concerns expressed by the Philippine media and civil society organizations, the election was generally considered successful, with voters appearing confident in the system and the transmission of over 92 percent of results occurring within 48 hours of election day. The Philippines did face significant challenges in the implementation of this new technology, however, which may be alleviated in future election processes.

Implementation of electronic voting necessitates careful planning by election administrators and vendors alike. Due to legal suits seeking an injunction against the use of electronic voting, the Philippine Commission on Elections (COMELEC) discovered the electoral calendar to be significantly compressed, resulting at times in ad hoc procedures and implementation of the system. In practice, the discovery one week before the election that 76,000 memory cards had to be recalled and reconfigured and then redistributed underscored the importance of a realistic electoral calendar. Increased time for implementation will help to ensure that adequate and comprehensive testing occurs, with

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1 Commemorated at the United Nations, October 2005. Available at http://www.cartercenter.org/resources/pdfs/peace/democracy/des/declaration_code_english_revised.pdf.

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Voters wait in line to enter a polling station.

Results protocols are printed and signed before being sent to COMELEC at the close of the polls.

to curtail universal suffrage in the case of ballot spoilage. As well, the adoption of automated technology resulted in a cost-saving measure that reduced the number of polling stations in the Philippines by nearly 75 percent and clustered previously distinct precincts so that each precinct would potentially serve up to 1,000 voters. Polling centers could include as many as 40 clustered precincts, meaning that some locations were expected to accommodate as many as 40,000 voters on election day. As a result, voters faced significant crowding and long wait times.

The Carter Center observed that results transmission was generally successful, with COMELEC and the technology vendor working in concert to provide necessary assistance to poll workers through written instructions, expert assistance, and a national call center. A lack of transparency and a general inefficiency in how officials actually administered and conducted audits plagued the postelection audit process, however. While random manual audits were to occur on election night, in practice, results of such audits were in some cases still unknown weeks after the election. While such difficulties did not negatively impact the credibility and proclamation of results, they do evidence a major area for improvement in future processes. In a different political context, timely audits could be essential to the success of elections. Therefore, COMELEC should focus on adopting clearer and more effective procedures to ensure completion of audits in a timely manner. The Carter Center is committed to the continued deepening of democracy in the Philippines and offers these and other recommendations in a spirit of cooperation with the government of the Philippines.

sufficient time to correct any identified errors.

During its limited observation, The Carter Center observed the automated election system (AES) in use. Under an AES, appropriate technology for voting and electronic devices is used to count votes and consolidate results. The Carter Center noted that use of electoral technology generally proceeded smoothly on election day; however, insufficient protections existed to ensure voter privacy and respect for secrecy of the ballot. In addition, legal provisions barring the distribution of excess ballots had the potential

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With the permission of the Philippine Commission on Elections, The Carter Center deployed a limited technical observation mission to the May 2010 elections in the Philippines that focused on the use of automated voting technologies. The mission sought to assess the potential impact of voting technology on the electoral process and to provide the Philippines with concrete observations concerning its use of such technology in the future.

The Carter Center mission conducted direct observation of some pre-election tests and preparations as well as election-day processes in three areas of the country. Carter Center observers arrived in the Philippines in March 2010, however, after many aspects of the pre-election testing and configuration of the automated election system already had been completed. Therefore, this report is based in part on interviews conducted with election commission staff, political party representatives, and civil society groups as well as on information obtained from primary documentation and official sources released by pertinent election administrative and government bodies.

Due to its small size and short duration, the mission did not assess the election's broader political context or its performance in more remote areas, such as the Autonomous Region in Muslim Mindanao. Due to the mission's limited size and narrow techni-

cal scope, public statements on the election were not issued. The Carter Center mission completed its field operation in the Philippines in June 2010.

The Philippines mission was part of a multiyear initiative aimed at developing and refining a methodology designed for the effective observation of elections that use electronic voting technologies. This initiative began in 2006, when The Carter Center deployed a specialized technical mission to Venezuela to observe the use of electronic voting in that nation's Dec. 3, 2006, presidential election as a preliminary field test of a specialized observation methodology developed earlier that year. Following the Venezuela mission, Carter Center staff and consultants further updated and revised the methodology based on informal observations of electronic voting technologies employed in the 2008 United States elections in California, Georgia, and Washington, D.C. The Philippines election provided an opportunity to build on these earlier missions and to assess the Carter Center's draft methodology prior to its final revision and publication. A revised edition of the observation methodology will be released in mid-2011.

The baseline survey, which serves as the foundation of the Center's methodology for observing electronic voting, can be found in Appendix E of this report.

Elections in Manila were contested vigorously.

THE LEGAL FRAMEWORK FOR THE AUTOMATED VOTING SYSTEM IN THE PHILIPPINES

The Carter Center assesses electoral processes on the basis of an observed country's domestic legislation, political commitments relating to the electoral process, and international human rights obligations. The Philippines, through a process of ratification, has committed itself to uphold a number of international human rights treaties relevant to the conduct of genuine elections (see Figure 1). These treaties guarantee such basic rights as universal and equal suffrage; secrecy of the ballot; freedom of assembly, association, and movement; equal treatment for all people before law; and the right to an effective remedy for the violation of protected rights. The Constitution of the Philippines includes many such rights, notably through Articles III, V, and XIII.[2] Given its limited scope, the Carter Center's mission did not systematically evaluate the extent to which the electoral process as a whole upheld all such rights; however, the Center's assessment of the electoral technology adopted by the Philippines includes consideration of the impacts this technology may have on fundamental rights protected by the Philippine Constitution and public international law.

In the 2010 election cycle, the national offices at stake included the presidential and vice presidential offices, 12 of the 24 seats in the national Senate,[3] and all seats in the House of Representatives. In addition to national executive and legislative offices, a number of local races were also contested in the May 2010 elections. These included provincial governors and vice governors, municipal mayors and vice mayors, and provincial and municipal legislatures and coun-

The Carter Center assesses electoral processes on the basis of an observed country's domestic legislation, political commitments relating to the electoral process, and international human rights obligations.

cils. In total, between national and local offices, voters chose candidates for over 20 elective seats in May. Elections for barangay-level (neighborhood) offices were not held on May 10, 2010, but instead occurred on Oct. 25, 2010.

Multiple laws govern the conduct of Philippine elections. The primary law is the Omnibus Election Code of the Philippines (Batas Pambansa Bilang 881) (December 1985).[4] This code has been amended by multiple subsequent congressional acts, however.[5] With regard to automation, the most notable of such amendments are Republic Acts 8436 and 9369.

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2 1987 Constitution of the Philippines. Article III of the constitution includes a Bill of Rights that includes the protection of expression and assembly as well as access to courts of law and due process. Article V extends suffrage rights to all eligible citizens and includes provision for ballot secrecy, while Article XIII, Sections 15–16, discuss the functioning of assemblies dedicated to the public interest.

3 Sixty-one candidates contested these 12 seats in the 2010 elections.

4 Batas Pambansa Bilang 881, or the Omnibus Election Code of the Philippines, was adopted on Dec. 3, 1985. Hereinafter, it is referred to as "the 1985 election law."

5 The following is a nonexhaustive list of acts that amend provisions of the 1985 election law. Republic Act 7166, An Act Providing for Synchronized National and Local Elections and for Electoral Reforms, Authorizing Appropriations Therefor, and for Other Purposes; Republic Act 7436, Rules and Regulations on the Resumption of the System of Continuing Registration of Voters and Providing for the Use of Data Capturing Machines Nationwide; Republic Act 7941, An Act Providing for the Election of Party-List Representatives Through the Party-List System and Appropriating Funds Therefor; Republic Act 8046, An Act Authorizing the Commission on Elections to Conduct a Nationwide Demonstration of a Computerized Election System and Pilot-Test It in the March 1996 Elections in the Autonomous Region in Muslim Mindanao (ARMM) and for Other Purposes; Republic Act 8436, An Act Authorizing the Commission on Elections to Use an Automated Election System in the May 11, 1998, National or Local Elections and in Subsequent National and Local Electoral Exercises, Providing Funds Therefor and for Other Purposes; and Republic Act 9006, An Act Amending Republic Act No. 8436.

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Figure 1. Status of Ratifications in the Philippines

Treaty/Declaration	Status	Date
International Covenant on Civil and Political Rights	Ratified	Oct. 23, 1986
International Convention on the Elimination of All Forms of Racial Discrimination	Ratified	Sept. 15, 1967
International Convention on Economic, Social, and Cultural Rights	Ratified	June 7, 1974
Convention on the Elimination of Discrimination Against Women	Ratified	Aug. 5, 1981
Convention on the Political Rights of Women	Ratified	Sept. 12, 1957
Convention on the Rights of the Child	Ratified	Aug. 21, 1990
International Convention on the Protection of the Rights of All Migrant Workers and Their Families	Ratified	July 5, 1995
U.N. Convention Against Corruption	Ratified	Nov. 8, 2006
U.N. Convention on the Rights of Persons with Disabilities	Ratified	April 15, 2008
Universal Declaration of Human Rights	Adopted*	Dec. 10, 1948
Charter of the Association of Southeast Asian Nations**	Ratified	Nov. 3, 2008

As a declaration, the Universal Declaration of Human Rights has not undergone a process of ratification. The Philippines was one of 48 states that originally adopted the declaration by proclamation in 1948. Although not designed as a legally binding treaty, the declaration is widely considered binding as customary international law.

** The Association of Southeast Asian Nations (ASEAN) is a geopolitical and economic organization whose focus is only tangentially related to human rights. As of 2010, the human rights monitoring bodies associated with ASEAN remain nascent.*

Under the Omnibus Code, the responsibility for election administration at all jurisdictional levels in the Philippines lies with the Commission on Elections (COMELEC), an independent constitutional body that exercises administrative and judicial powers over the electoral process. As provided through their constitutional mandate and reflected in the 1985 election law,[6] COMELEC resolutions and directives regarding the application of laws relevant to the electoral process form an integral part of the legal framework for elections.

CREATING A LEGAL FRAMEWORK FOR AUTOMATION

The Omnibus Election Code of the Philippines does not address matters related to the introduction of

electronic voting technology; however, subsequently enacted laws do provide a legal framework for the conduct of automated elections. The legal framework related to electronic voting is primarily defined in Republic Act 9369, promulgated on Jan. 23, 2007. This act explicitly authorizes COMELEC to adopt automated electoral technologies, whether electronic or paper-based, with the intent to ensure that consolidation and proclamation processes are conducted in an efficient and transparent manner.[7] The act also

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6 The 1985 election law, Article 52(c) and the Constitution of the Philippines, Article IX, Section C2.1.

7 Republic Act 9369, Section 6 (Amending Section 5 of Republic Act 8436).

provides COMELEC with a mandate to include the identification and provision of such a system as it deems suitable and defines requirements for minimum system capabilities, procurement policies, external evaluation, testing, canvassing of election returns, and results audits.

Republic Act 9369 generally provides a broad over-all basis for the successful adoption of an electronic voting system, focusing on issues such as efficiency, transparency, and accuracy of results. The provisions of this act are at times overly vague, however, creating potential difficulties in interpretation and implementation. Further, such regulations are at times inconsistent with the Omnibus Election Code. While not pervasive, such inconsistencies have the potential to make the intent of the law unclear, increasing the chance of misapplication or increasing the need for clarifying resolutions by the election management body.

Minimum system capabilities, as defined by Section 7 of Republic Act 9369, include the following:

- requirements of security against unauthorized system access
- accuracy in recording
- efficiency in recording and consolidation of vote records
- data retention
- archiving of a paper record of voting
- a voter-verified paper audit trail

The use of paper ballots in the Philippines fulfills these requirements, serving as an archivable voter-verified paper audit trail; however, Section 7(n) of the act further requires that the system "provide the voter a system of verification to find out whether or not the machine has registered his choice." As the automated system used on May 10 did not include such a function, the system in use in future elections may require modification so that it allows voters to verify that the machine properly registered their choice. Once such modification is made, the automated system would then comply with the electoral code as currently written.

Republic Act 9369, Section 10, also amends Section 9 of Republic Act 8436 to require that a continuity plan be in place and be publicly known to political parties in order to ensure that voting processes may continue in the case of system failure. The Section 10 provision does not require that these plans include the use of electronic technologies. This is a significant amendment from Republic Act 8436, which limited continuity plans to the "use [of] any available machine or any component thereof from another city/municipality."[8] The ability to retain manual voting procedures in cases of emergency or machine malfunction is an important provision of the law, with the potential to aid in achievement of universal suffrage in cases of technology breakdown.

While Act 9369 gives COMELEC wide latitude in determining the automated process by which voting and counting will occur, it specifies that any such system must print 30 official copies of the election return for public display, physical transportation to canvassing centers, and distribution to political party observers. In addition, it requires that the results be electronically transmitted to the board of canvassers within one hour of the close of polls.[9] Similar requirements exist for the board of canvassers, with the additional allowance that any parties not receiving one of the 14 copies allocated to political parties may receive an additional copy at their own expense.[10]

Republic Act 9369 also requires the completion of a random manual audit (RMA) in one precinct per congressional district, to be randomly chosen by the election commission in each province and city. The law specifies that any discrepancies in audit results will require a "determination of root cause and initiate a manual count for those precincts affected by the computer or procedural error."[11] Specific instruc-

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8 Republic Act 8436, Section 9.

9 Republic Act 9369, Section 19 (Amending Section 18 of Republic Act 8436).

10 Republic Act 9369, Section 21 (Amending Sections 22 and 26 of Republic Act 8436).

11 Republic Act 9369, Section 24 (Amending Section 24 of Republic Act 8436).

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tions for the conduct of the random manual audit, including the determination of ballot validity and the process through which votes should be counted, were provided by COMELEC through Resolution 8837. Notably, this resolution also increased the number of precincts to complete an RMA per district to five and specified that the audit occur on the evening of May 10, 2010, in the presence of poll watchers and political party representatives.[12] This was a positive step to increase voter confidence in the process. Furthermore, on May 25, 2010, COMELEC issued Resolution 8947, which focused on the procedures for validation of RMA results that returned discrepancies in their initial conduct. Unfortunately, as noted later in this report, RMAs in many districts were not conducted on election night but rather days and sometimes weeks after May 10. It will be essential that this be rectified for future elections so that the value of the RMA process is not undermined.

PROTECTION OF FUNDAMENTAL RIGHTS WITH REGARD TO AUTOMATED VOTING

Section 1 of Republic Act 9369 reiterates the constitutional protections of suffrage rights, requiring that any automated system ensure "the secrecy and sanctity of the ballot … and that the results shall be … reflective of the genuine will of the people."[13] There are a number of provisions of law, however, that have the potential to impede the protection of these and other fundamental rights. The Carter Center notes these relevant laws in the paragraphs that follow.

Republic Act 9369 amends Section 11 of Republic Act 8436 to require that each precinct receive one ballot for each voter plus an additional three ballots per precinct, presumably for use by the three polling station staff members. This is a significant deviation from the 1985 Omnibus Election Code, which required that ballots be allocated at a rate of 1 and 1/5 ballots per voter (100 extra ballots per 500 voters, or 20 percent).[14] In addition, Republic Act 9369, Section 15, amends Section 14 of Republic Act 8436 to remove specific regulations regarding the reissuance of additional ballots in the case of spoilage.

A COMELEC official conducts a postelection random manual audit using ballots extracted from a precinct count optical scanner selected for audit review.

While the allocation of ballots at the rate prescribed by the 1985 election law appears high, it is good practice that additional ballots be provided to each precinct in order to facilitate the suffrage rights of voters in case of ballot spoilage.[15] This amended provision of Republic Act 9369 limiting additional ballots to just three, as enforced by COMELEC, has the potential to effectively curtail enfranchisement and should be reviewed prior to future electoral processes.

Section 15 of Republic Act 9369 mandates that the electoral commission prescribe a manner of voting that takes into consideration "the secrecy of the

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12 Sections 7(b) and 8(b) of COMELEC Resolution 8837, promulgated on April 30, 2010.

13 The suffrage rights protected by the Philippine Constitution are in line with the commitments made through the ratification of the International Covenant on Civil and Political Rights (adopted Dec. 16, 1966, entered into force March 23, 1976) 999UNTS 171.

14 The 1985 election law, Article XVI, Section 183.

15 See, for example, *United Nations Human Rights and Elections: A Handbook on the Legal, Technical, and Human Rights Aspects of Elections*, paragraph 111.

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ballot"; however, this act also removes the requirement of section 14 of Republic Act 8436 that voters mark ballots behind voting booths. Such booths are required by the 1985 election law to be provided at the rate of one secrecy booth per each 20 voters registered at a precinct,[16] with a minimum of 10 required by Section 11 of Republic Act 7166. The removal of specific measures to ensure secrecy of the ballot potentially undermined the strength of this requirement in law and impeded secrecy in practice.[17]

Republic Act 9369 includes positive provisions aimed at ensuring public confidence in the counting procedures. In particular, Section 19 of this act amends Section 18 of Republic Act 8436 to require the posting of results in a public place and the provision of official copies of results to political parties. In addition, Section 40 amends Section 29 of Republic Act 7166 to require public posting at the canvassing-center level as well. Though not required by international law, the posting of results at the polling-station level is widely recognized as good practice, and so this is a commendable amendment.[18]

Voter education efforts are necessary to ensure an informed electorate able to effectively exercise their right to vote,[19] and such a provision is critical to the successful protection of suffrage rights in practice. A move to automated technology inherently increases the need for comprehensive voter education, aimed at sensitizing voters to the use of electoral technology. In the Philippines, the transition to automated voting technology required both the familiarizing of voters with the use of technology and the transition away from the historical system of paper ballots. Voter education provisions are specifically included in Republic Act 9369, Section 26, which requires that the electoral commission "undertake a widespread stakeholder education and training program," aimed at ensuring understanding and acceptance of the automated

system by citizens, parties and candidates, local government and military personnel, and the electoral commission itself. Explicit provision of a mandate for voter education is an important step to ensuring that such programs receive adequate attention and budgetary resources in practice and represents a strong element of the Philippine legal framework for elections.

A clear and concise legal framework can significantly enhance the ability of the election commission and other relevant parties to administer elections in line with their legal obligations. Although the 1985 Omnibus Election Code was originally designed as a comprehensive law, since its promulgation, the Philippine electoral system has undergone substantial changes, including a synchronization of elections, alterations to the process for voter registration, and, most critically, the introduction of a nationwide automated election system. Such changes have required the adoption of numerous amendments and regulations. A foreseeable impact of such revision is that discrepancies exist among different provisions of the legal framework, and significant areas of the 1985 election

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16 The 1985 election law, Article XII, Section 158.

17 The Philippines has committed to ballot secrecy, International Covenant on Civil and Political Rights, Article 25(b).

18 While not required by international law, support for the best practice of posting detailed election results disaggregated to the polling-station level can be extrapolated from General Comment No. 25, paragraph 20, which provides that "there should be independent scrutiny of the voting and counting process and access to judicial review or other equivalent process so that electors have confidence in the security of the ballot and the counting of the votes." Publication of final results broken down by polling station is prerequisite for this scrutiny, and its inclusion in the Philippines electoral code is commendable. This is further supported by paragraph 112 of UN *Human Rights and Elections*, which requires that "the process for counting votes, verification, and reporting of results and retention of official materials must be secure and fair."

19 United Nations Human Rights Committee, General Comment 25 on The Right to Participate in Public Affairs, Voting Rights and the Right to Equal Access to Public Service (UN Doc. CCPR/C/21/Rev. 1/Add.9) (1999), paragraph 11.

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law appear outdated or inappropriate to the current election system. The development of a single, comprehensive election law reflective of the current electoral system of the Philippines and the use of electronic technologies may greatly benefit the country in future electoral processes, streamlining administration and ensuring that the laws and regulations governing elections are accessible and understandable to the electorate at large.[20]

ELECTION SYSTEM IN THE PHILIPPINES; NATIONAL AND LOCAL RACES

Republic Act 7166 amends the 1985 election law and builds upon previous acts of the republic requiring synchronized elections for national and local elections.[21] Under the auspices of this act, the office of the president is elected every six years, while the Senate, House, and local races are held every three years. While all local and House races are contested every three years, senators are elected to staggered six-year terms, with 12 of the 24 Senate seats contested each election.

Executive branch offices are limited to a single six-year term, with the offices of president and vice president elected separately rather than on a closed-ticket basis. In contrast, senators and representatives can serve a maximum of three terms, or a total of nine years for representatives and 18 for senators.

Senate seats are elected nationally and not tied to any region or locality. Through this plurality-at-large system, voters throughout the country vote on the same group of senatorial candidates, with each voter allowed to vote for up to 12 senators per election. The House of Representatives contains two representative groups that may each vary in size but not to exceed 250 seats. Most members represent one of the 212 geographically defined congressional districts. The rest represent "party-list" parties (often called "groups") that represent particular societal sectors, such as veterans, farmers, or indigenous peoples. As party-list seat allocations are based on a percentage of votes received, with groups needing to reach a minimum threshold of 2 percent in order to gain at least
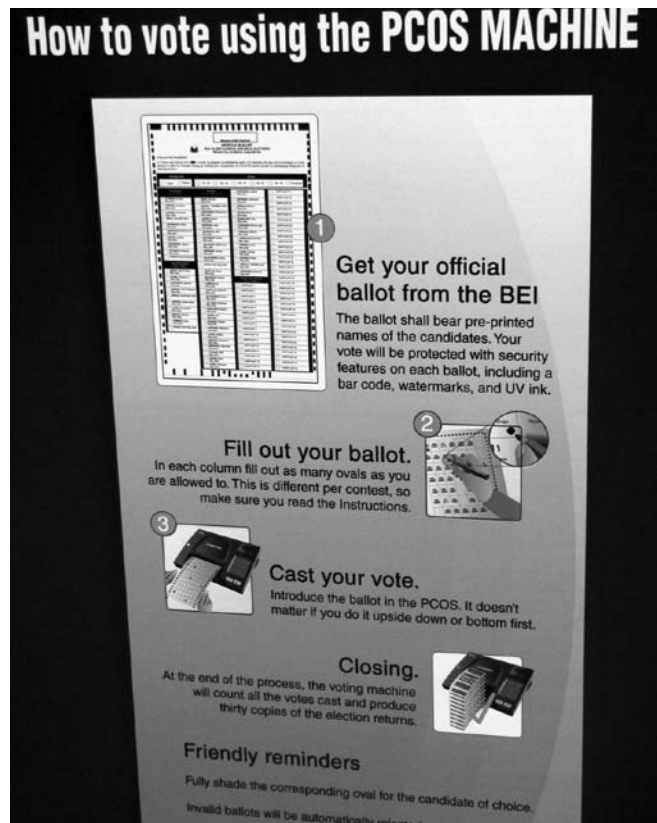
COMELEC provided instructions on how to use PCOS machines to vote.

one seat, the number of representatives elected from such a list may fluctuate, with up to a maximum of 38 seats. During the May 2010 election, Filipino voters selected one House representative for their district and, separately, one party-list group from among those that appeared on the ballot. Voters throughout the country chose from the same slate of party-list groups, in which the contesting parties, not individual candidates, are listed by name.

20 While not required by international law, the publication of electoral practices globally supports the creation of a single, coherent, and comprehensive election law as a measure to ensure effective implementation and understanding. See, for example, The Organization of Security and Cooperation in Europe, Office of Democratic Institutions and Human Rights, *Guidelines for Reviewing a Legal Framework for Elections*, pp. 5–6; European Union, *Handbook for European Union Election Observation*, 2nd ed.), p. 29.

21 Republic Act 7166, Section 2.

The Move Toward Automation in the Philippines

Historically, elections in the Philippines have been marked by concerns about corruption, insecurity, and a lack of transparency. Low public confidence in elections was abetted in part by slow consolidation of vote returns and the announcement of final results. Such delays in the announcement of results are not uncommon in countries of high population and diverse geography, which often require significant institutional planning and time to secure the transmission of official results to a central location. Seeking to address such concerns and provide a secure and efficient means to consolidate voting results, the Philippine government began to consider the use of automated voting technologies as early as 1993.

A COMELEC poster illustrates the transition to electronic voting.

In 1995, Republic Act 8046 was passed, authorizing the implementation and testing of an automated election system in the Autonomous Region in Muslim Mindanao, resulting in the country's first electronic voting pilot in 1996. Following this 1996 pilot, Republic Act 8436 was passed in December 1997, setting out a general legal framework for the implementation of an electronic voting system. This law was followed by partial automation in the nationwide 2001 legislative elections, and in 2004 COMELEC began to plan for full automation and procured a physical automated election system.

Due to logistical and security contingencies, however, the machines were never used, and the election was administered via manual processes. In 2007, Republic Act 9369 was passed, amending the 1997 law, to reflect technological advances and "lessons learned" from the various pilot projects undertaken in automation. Republic Act 9369 mandated the use of electronic voting for the 2007 elections. Due to the adoption of a time frame that left insufficient time for the procurement and testing of an automated system, however, COMELEC was again unable to implement an electronic system in time for the 2007 election.

In 2008, a pilot project was implemented during elections in the Autonomous Region in Muslim Mindanao for governor and vice governor, using a combination of direct recording electronic (DRE) and optical mark recognition (OMR) systems. The relative success of these elections helped pave the way for national implementation of an automated system in 2010. Because Republic Act 9369 did not mandate the use of a specific type of technology or system, the Philippines considered the acquisition of both DRE

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and OMR systems for the 2010 elections. Due to concerns about costs, technical reliability, and public distrust of DRE technology, however, COMELEC eventually opted to use only OMR technology in the 2010 elections. Figure 2 provides a time line of the main events in the Philippine move to automation.

Figure 2. Time Line of Events in the Philippine Move to Automation

1995 — Republic Act 8046 passed

1997 — Republic Act 8436 passed

2007 — Republic Act 9369 passed

2008 — E-voting pilot in the ARMM with DRE and OMR systems

1996 — First pilot in ARMM

2001 — Partial automation of national election

2007 — COMELEC unable to implement electronic voting system due to insufficient time

2010 — OMR E-voting system implemented nationwide
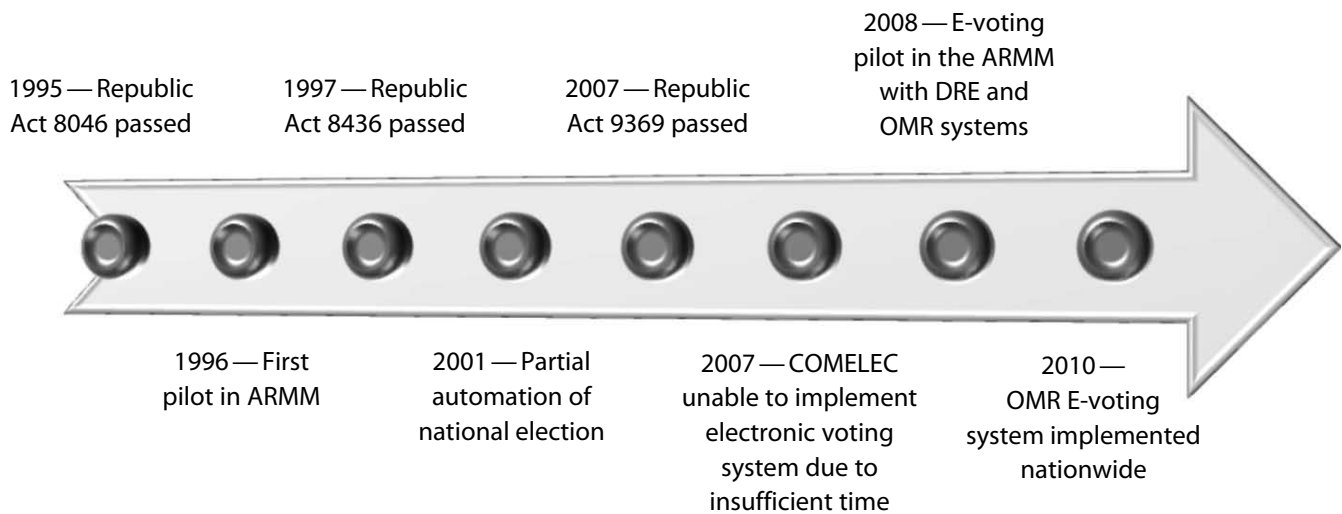
THE ELECTION MANAGEMENT BODY

An independent and impartial electoral authority that functions transparently and professionally is internationally recognized as an effective means of ensuring that citizens are able to participate in a genuinely democratic election and that other international obligations related to the electoral process can be met.[22]

Elections in the Philippines are organized by the Commission on Elections (COMELEC). The role and mandate of COMELEC are defined by Article IX of the Constitution of the Philippines as well as by Article VII of the 1985 election law. The constitution requires that COMELEC comprise seven members, including one chairman and six commissioners (the majority of whom must have passed the Philippines bar), appointed by the president to a nonrenewable seven-year term.[23] Legally, COMELEC enjoys independence, although it is subject to limited oversight by organs of the judicial and legislative branches. COMELEC's procedural rule-making powers, as provided by Section C2.1 of the Constitution of the Philippines,[24] are overseen directly by the Philippine Supreme Court, while its organizational actions and personnel are subject to investigation and subpoena by the Congress, which can order special investigations and hold hearings on electoral matters.

COMELEC's powers are wide-ranging, including the enforcement of all "laws and regulations relative to elections" and jurisdiction over all election disputes for subnational offices.[25] Article 52(i) of the 1985 election law confers responsibility on COMELEC to adopt electoral technologies as it sees fit. Under this act, COMELEC has a broad mandate to identify an appropriate system, determine voting and counting procedures and locations, conduct voter education, oversee material procurement (including technology, ballots, and ballot boxes), and conduct a public source code review.[26]

Section C2.4 of Article IX of the constitution further provides COMELEC the wide-ranging power to "deputize … law enforcement agencies and instrumentalities of the Government, including the Armed Forces … for the exclusive purpose of ensuring free, orderly, honest, peaceful, and credible elections." The constitution also gives COMELEC the power to regulate all government-owned franchises, permits, or grants (such as those provided to media outlets or public transportation) during the election period as necessary[27] and to enlist impartial, nonpartisan groups in order to assist in the implementation of the law as appropriate.[28] This mandate effectively allows COMELEC to dispatch, with legislative approval, the Philippine National Police and armed forces of the

> *COMELEC's powers are wide-ranging, including the enforcement of all "laws and regulations relative to elections."*

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22 United Nations Human Rights Committee, General Comment 25, paragraph 20.

23 Constitution of the Philippines, Article IX, Section C1.1; this article further provides that commissioners must be natural-born citizens of the Philippines, hold college degrees, and be at least 35 years old.

24 See *supra*, note 3.

25 Constitution of the Philippines, Article IX, Sections C2.1 and C2.2; the 1985 election law also makes clear that decisions and directives of COMELEC are superior to those of any other body except the Supreme Court of the Philippines.

26 Republic Act 9369 (Amending Republic Act 8436), Sections 1, 10, 12, 15, 17, 18, and 26. COMELEC's mandate over procurement is similarly provided for by Article 52(h) of the 1985 election law.

27 Constitution of the Philippines, Article IX, Section C.4.

28 The 1985 election law, Article 52(i).

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Philippines for the promotion of security and political stability during the period immediately preceding election day and to engage the services of any government agency as deemed appropriate throughout the electoral period.[29] In the 2010 elections, COMELEC utilized this power to engage the assistance of information-technology-literate members of the civil service in implementing the optical mark recognition (OMR) voting system and to request the assistance of the Philippine armed forces in distributing voting materials to remote and insecure locations.

Advisory Bodies to COMELEC

The introduction of new technology into the electoral process necessarily impacts the structure for administering the elections and requires a higher degree of technical knowledge among election commission staff. In this light, Republic Act 9369 called for the establishment of various governmental bodies to provide advice and technical assistance to COMELEC throughout the process. In 2010, in addition to creating a Project Management Office to oversee the implementation and operation of the OMR system, COMELEC established the following advisory bodies to aid and assist its efforts:

The Technical Evaluation Committee. The committee was made up of key leaders from government, industry, and civil society. The committee was legally tasked with obtaining the certification of the automated election system (AES) by an established, international certification entity and thereby determining whether the AES, including its hardware and software components, was "operating properly, securely, and accurately." In addition, the committee was required to ensure the proper review and retention of the source code by a secure third party (The Central Bank of the Philippines).

Posters in COMELEC's media center provide basic information on the elections and the new technology.

The COMELEC Advisory Council. The council is made up of nine members from national departments, academia, the information and communications technology field, and nongovernmental electoral reform organizations. During the 2010 elections, the council was tasked with recommending the most appropriate, secure, and cost-effective technology and with participating as nonvoting members on the Bids and Awards Committee. While the council had no official duties related to the implementation of electronic voting technologies, it was ultimately responsible for the following:

• recommending and reviewing voting systems
• planning and testing systems
• identifying potential issues
• designing contingency plans for the bidding process, use, and eventual disposal of AES
• conducting an evaluation of the AES after its use

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29 The 1985 election law, Article 52(b) limits the ability of COMELEC to deputize government instrumentalities and military forces to the campaign period and "thirty days thereafter."

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A typical PCOS machine sits idle before being powered on.

Joint Congressional Oversight Committee on the Automated Election System and the House Committee on Suffrage and Electoral Reforms. In conjunction with their enumerated powers, legislatively, two bodies were tasked with legal oversight for the automated voting system, the Joint Congressional Oversight Committee on the Automated Election System and the House Committee on Suffrage and Electoral Reforms. Per Republic Act 9369, the Joint Congressional Oversight Committee on the Automated Election System comprises 14 members of Congress, seven from the Senate and seven from the House of Representatives, who are tasked with conducting an assessment of strengths and weaknesses of electoral technologies, including questions of accuracy. The committee's findings form the basis of recommendations to the full Congress regarding the scope of implementation best suited for electoral technologies in future electoral processes.

THE TECHNOLOGY VENDOR AND COMELEC

Under its mandate to identify and procure an automated electoral technology, COMELEC issued a request for proposals to solicit bids from manufacturers of election system equipment in early 2009. Ultimately, COMELEC selected the services of a

joint venture, composed of the Dutch/Venezuelan company Smartmatic, working in partnership with the Philippine company Total Information Management (hereafter, Smartmatic).[30] COMELEC's full budget allocation for the election project was 11 billion pesos (approximately USD $250 million): 7.2 billion pesos of this was earmarked for the Smartmatic contract for the AES.[31] The contract for the AES was signed on July 10, 2009, and stipulated three primary components:

1. a paper-based automated election system, including the election management system software
2. precinct count optical scanner (PCOS) machines
3. a consolidation/canvassing system for electronic transmission of election results using the public telecommunications network and overall project management services

Although the AES contract was signed in July 2009,[32] legal challenges filed by a civil society group (Concerned Citizens Group Against Poll Automation) seeking an injunction against the use of technology were not settled until September 2009. This delayed the manufacture and delivery of the PCOS machines as well as other preparations for contract fulfillment, effectively compressing the electoral calendar and shortening the time allotted for system implementation.

Assigning Vendor vs. COMELEC Responsibilities

The contract between Smartmatic and COMELEC indicates a division of labor under which COMELEC retains full oversight of election administration but shared responsibility for the implementation and

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30 According to Republic Act 9369, although foreign vendors were allowed to take part in the bidding process, all submissions required 60 percent Philippine ownership.

31 The software and hardware components of the AES were leased, with COMELEC retaining an option to purchase the machines by December 2010.

32 While the contract document was made publicly available by COMELEC, The Carter Center was unable to obtain the annexes to the contract (consisting of lists of the goods and services to be delivered by the vendor), despite written and verbal requests to COMELEC.

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A Smartmatic technician instructs the Board of Election Inspectors (BEI) officials on the function and proper working of the PCOS machine for election day operation.

operation of the AES. According to the contract, "The entire processes of voting, counting, transmission, consolidation, and canvassing of votes shall be conducted by COMELEC's personnel and officials, and their performance, completion, and final results according to specifications and within the specified periods shall be the shared responsibility of COMELEC and the provider." In practice, COMELEC retained the responsibility for hiring electoral workers, for selecting precinct and canvassing center locations, and for coordinating security in areas known for violence or political unrest; however, most technical and logistical duties were eventually completed by Smartmatic and other technical service provider corporations, with COMELEC providing oversight.[33] While the unfamiliarity of the

AES required significant input and oversight from Smartmatic in 2010, in future elections COMELEC, as the legally mandated election management body of the Philippines, should seek to increase its capacity to oversee the technical aspects of the process. Smartmatic officials often conducted press interviews and voter education efforts, responsibilities more clearly mandated as COMELEC's, and which may be better completed by the commission itself in future elections.

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33 Subsequent and separate contracts with Smartmatic included a 519-million-peso contract for the procurement of ballot boxes and transportation of PCOS machines to all polling centers nationwide as well as another contract for 499 million pesos to cover delivery services for the ballots.

Design and Function of the Automated Election System

The Smartmatic PCOS machine used in the Philippines was an optical mark recognition system, which scans a double-sided paper ballot that has been marked by voters using a felt-tip pen provided at the polling place. Due to its use of paper, hand-marked ballots, this AES is not technically an electronic voting system but rather an automated counting system. When the ballot is inserted into the PCOS, the machine scans an image of each side of the ballot and interprets the selections on the basis of "timing marks" that run along the ballot's edge and instruct the PCOS where each particular oval and name is located. Data about a voter's selections are then digitally stored on a compact flash card inside the PCOS machine, while the ballot itself is dropped into a secure ballot box physically attached to the PCOS for storage.

Smartmatic licensed the PCOS hardware, software, and firmware from the Canadian vendor Dominion Voting Systems for a period of five years, beginning in April 2009, "with the right to sublicense the right to use such software to the COMELEC" and with the qualification that "Dominion will retain sole liability to amend, change, or develop all software or firmware or [election management systems]."[34] The Taiwan-based Qisda Corporation, on behalf of Smartmatic, manufactured the PCOS machines in China. The PCOS machines used in the Philippines were the SAES1800, which were loaded with firmware (v.3.16.6PH) and ran embedded uClinux, an operating system written specifically for the Philippine 2010 elections. The AES system used in the Philippines included the following components:

Due to its use of paper, hand-marked ballots, this AES is not technically an electronic voting system but rather an automated counting system.

- SAES1800 precinct count optical scanner (PCOS) machine, which is the core of the AES
- the Realtime Electoral Information System, which is the underlying enterprise software system
- the consolidation and canvassing system, which provides for results tabulation and transmission
- the Smartmatic election management system, which comprises the software and source code

Each polling station in the Philippines received one PCOS machine for use in voting. Each PCOS machine contained the following hardware and components:

- mono-color touch-enabled screen
- 4-bit mono-color digital scanner with 200 DPI resolution[35]
- integrated thermal printer with paper cutter
- input/output ports (for compact flash card reader, UTP Ethernet, disabled USB, RJ-11 modem)
- two compact flash cards (one main, one backup) with separate ports
- "cast" and "return" buttons (disabled because voter verification was not conducted in the 2010 election)
- iButton key slot

Security Features of the Automated Election System

A critical security feature of the AES is its ability to create and store election results in both physical

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34 License agreement presented to COMELEC by Smartmatic.

35 Scan resolution refers to how many dots per inch (DPI) a device reads. Normal scanners read 300 DPI. Scan depth refers to how many shades of color can be associated with each dot. Normal scanners read 24 bits of color per dot, or more than 16 million shades of color. The SAES1800 recognizes 16 shades of black.

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Written PCOS operating instructions cover opening through closing of the polls.

and digital formats. (In addition to the ballots cast by the voter, physical records include 30 copies of the election return printed by the PCOS; eight copies are printed prior to electronic transmission of results and are distributed to the dominant parties to decrease doubt that the PCOS can be manipulated remotely. Twenty-two copies are printed after transmission and distributed to parties interested in both viewing the results and comparing them against the eight pre-transmission copies to ensure the vote count was not tampered with). Electronic versions

of the results are digitally transmitted and stored in the Municipal Board of Canvassers' canvassing and consolidation system and the COMELEC and the Association of Broadcasters of the Philippines/Parish Pastoral Council for Responsible Voting ("citizens arm")[36] servers. In addition, these results exist as ballot images stored on the main compact flash card and results data on the backup compact flash card of each machine. This provides the ability to check the accuracy of each result against one another, allowing for the identification of any potential discrepancies or attempted manipulation of one set of results. Additional security features included in the AES are described below.

Ultraviolet Marks and Bar Codes on Ballots

According to election law, official paper ballots were to contain security features that would reduce the likelihood of false or duplicate ballots being used. Each ballot was printed with an ultraviolet (UV) mark, using special ink visible only under UV light. The SAES1800 manufactured for the Philippines had UV-reading functionality so that the PCOS machine itself would automatically confirm the authenticity of a ballot.

It was discovered during the pre-election testing procedures, however, that due to an error in the ballot printing process, the PCOS machines were, in fact, unable to read the UV mark.[37] Because printing had already begun by the time the error was discovered and had to proceed under a series of tight dead-

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36 Section 52(k) of the 1985 Omnibus Election Code provides for COMELEC to name a civil society or nongovernmental organization to aid in the implementation of elections. In this light, COMELEC named the Parish Pastoral Council for Responsible Voting as its official "citizens arm," responsible for receiving one set of election returns.

37 At least two separate explanations were given to Carter Center observers for the oversight. Smartmatic representatives explained that because the ballot printing process was being rushed, the UV mark was misaligned, thereby preventing it from being identified by the PCOS. A representative from the COMELEC Advisory Council stated that the UV ink was not printed according to the required density specifications. Another explanation was that the National Printing Office had introduced a late requirement that its own UV mark also be included in the ballot printing process.

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BEI officials unpack, organize, and account for election materials at a polling place on election day.

A BEI worker is trained on how to use the PCOS machine.

lines, COMELEC decided to disable the UV verification feature on the PCOS rather than halt printing. Instead, COMELEC procured handheld UV lamps for each polling precinct's board of election inspectors (BEIs) to use on election day to verify each ballot's authenticity before handing it to a voter. In addition, each ballot was printed with a barcode, which provided a unique identifier containing details about the precinct and contests. The PCOS was programmed to recognize and accept each ballot only once. This feature, in combination with the UV marking, was intended to prevent the acceptance of fake ballots.

Data Storage and Encryption Procedures

During manufacture, each PCOS machine was loaded with firmware (version 3.16.6PH) programmed directly into the circuitry of the read-only memory (ROM) for control of the machine's operation. The main compact flash card has a storage capacity of 2 gigabytes and contains two partitions: a 250-megabyte FAT32 volume containing the configuration files for a particular precinct and a raw partition in which the scanned ballot images and interpretation are stored and encrypted using AES128-bit symmetric cryptography. In order to prevent a possible reconstruction of voter sequence, ballot images are randomly stored in the second partition, using an algorithm generated by the Smartmatic election management system.[38] In addition, ballot images are stored without the bar code that appears on the paper ballot to preserve anonymity and the secrecy of the ballot.[39] After voting closed and results were transmitted to the canvassing server from the PCOS, the machine was programmed to automatically back up the results to the blank compact flash card in the administrator slot (the "second," or alternate, card). This card is a blank "write-once/read-many" device that ensures that only one set of results can be stored on the card.

Physical Security of the Digital System

Another key security feature of the AES was the restriction of physical access to the digital data trail that the system produces during balloting and results transmission. BEIs were to ensure that tamper-evident seals (or plastic ties) were correctly applied to all outwardly accessible ports on the PCOS machines, including printer, memory card, and transmission slots, and to record serial numbers when required. While the main memory card slot had been sealed in the COMELEC warehouse prior to shipment, the

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38 This information was gathered in an informal interview with a representative from Dominion Voting Systems (DVS). While no nondisclosure agreement was signed, the representative claimed that this information should be verified with DVS/Smartmatic before being published.

39 It is good practice that votes and voter information be stored separately to prevent the two being associated with one another. See, for example, the Recommendation (Rec (2004)11) of the Committee of Ministers of the Council of Europe on the Legal, Operational, and Technical Standards for E-voting, Article 35.

Public Concerns Regarding the Automated Election System

From the outset of the initial planning discussions held in 2008, some civil society groups and political actors expressed concerns about the automated election system and Smartmatic. While these concerns dominated public discourse throughout the pre-election period, The Carter Center found little evidence of their impact on public confidence on election day. Although limited in nature, the Center's observation mission was nonetheless able to report that voters generally appeared excited and willing to use the new technology. Future electoral processes, however, may be improved by increased programs aimed at alleviating public fears and increasing familiarity with electoral systems prior to their use. These concerns included the following.

Haste

Some argued that COMELEC moved to full automation without appropriate planning and testing. According to the law, any system of automation must be used on a limited pilot-test basis in an actual election before deployment on a national scale. According to critics, although a similar automated system was used in the 2008 elections in the Autonomous Region in Muslim Mindanao, that system differed from the one deployed in the 2010 election and could not be considered an appropriate pilot test for 2010. Section 10 of law 9369 states, however, that the technology should have been deployed "here or abroad." This technology has been used in other jurisdictions, so use of the system was likely not in contravention of the law.

In addition, some analysts noted that the decision to move to full automation was made only in March 2009, with the vendor contract signed in July 2009. This left less than a year to implement the system, including source code customization, software audit, equipment procurement, configuration and testing, ballot design and printing, transmission testing, poll worker training, voter education, and contingency planning. Concerns were raised that there was inadequate time allotted for the many tasks that needed to be completed by May 2010.

Information Technology Security

It was also alleged that the AES was fraught with IT-related security vulnerabilities that could render the system vulnerable to digital manipulation, fraud, and failure. For example, it was argued that since the public and private keys contained in the digital signatures used in transmitting results were generated by the same body (COMELEC/Smartmatic) and not a third party, it was potentially possible for personnel in these institutions to falsify election returns. In the future, an independent third party should generate the public and private keys (or digital certificates) used in results transmission.

Software Architecture

A lack of transparency inherent in the use of voting technologies, in which there is no physical, observable vote count, was also a source of concern. Some critics of the AES called for a system based entirely on open-source software and wanted automation limited to the process of vote transmission to canvassing centers, with voting and counting to be carried out using traditional, manual methods. A manual vote and count coupled with automated transmission, they contended, would be more cost-effective and would promote public confidence in the election; however, efforts to use electoral technologies to decrease the time necessary to conduct results aggregation would potentially be undermined by retaining a manual count.

Transparency

COMELEC was criticized for an alleged lack of transparency in its operations and its perceived unwillingness to disclose certain documents and information; for example, copies of the certification review by U.S.-based software auditing firm SysTest, an independent third party, were only made public at a late date and even then were released not by COMELEC but by senatorial candidate Joey DeVenecia. COMELEC was also criticized for failing to make available full copies of its contract with Smartmatic and for the limited nature of the external source-code review offered to civil society and political parties.

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During a mock election, a citizen inserts a ballot into the PCOS machine to test its proper functioning.

backup card was to be placed in the administrator slot and sealed by the BEI only after testing and sealing took place.

Results Transmission and Digital Signatures

In the initial request for proposals for the automated election system, COMELEC stated that the system would require the BEIs to sign and encrypt an internal, digital copy of the election returns prior to transmission to the three servers.[40] An April 2009 bid bulletin stated that the digital signature would be issued by a certification authority nominated by the winning bidder and approved by COMELEC.[41]

Despite these initial plans, however, the public and private keys were ultimately generated by Smartmatic itself rather than a third-party certification author-

ity hired to generate the public key infrastructure. This alteration was due in part to COMELEC's concern that providing each BEI member with his or her own digital signature would leave the success of transmission reliant on the attendance of all the BEI members. In addition, according to COMELEC, the Philippines does not have an adequate legal infrastructure governing digital signatures. This claim was contradicted by professional information technology (IT) organizations and opposition parties, however, who pointed to provisions under the E-Commerce Act of the Philippines (passed in 2000) and cited the ePLDT, a Philippine technology corporation, which served as a certification authority in the 2008 Autonomous Region in Muslim Mindanao elections.

Despite the lack of BEIs' digital signatures having been raised as a concern by civil society groups and IT professional organizations in the pre-election period, candidates did generally not appear concerned with this issue at this time. In the postelection period, however, a number of candidates argued that the results' lack of digital signature applied by the BEI (rather than the PCOS) meant that results were not duly certified and therefore challenged their merit to the National Board of Canvassers, which nonetheless did not alter its decision to proclaim official election results.

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40 Each BEI chairperson was provided with an iButton key (a small magnetic device used to start and end voting operations on the PCOS) as well as two envelopes containing a unique password for the two other board members. When inserted into the PCOS iButton key slot, the key, in combination with unique personal identification numbers (PINs), decrypted or unlocked the configuration files contained on the main compact flash card, allowing the PCOS to read ballots correctly. After the close of polls on election night, the PCOS was programmed to apply the machine's unique digital signature to the results before their transmission to the three servers. This was to occur after the reinsertion of the iButton key, performed by the BEI chairperson, and the entry of two PINs by two other BEI members who then together close the polls. The PCOS would then display a message to the BEI chairperson, asking, Would you like to digitally sign the transmission files with a BEI signature key? BEIs were instructed to select "no." To comply with the legal requirement that the results be digitally signed, however, the PCOS machine itself "signed" the files using its own signature, through the use of the SHA256 algorithm, and encrypted them using AES128-bit symmetric cryptography, a secure industry standard.

41 Bid Bulletin No. 10, April 15, 2010.

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Trusted Build and Hash-Value Verification

A "trusted build"—the process of turning the original source code into machine-executable code—occurred on Feb. 4, 2010.[42] While no official record was provided as to who witnessed the trusted build, COMELEC reported to Carter Center observers that the process remained open to party officials, candidates, and their representatives. The hash values, or indices that match data sets in an array (such as filled-in oval marks to indicate candidate names) were published in a COMELEC resolution and posted on the website. According to COMELEC and Technical Evaluation Committee (TEC) officials, the configuration of the machines—including the loading of firmware and hash checking—was conducted from February to mid-April; however, exact dates were not provided.[43]

Carter Center observers were unable to obtain any documentation on the procedures for or results of these verification activities. In addition, The Carter Center was informed by COMELEC that the Philippine political parties and the Parish Pastoral Council for Responsible Voting, which served as the citizens arm in this election, were provided with the firmware's digital signature, which could then be verified against that listed on the initialization report printed by the PCOS on election day; however, it was unclear to Carter Center observers whether such verification took place.

CERTIFICATION AND SOURCE CODE REVIEW

Critical to the implementation of any automated voting technology are the thorough and transparent testing, review, and certification of all system components prior to use.[44] Bound by Resolution 9369, COMELEC, via its Technical Evaluation Committee, is required to certify that "the AES, including its hardware and software components, is operating properly, securely, and accurately." The resolution provides that such certification must include documented, successful reviews of the following procedures: (1) field tests and mock elections; (2) an audit of the

accuracy, functionality, and security controls of the AES software; (3) a source code review; (4) storage of the source code at the Philippines Central Bank; (5) confirmation that the source code review was conducted on the actual source code installed on election equipment; and (6) development of contingency plans for each component and sequence within the AES system. The committee issued its final certification, affirming that the above requirements had been properly, securely, and accurately met in a resolution dated March 9, 2010.[45]

SysTest Labs, an American software and source code testing and auditing firm, carried out steps two and three of the certification. SysTest's review covered almost all of the software, hardware, and transmission components involved in the election.[46] Election system software was reviewed against both Philippine election law as well as specific certification criteria of the Voluntary Voting System Guidelines published by the U.S. Election Assistance Commission.[47] On the critical issue of whether the AES software tallies votes accurately, SysTest stated in its final report that the firm's "manual and automated review of Smartmatic's election management system and consolidation/canvassing system source code, as well as Dominion's election event designer and precinct count optical scanner source code, revealed no evidence of any intentionally written instructions to yield any but the correct results."

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42 Carter Center observers had not yet arrived in the Philippines.

43 Interview with COMELEC and TEC, June 10, 2010.

44 It is recognized good practice that the state should ensure the reliability and security of the e-voting system and that an independent body be charged with this task (Recommendation of the Committee of Ministers of the Council of Europe, Articles 25 and 28).

45 Republic Act 9369, Section 11.

46 Excluded from the review were the ballot generation software and the architecture of the government website used to announce election results. Nor did SysTest review some aspects of the software, including the modem transmission module.

47 Available at http://www.eac.gov/vvsg.

SysTest also prepared a list of issues that were discovered during the course of its testing process. Smartmatic was then provided the opportunity to resolve the issues, most of which related to best practices followed within the industry for the writing of software code. According to the final SysTest report, Smartmatic then "brought all of those cited findings [that had been] classified as having the potential for either 'critical' or 'major' impacts on the voting system into compliance with the [Voluntary Voting System Guidelines] requirements." SysTest noted, however, that one unresolved issue—the lack of extensive nonexecutable commenting in the code base—could affect long-term maintenance of the software, although not necessarily impacting the immediate use of the AES.

Philippine law mandates that political actors and civil society groups be permitted to conduct their own source code review, if they so desire. COMELEC Resolution 9369 states, "Once an AES technology is selected for implementation, the commission shall promptly make the source code of that technology available and open to any interested political parties or groups, which may conduct their own review thereof."[48] Interpretation of the phrases "promptly" and "make available" varied, however, and for some civil society watchdog groups, particularly those with technology-issue-oriented members (such as the Center for People Empowerment in Governance), this matter proved to be one of the more contentious aspects of the certification process of the AES.

COMELEC allowed interested parties to review the source code on a read-only basis, accessible only within COMELEC facilities, beginning on Feb. 25, 2010. Rejecting these limitations as too restrictive to allow for a truly adequate review of the source code, and apprehensive that any review conducted under such conditions would imply acceptance in the absence of detected anomalies, many election watch-

dog groups declined to evaluate the source code. COMELEC and Smartmatic officials defended their policies for external source code review, declaring that the procedures adhered to the text of the resolution and that security and intellectual property concerns precluded greater and easier access to the code. While there is no universally recognized best practice for the review of source codes, COMELEC should consider increasing access to the source code in future elections in order to increase public confidence and foster partnership with civil society watchdogs. At a minimum, the legal provisions regarding source code review should be made more clear.

COMELEC should consider increasing access to the source code in future elections in order to increase public confidence.

Post-bid Testing

After determining that Smartmatic had passed an initial set of eligibility screenings, COMELEC's Special Bids and Awards Committee conducted the first tests performed upon the PCOS machines. The tests were conducted against a standard of 26 criteria for performance and reliability. The most important of these were designed to ensure that the machines could continuously operate for 12 hours by battery power, that voting results could be transmitted using a public telecom network, that the machines would reject fake or previously scanned ballots, and that the machines exceeded a vote-reading accuracy rate of 99.995 percent—or only one out of 20,000 marks incorrectly read.[49] This process was open to observation by the Parish Pastoral Council for Responsible Voting.

Acceptance Testing

Acceptance testing took place in four stages before the machines were put into service on election day.

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48 Republic Act 9369, Section 12.

49 Per the technical specification of COMELEC's contract with Smartmatic.

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The first test was conducted in China directly after manufacture,[50] and the second was conducted on arrival in the Philippines at the PCOS configuration facility in Laguna, located 40 kilometers south of Manila. A third test was performed during the immediate pre-election period after machine configuration was completed in Laguna and before the machines were transported to provincial warehouses throughout the country for storage. All acceptance tests were conducted by Smartmatic, with some participation of the Philippine National Computer Center and the Philippine National Audit Bureau, agencies independent of COMELEC. A final acceptance test, commonly referred to as "testing and sealing," was then conducted on-site in the voting stations by poll workers in the week leading up to the election (and in some cases on election day itself).

Field Testing

COMELEC and Smartmatic conducted field tests at various locations throughout the country in late January 2010. Although initially intended as an internal exercise, the field tests were eventually opened to observation by civil society organizations and journalists, a notable effort to enhance transparency. During these tests, problems occurred with both feeding ballots into the PCOS machines and successfully establishing transmission connections, leading to increased media reports about potential issues with the AES in the immediate pre-election period. Ballot rejection during these tests may have been caused by slight creasing of ballots due to their re-use in multiple field tests and did not appear to be an issue on election day. Carter Center observers noted difficulties with transmission of results on election night, however, with some BEIs attempting to establish a transmission connection with the three canvassing servers multiple times. Due to the limited size of the mission, the Center was unable to verify how prevalent such transmission difficulties were.
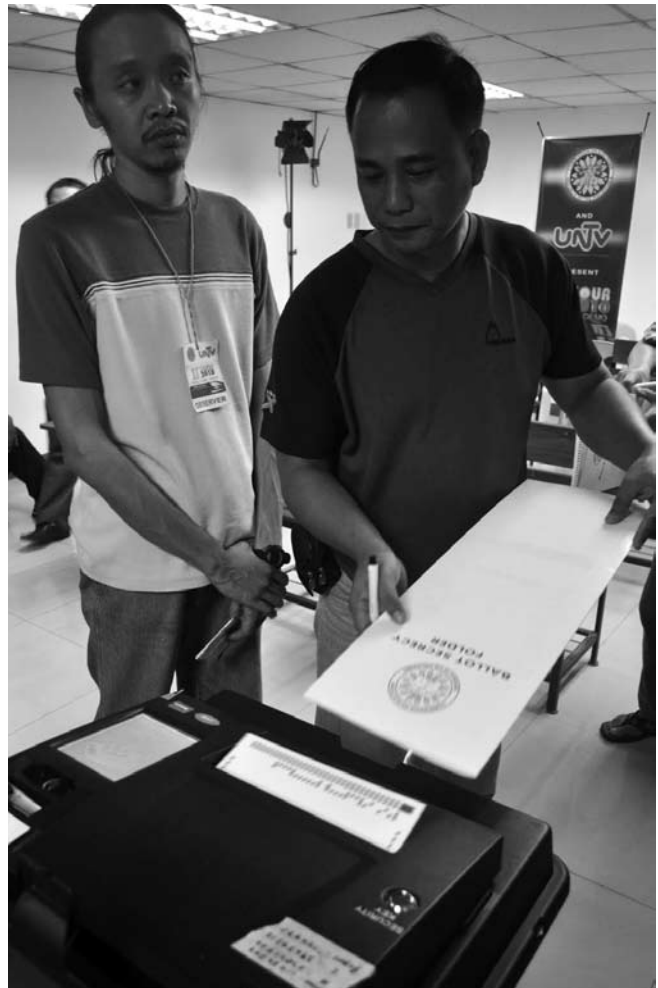
Though COMELEC instituted mock election procedures, many tests failed to reflect actual election conditions.

Mock Elections

According to the certification rules set forth in Section 11 of Republic Act 9369, COMELEC is required to administer mock elections "in one or more cities/municipalities" following field testing. COMELEC exceeded the minimum requirement necessary, holding mock election exercises in Manila, Luzon, the Visayas, and Mindanao. As stated in COMELEC's operational plan, the activities man-

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50 After being awarded the final contract, Smartmatic (under contract with Qisda Corporation) set up a manufacturing facility for the PCOS machines in China.

dated in the mock election are designed and intended "to test and determine the functional capabilities and systems reliability in actual conditions and environment as on election day … in recording and reading the votes, printing of election returns, electronic transmission of results from polling places to the municipal, city, provincial, national canvassing and consolidation centers."

In actual practice as observed, mock elections were limited in all but one case to not more than 100 vot-ers and did not include manual audits to check the accuracy of the results. Critically, the design and layout of the mock election ballots did not precisely correspond with those used on election day, and the ballots used in the mock election were never compared with the results produced by the PCOS. In the future, COMELEC should consider conducting mock elections that more accurately reflect election day conditions in order to ensure the identification of potential problems with adequate time for their resolution.

Machine and Material Distribution

Just as with manual, paper-ballot-based elections, ensuring a secure physical chain of custody of voting equipment (including ballot boxes, ballots, and precinct voting paraphernalia) is vital to the avoidance of any risk of fraudulent or malicious behavior. In the case of automated elections, the need to ensure strict control of the voting machines, modems, memory cards, and other electronic devices used in voting and results transmission can be even more critical, given the increased potential for unseen malfeasance and variable public trust. As such, materials should remain secure at all times, and documentation of access to the materials must be recorded throughout the election cycle—from manufacture to machine decommissioning.

Ballot Printing and Distribution

Ballots were printed at the National Printing Office (NPO) under the supervision of Smartmatic and COMELEC officials. In visits to the NPO in the weeks prior to the election, Carter Center observers noted that well-organized security precautions were taken.

Prior to the ballot distribution contract being awarded, however, the finished ballots were stored in the NPO building itself, overflowing into a fenced-off area of the otherwise open main lobby of the building. While this did not necessarily represent a security threat, it represented the practical impact that the late issuance of election-logistics subcontracts had on the process and emphasized the importance of future efforts to ensure that the electoral calendar allows for proper implementation of the electoral technology to be used.

To prevent extra ballots from being produced, all electronic files used in their creation were deleted from the NPO systems, and all printing machines were sealed after the last ballot was printed. Once printed, ballots were shipped to their locations in tamper-evident boxes. COMELEC also instituted chain-of-custody procedures that included the Philippine police or armed forces accompanying the ballot shipments to the municipal treasurers' offices as well as to their ultimate precinct destination on election day. COMELEC also maintained a warehouse in Cabuyao, Laguna, where PCOS machines were stored and configuration took place under constant security.

Access to observe the process was available to political parties and accredited observer groups. While Carter Center observers were invited on a scheduled tour of the facility on April 20, on a subsequent unannounced visit a week later, they were denied entry and were informed that prior security clearance was required to enter the facility and that they must be accompanied by senior Smartmatic staff. A second, scheduled tour along with the Parish Pastoral Council on Responsible Voting (PPCRV) and members of the media took place on May 5 to observe the reconfiguration of the system's PCOS machines. Accredited international and domestic observers should be granted access to all aspects of the electoral process.[51]

PCOS Machine Distribution

COMELEC implemented various measures to restrict unauthorized access and prevent tampering with the AES components during distribution. COMELEC informed The Carter Center that comprehensive chain-of-custody procedures had been established and that shipment of the machines from the central warehouse to the various distribution hubs around the country had begun by mid-April. The delivery plans and schedule were to be known only by COMELEC, Smartmatic, and the PPCRV—political parties reported that they were not informed of the schedule. Once at the distribution hubs, machines were

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51 Declaration of Principles for International Election Observation, Articles 12(b) and (c).

Carter Center Limited Mission to the May 2010 Elections in the Philippines

Poll workers unpack PCOS machines in preparation to open the polls.

Ballot papers are delivered to a COMELEC official prior to opening of the polls.

under around-the-clock surveillance until delivered to their designated polling stations. Once at the polling stations, machines continued to be guarded by the Philippine National Police and in some cases other watchers, such as PPCRV. Carter Center observers noted that while chain-of-custody procedures were in place at higher levels of production and shipping, the same could not be said of the precinct level. BEI members, in many cases, were not aware of where the machines had been stored prior to delivery to the polling station and were unsure about the level or type of security that had been provided.

Testing and Sealing of Compact Flash Cards

Testing and sealing, or the final step in the secure distribution of election materials to voting sites, were to be conducted by poll workers at each polling station seven to three days before election day. The procedure consisted of inserting 10 specially marked ballots (for differentiation from regular ballots) into the PCOS machine. After insertion, the PCOS machine

printed out the results of the 10 ballots, which were compared with a manual tally of the ballots. If the machine appeared to have malfunctioned, it was to be replaced. Testing and sealing did not involve transmission testing, and after the completion of the testing exercise, the physical input slots for the two compact flash (CF) cards were to be sealed with plastic ties specially designated for each slot.

In the first testing and sealing procedures conducted, performed on May 3 at polling stations in Manila, it was discovered, through comparisons of the printed vote tally with the physical ballots, that the PCOS machines were not correctly registering votes for local races. Smartmatic investigated the cause of the discrepancy and determined that the error was due to the design of the reverse side of the double-sided ballot, where local races are printed. Text layout had been set to double-spacing between the horizontal lines containing candidate names, whereas spacing on the front of the ballot for national races had been correctly set to single-spacing. Because it would be impossible to reprint and ship 50 million ballots in a

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week's time, the chosen solution consisted of altering the configuration of the primary CF cards to enable them to correctly read the misspaced ballots.[52]

All primary CF cards that had already been distributed were recalled to the configuration facility in Laguna. By using 18,000 spare CF cards that were already on hand at the configuration facility, purchasing 30,000 new cards in Hong Kong and Taiwan, and reconfiguring thousands of cards recalled from the provinces, Smartmatic managed to distribute a sufficient number of properly configured CF cards nationwide within the week. Testing and sealing were then conducted a second time in the few polling stations that had initially conducted the procedure on the first day allowed,

In some polling places, poll worrkers had to complete testing and sealing on the day before the election because of a compact flash card error.

May 3. In the great majority of polling stations, the time frame for testing and sealing was extended, with most procedures occurring on May 8 and 9. In the few areas that received the new CF cards at a later date, testing and sealing took place on the morning of the election, before polls opened.

Given the centrality of the CF cards to the functioning of the AES, the need to recall all 76,000 cards and deploy new ones within a week of election day alarmed the public and led to demands for the election to be postponed. In spite of the tight time line, however, CF cards were recalled, reconfigured, and redeployed in time for nearly all precincts to open as scheduled. Despite this, the episode raised serious questions about COMELEC and Smartmatic's testing procedures and contingency plans. The rushed introduction of new CF cards and the replacement of old

ones also significantly undermined existing chain-of-custody procedures.

Furthermore, it was apparent on election day that some PCOS machines were missing seals on the CF card slots. While it is hard to pinpoint why the proper seals were not used, it seems likely that the card replacement process was a contributing, if not the primary, factor for this oversight. The Carter Center received no reports of unreconfigured CF cards being used on election day nor reports of incidents of CF cards being removed during voting because of the lack of seals; however, the confusion created by the CF card episode raised concerns about the creation and successful adherence to chain-of-custody security precautions and realistic testing schedules for future elections.

52 The blank backup CF cards were not affected by this reconfiguration.

Observing the Automated Election System in Use

On election day, May 10, 2010, The Carter Center deployed 10 observers throughout metropolitan Manila, Baguio City, and Bacolod to observe electronic voting processes. Because of the limited size of the Carter Center mission, observers were not asked to complete a comprehensive assessment of the electoral process but rather to focus only on the use of electoral technology and its impact on the larger process. The following observations and recommendations are made in light of this limited scope of observation.

Physical Port Sealing

Per AES security requirements, the PCOS machine's CF card slots were to be sealed throughout the voting process; however, given the need for reconfiguration, many CF cards were not delivered until the morning of election day, requiring insertion and testing at that time. As a result, The Carter Center observed confusion on the part of BEIs about whether to reseal the CF card slots after insertion of the new CF card as well as an inconsistent application of the seals. The majority of CF card slots did not have a security seal applied, and seals themselves were not always available or were of different varieties, prompting BEIs to either ignore their written instructions or to improvise.

Because the seals were not always applied, the PCOS machines were left open to the possibility of physical tampering. In particular, the lack of seals on the main memory card slot rendered the machine potentially vulnerable to removal or replacement of a CF card. While it is critical to note that no cases of tampering were observed or reported to the Center, COMELEC should in the future provide more thor-ough training to BEIs on the purpose and importance of the seals as a measure of security.

COMELEC should in the future provide more thorough training to BEIs on the purpose and importance of the seals as a measure of security.

Voting Procedures

After poll workers verified their identity, voters received a ballot and secrecy folder and were instructed on how to fill in an oval next to a candidate's name to cast a vote using a felt-tip pen provided by the BEI.[53] Upon completion of the ballot, the voter inserted it into the feeder slot of the PCOS machine, using the secrecy folder to shield the ballot from view. If the PCOS accepted the ballot, the machine display would "congratulate" the voter. Upon acceptance, the PCOS scanned the ballot and saved the image as a TIFF[54] file in the main CF memory card, along with data on how the PCOS interpreted the choices of that particular ballot, based on scan resolution and mark depth.[55] The paper ballot dropped into a secure receptacle under the scanner. After casting their ballots, voters returned to the BEI to have their finger marked with indelible ink, in order to prevent them from voting more than once. PCOS machines were usually placed within a few feet of the poll workers' desk, which was typically stationed close to the door.

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53 Traditionally, in Philippine elections, voters were required to write in the name of the candidates on the ballot, which would then be read aloud during counting—and where unclear the voter's intent would be interpreted. The 2010 election using the automated system, however, was the first in which voters were to make a mark—in this case, an oval—beside their choices.

54 Tagged Image File Format, a specification for storing images.

55 It was unclear to The Carter Center how these specifications were determined.

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Many polling precincts were located in classrooms, with student desks used by voters to complete ballots, and the teacher's area utilized by polling station staff for materials and voter check-in. Carter Center observers noted that in many cases the layout of the polling places led to long lines and bottlenecks in the registration process. In the future, clearer guidance should be provided to BEIs on how to arrange the polling precinct to maximize the efficient use of space, and new methods of streamlining the sign-in process with additional BEI members should be considered.

Clustered Precincts

As a result of the introduction of new voting technology, the May 10 elections also saw the introduction of a new system for locating and grouping polling
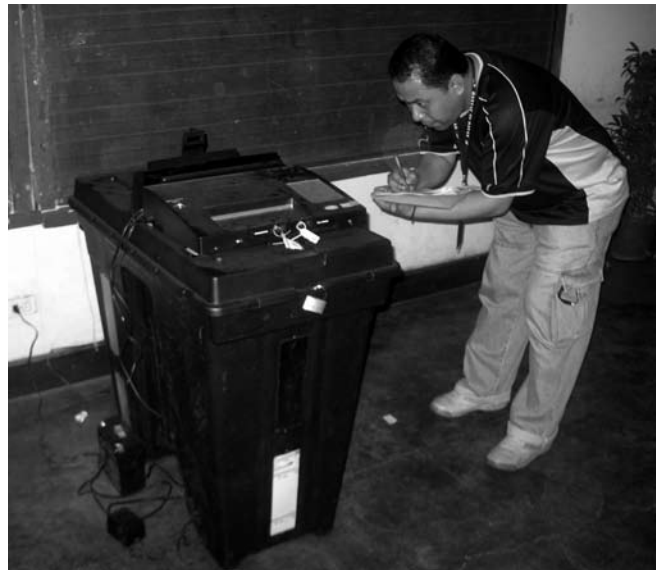
*An observer records and seals numbers from the PCOS machine.*

Two women show their fingers marked with indelible ink, indicating they have already voted and cannot do so again.

stations. In previous elections, voters were assigned to one of approximately 320,000 polling stations. In 2010, the number of polling stations was reduced to 76,347 in an effort to reduce costs so that each precinct could have its own PCOS machine. Previously proximate polling stations were combined into clustered precincts. The reduction of polling stations by approximately 75 percent produced a corresponding increase in the number of voters per station. For the 2010 elections, the maximum number of voters per clustered precinct was 1,000, a sizable increase from the approximately 200 voters per precinct in previous elections. In urban areas, polling centers could house between 20 and 40 clustered precincts, with some schools and other public buildings expected to accommodate up to 40,000 voters on election day. As a result, Carter Center observers noted significant congestion in polling centers, particularly in the early hours of voting.

This congestion caused long waits for voters throughout the country, often longer than three hours. COMELEC responded to these reports of delays by extending voting from 6 p.m. to 7 p.m., an important step to help ensure that all voters had the ability to cast ballots. By late afternoon, the

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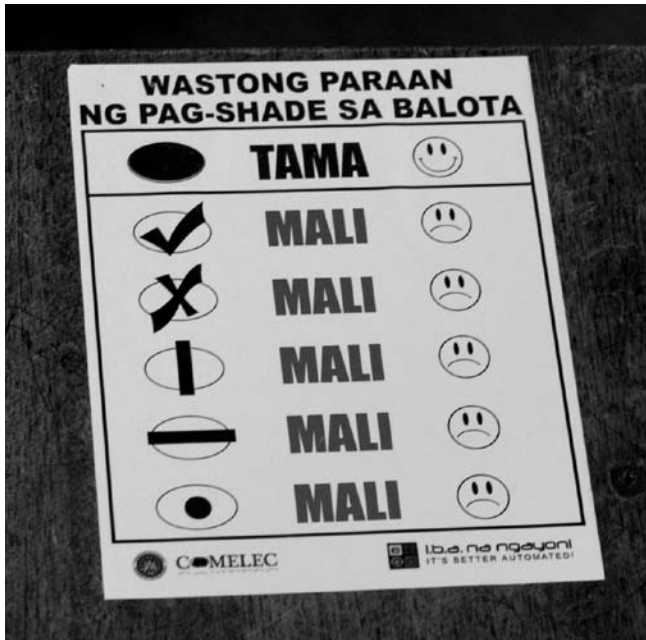
A voter education sticker provided by COMELEC displays both proper and improper ballot-marking procedures.

congestion in most lines had cleared. For future elections, COMELEC should consider minimizing the number of voters per clustered precinct or reducing the number of precincts per center to minimize such delays and avoid having to extend voting hours.

MARKING AND CASTING OF BALLOTS

Due to the extensive number of seats being contested in the 2010 election and the number of races on each ballot, it took voters approximately eight minutes to fill in their ballots. The classrooms chosen for polling stations were generally large enough to accommodate a significant number of voters at once, and Carter Center observers rarely, if ever, encountered a polling station without at least a few available seats. In addition, lines were minimal to nonexistent at the PCOS machines. It took approximately 20 seconds for each voter to approach the PCOS, deposit his or her ballot into the machine, and vacate the area, freeing the PCOS for the next voter. A voter, after completing his or her ballot, typically had a direct path to the PCOS machine. While some voters experienced extreme delays as noted above, these generally occurred earlier in the voting process and not as a result of voter behavior during the marking and casting of ballots.

The PCOS machines were programmed to return a ballot out of the feeder slot for the following reasons: (1) if the timing marks printed along the ballot did not match the assigned clustered precinct; (2) if the ballot had already been accepted or rejected; or (3) if there were marks considered to be ambiguous in any oval on the ballot. The PCOS was physically configured to accept ballots in four separate orientations, meaning that if a ballot was not recognized for any reason, voters could feed it through the machine up to three more times. Thereafter the ballot would be considered rejected, and the voter would be required to return the ballot to the BEI. Carter Center observers noted that most ballots were accepted on the initial try, although in some instances, the machine did return the ballot, either because the machine had failed to read the timing marks correctly (because the voter had inserted the ballot slightly crookedly or too fast) or because of an ambiguous mark. In practice, however, even on the rare occasions that such rejection occurred more than three times, BEI staff generally allowed voters to attempt insertion until the ballot was successfully accepted. While against the letter of the election law, such a practice was not observed to have a negative impact on the process and is generally supportive of efforts to minimize disenfranchisement due to machine error.

VOTER EDUCATION

Pre-election concerns about the extent to which voter education, primarily conducted through television ads and the work of PPCRV, had readied the population for use of the AES appeared generally unfounded. Although voters lacked detailed understanding of technical aspects of the AES system, their exposure to the machines appeared to help them to feel comfortable with the new voting process. Carter Center observers noted that while some voters displayed unease at approaching the PCOS machine,

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they seemed otherwise comfortable with handling and completing the ballots.

Voter education efforts at the polling station, including having poll workers stationed by the PCOS machine to guide voters through the process and confirm that their ballot had been accepted and deposited into the ballot box appeared successful at allaying concerns about the system; however, in some polling stations where workers were otherwise engaged, poll watchers from the PPCRV or various political parties stepped in to offer guidance on use of the PCOS machine to voters. While The Carter Center did not note any indication that such assistance influenced any aspect of voting, the role of poll watchers should be clarified, and such participation avoided, especially at this stage in the process when ballot secrecy is easily violated.

In future elections, greater efforts should be made to ensure voter secrecy.

SPOILED BALLOTS

In light of irregularities in previous Philippine elections, COMELEC was keen to reduce the potential for fraud by limiting the number of excess ballots available. Therefore, as required by Republic Act 9369, each polling station received a ballot allotment equal to the number of voters assigned to the station as well as three additional ballots for BEI members. As a result, voters who received creased or damaged ballots or who accidentally spoiled their ballots during the course of voting could not obtain a new ballot, resulting in disenfranchisement. While Carter Center observers did not witness any cases of rejected ballots on election day, there were various reports from BEIs and poll watchers that ballots had been rejected at other precincts.[56] Although the Center was unable to obtain a final tally of the number of rejected ballots, COMELEC said figures would be aggregated and made available in the future.

Because the PCOS machine rejected ballots with ambiguous marks, the lack of replacement ballots also meant that some voters were forced to effectively dis-

enfranchise themselves when they accidentally placed an ambiguous mark on the ballot. In order to preserve their right to vote in other races, voters were commonly instructed to fill in the oval with the ambiguous mark, thereby either voting for someone whom they had not intended to or overvoting in that race and invalidating their choice. By doing so, they would preserve their ability to have their choices counted for the other races. While the objective of limiting the number of ballots available at each station to prevent fraud was understandable, the Philippines should reconsider the provisions limiting the number of additional ballots to ensure such provisions do not have a significant impact on the right of universal suffrage.

BALLOT SECRECY

The configuration of polling stations — desks without surrounding enclosures set in a classroom filled with poll workers, party observers, and other voters — did not allow voters to complete their ballots in privacy. Voters were issued a manila folder (known as a secrecy folder) that they were to use to shield their ballot as they filled in the chosen ovals. They were then to place the completed ballot inside the folder, where it would remain as it was fed into the PCOS machine, ensuring that the voting marks were not seen by anyone else. In practice, however, this process did not work very well, with many voters using the folders ineffectively or ignoring them entirely.

While some stations adopted creative measures to increase secrecy, such as affixing secrecy folders vertically to desks to offer increased privacy, such secrecy measures did not generally extend to the process of

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56 Carter Center observers did witness two rejected ballots at a mock election event; one due to a misprint on a ballot's timing marks, another because the BEI thumb-printed the voter prior to voting, who subsequently stained the timing marks with ink, rendering the ballot invalid according to the PCOS.

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feeding the ballot into the PCOS machine. In many cases, voters abandoned the secrecy folder entirely and inserted the ballot directly into the PCOS machines without a concealing cover. Furthermore, in those cases where the PCOS machine returned the ballot, there was no real possibility of retrieving the ballot within the folder, and the Center observed various instances of BEI members directly reviewing ballots to identify ambiguous marks or the reason for rejection. In future elections, greater efforts should be made to ensure voter secrecy, including consideration of reinstating the legal provisions for voting booths or other privacy-enhancing measures.

Folders intended to provide ballot secrecy are instead used as vertical privacy screens.

Voter Verifiability

According to election law, the AES system should allow voters to verify that the PCOS machine has successfully recorded their ballot.[57] According to COMELEC and Smartmatic, the PCOS has an available screen-display feature that allows voters to verify how the PCOS had read and interpreted their ballot, a capability that also provides for notification of null votes. At the request of COMELEC, however, this feature was disabled in the 2010 election. The reasons cited for this decision included concern that a voter verification feature would slow down the voting process and that there was the potential for vote buying, facilitated by the use of camera phone photos of the verification screen.

As a result, no feature existed on the PCOS for voters to confirm their choices or see whether they had over- or undervoted. The lack of such verification is in direct contravention of the Philippines election law. Therefore, the Philippines should consider either amending its election law or bringing the AES in line with existing provisions prior to future elections.

Ultraviolet Marks

Each ballot used in the 2010 election contained an ultraviolet (UV) mark designed to prevent the acceptance of counterfeit ballots; however, due to a printing error, the PCOS machine was unable to read these marks automatically, requiring COMELEC to distribute handheld UV lamps for manual verification. It was intended that BEIs use the UV lamps to show the authenticating UV mark to each voter prior to his or her acceptance of a ballot; however, actual use of the UV lamps was observed by The Carter Center in only a handful of polling stations. BEI members were not trained in the use of the UV lamps, nor were instructions on their use provided. In one notable case, BEI officials explained that they had been told the lamps were expensive, so they preferred to keep the lamp untouched and in its original packaging.

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57 The PCOS shall "provide the voter a system of verification to find out whether or not the machine has registered his choice." Republic Act 9369, Article 7n.

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As with the failure of some BEI members to properly secure PCOS machine ports after testing and sealing, this lapse did not seem to have a material effect on the elections as there were other ballot security features in place. While there were no reported cases of counterfeit ballots being used or accepted by the PCOS machines, the apparent failure by BEIs to understand the significance of the UV lamps and how to use them suggests shortcomings in the training of election officials in both the procedures and the significance of compliance with them.

Equipment Performance

According to Smartmatic, fewer than 400 PCOS machines needed replacement on election day, a number well within the range envisioned by the vendor's technical contingency plans. While Carter Center observers reported limited instances of compact flash cards or PCOS machines failing, all such instances were resolved by Smartmatic technicians without recourse to manual voting or manual vote tabulation.

While the majority of polling machines were able to electronically transmit results to the canvassing servers on the evening of the election, some polling stations experienced transmission delays. These delays generally stemmed from a lack of capacity on the local networks that carried the transmissions or lack of capacity of the networking systems at the canvassing centers. In limited cases, difficulties also arose due to a lack of understanding of transmission procedures on the part of the BEIs. While not appearing to have a significant impact on the quality of the electoral process, The Carter Center noted other minor performance issues related to the use of the PCOS machines. These are described below.

Transmission of testing and sealing results. On election day, a few polling stations mistakenly transmitted results from the 10-vote testing and sealing process, instead of actual election day results. Given the anomaly of returns showing 10 votes or fewer, this mistake was quickly identified, and the polling sta-

tions involved were able to resubmit the correct set of results without significant delay.

Incorrect date and time configuration. A small number of PCOS machines were configured with the incorrect time and date. The printed election returns and the precinct audit logs therefore displayed dates and times that did not correspond with the date of the election, May 10, 2010; however, the actual results from these precincts were not affected, and there was no dispute as to whether the elections were held during the appropriate appointed time period.

Error in voter registration data on server. The central tabulating server used by the National Board of Canvassers in Congress to tabulate the presidential and vice presidential races was initially set with an overstated number of registered voters. The error, which would have only affected reported turnout percentages, was detected and resolved before the server was put to use. It was reported to Carter Center observers that this was due to the fact that the server that had been deployed for use was in fact not the same server that had been used in the pre-election testing procedures. In the future, the hardware and software that is tested prior to election day should also be used during the election.

Postponement due to misallocation of materials. Elections were postponed in two towns in the Visayas province, which were mistakenly sent each other's set of ballots. While there were a limited number of delays in the Mindanao region for security-related reasons, these were the only known instances of delays caused by mistakes in material allocation.

Procedures for Resolving Election Day Technical Contingencies

COMELEC and Smartmatic developed a multilevel contingency plan to cover major AES malfunctions, including: (1) PCOS malfunction, (2) primary compact flash card malfunction, and (3) failure to successfully transmit results to canvassing centers.

Poll workers were provided with manuals aimed at troubleshooting problems and providing procedural steps in case of machine failure. Carter Center

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observers noted that this manual generally appeared sufficient, with poll workers able to resolve issues or confusion without any additional help. Smartmatic technicians were also deployed to each polling center to provide assistance as needed. These technicians were further supplemented by roving technicians, each of whom was responsible for a number of centers. Smartmatic also created and staffed a call center in Manila that technicians or BEIs could contact in case of machine error.

If a particular issue could not be resolved using this chain of support, further contingency plans existed. For instance, in the case of transmission failure, BEIs were instructed to remove the primary compact flash card and insert it into another PCOS machine at a neighboring station where transmission had already been completed or, failing that, to physically transport the card to the appropriate canvassing center to directly upload the results to the canvassing computer. After the successful completion of data transmission, BEIs are required to physically bring the cards to the canvassing centers for safekeeping as the last step in the closing procedures. So, this solution was a practicable one that did not unduly burden BEIs.

In the event of PCOS machine failure, replacement machines were to be delivered from among the 6,000 spare machines readied at warehouses through-

out the country in advance of the election. Polling stations could continue with manual voting while waiting for a replacement machine to arrive from the local warehouse. BEIs would then feed the ballots completed in the interim into the new machine either immediately upon its arrival or, if long lines were present, later in the day but before the close of voting.

Finally, two computers with card burners were on standby in each province along with 20 blank compact flash cards. In the event of a primary card failure, Smartmatic officials at the main configuration facility outside Manila would deliver by e-mail the configuration file for the polling station to a Smartmatic technician in the province who would make a replacement and deliver it to the polling station. As a final measure for polling stations that had been issued defective voting equipment, manual forms for recording the vote tallies were also available in each province for delivery to affected precincts. Carter Center observers were unable to find any reported instances of polling stations needing to resort to a manual tally or recording of votes. The clarity of such contingency plans was a critical step to ensuring the successful implementation of the AES and should be continued in future elections.

Results Transmission and Aggregation

Electoral security must take into consideration the process by which results are transmitted to aggregation centers. In the case of elections employing automated technology, results transmission generally occurs through transmission of a digital file, making the process largely unobservable. Given the inherent lack of transparency in secure digital transmission, observation of such processes is at best limited in nature, focusing on the legal and technical framework for transmission. Under the Philippine election law, the process for digital aggregation of results mirrored the manual system employed in previous elections, with election returns transported to the board of canvassers, Parish Pastoral Council on Responsible Voting (PPCRV) and COMELEC; however, instead of physical returns being prepared and delivered, digital results are relayed over a digital network.

Early registration figures suggest that the widespread absence of civic education efforts impacted participation in the beginning phases of voter registration.

Observation of Closing and Results Transmission

To close the polls, the BEI chairperson reattached his or her iButton key to the PCOS machines, which was previously used to open voting and initiate the printing of a "zero report," while two BEI members entered their unique personal identification numbers. The BEI chairperson then pressed the "close voting" button and confirmed his or her choice. BEIs were then to print eight copies of the election return for national races, followed by eight copies for local races, which were physically signed and thumb-printed by BEIs before distribution to COMELEC, the dominant majority and minority parties, and the PPCRV representative. In addition, a copy of the polling results was to be posted publicly outside the polling station, an important measure that helps ensure transparency.

After printing an initial eight copies of the result, BEIs connected a transmission device[58] to each PCOS, and the results, which were also encoded onto the compact flash cards, were transmitted to three servers: the Municipal/City Board of Canvassers, the COMELEC central server, and the KBP/PPCRV ("citizens arm") server. This transmission was conducted by one of four methods:

1. general packet radio service/cellular (most common)[59]

2. broadband global area network (BGAN) satellite

3. very small aperture terminal (VSAT) satellite[60]

4. physical transport of the compact flash card to the canvassing center and direct upload of results to the canvassing computer

The first three methods involve wireless transmission. Physical transport of compact flash cards was used as a contingency in the event of transmission difficulties or as the primary means for some precincts located near a canvassing center. In the latter case, the polling stations were issued no transmission equipment. Also, some adjacent precincts located in the same polling center shared transmission equip-

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58 Modem, BGAN, or VSAT. *See below.*

59 Approximately 70 percent of the country is covered by cellular networks, according to COMELEC.

60 Five thousand six hundred BGANs and 680 VSATs were deployed, generally to regions with poor cellular coverage.

At poll closing, ballot papers are packaged for delivery to COMELEC.

ment. The precinct that was ready to transmit results first would use the transmission equipment and then pass it along to the next station when its transmission was completed. From the polling stations, results were transmitted sequentially and separately to servers at the Municipal Board of Canvassers, KBP/PPCRV in Manila, and the COMELEC backup server in Manila.

If transmission was not successful after three attempts, a Smartmatic technician would be called to the precinct to provide technical support. After successful transmission, an additional 22 copies of the election returns were printed and distributed to various parties, watchers, and election officers, as per COMELEC guidelines. Carter Center observers noted that in the polling stations that they visited, these processes were followed.

Within five hours of the close of voting, 57 percent of the clustered precincts had transmitted their results to the COMELEC servers. By 8 a.m. on May 11, or 13 hours after the close of voting, that figure had increased to 78.5 percent. By midnight May 12, 2010, 92 percent of polling stations using a form of wireless transmission had successfully submitted their results. These figures represented a dramatic improvement in speed of transmission compared with the manual system used in previous elections, in which precinct results were only made public at the national level a month after election day.[61] COMELEC published

61 These figures are based on the Twitter feeds of Smartmatic Director Cesar Flores and COMELEC Commissioner Gregorio Larrazabal. Although confirmation was sought from both, it was not available.

results soon after they were received at the central server on a government-hosted, publicly accessible website, and poll watchers throughout the country were able to confirm their precinct-level printed returns with the figures published at the national level.

Complications with Canvassing Thresholds

Complications occurred during the canvassing process. Results from each clustered precinct were to be aggregated at the Municipal Board of Canvassers (MBOC), where the winners for local races are declared. The MBOC also sends the aggregated results for offices at the provincial and national level to the Provincial Board of Canvassers (PBOC). The PBOC aggregates all the results from its constituent MBOCs and declares the winners for provincial offices. The PBOC then transmits the aggregated results for offices at the national level to the National Board of Canvassers (NBOC). The NBOC is responsible for

aggregating the results from all the provinces in the country as well as overseas ballots and declares the winners for national offices.

The original COMELEC rules, and hence the configuration of the canvassing software, specified that canvassing centers could only proclaim winners and transmit results up the chain after receiving returns from 100 percent of its constituent stations or boards of canvassers. As it became clear that there would be a few polling stations in many districts with transmission difficulties, however, COMELEC issued a resolution that lowered the thresholds for transmission and proclamation. If the number of outstanding votes would not be enough to affect the standings of contestants in a specific race, canvassing centers were authorized to proceed with proclamations for races at their jurisdictional level. Although the resolution did not specify the threshold that must be reached prior to the proclamation and transmission of higher-level results, in practice, it fell in the 93 to 95 percent range.

Postelection Day Processes

In the postelection period, a number of events unfolded that had the potential to impact public confidence in the automated election system both positively and negatively. These include a series of congressional hearings that encouraged public discourse on the system and a number of postelection audits that took place with varying levels of success.

Congressional Hearings

Responsibility for the proclamation of the presidential and vice presidential election results lies not with COMELEC but rather with the National Board of Canvassers (NBOC), which is independently appointed by Congress to complete an official canvass of the Provincial Statement of Votes.

As the canvassing process within the congressional NBOC proceeded, it quickly evolved into an ad hoc hearing on the automation system itself, with witnesses and experts called upon to offer testimony and answer questions from members of Congress. COMELEC and Smartmatic representatives were present throughout much of the process to speak in support of the AES, explain its functions, and address various allegations made by detractors of the system and the vendor.

The hearing served a double role: it aided public understanding of the functioning of the AES, providing a natural and deliberative forum for inquiry into specific errors and glitches that surfaced at various points during the electoral process in the Philippines; in addition, the hearings served as a forum for critics of Smartmatic, the AES, and automation in general. While complaints of fraud were recorded, none adduced sufficient corroborating evidence to further delay the canvassing process.[62] The Carter Center, through its independent observations and interviews, also did not note any information presented in the postelection congressional hearings or elsewhere that

suggested that the overall election result was compromised.

The NBOC proceedings coincided with separate hearings held by the House of Representatives Committee on Suffrage and Electoral Reforms, which was specifically convened to investigate electoral complaints. The two proceedings featured many of the same complainants, speakers, and witnesses. During these hearings, Smartmatic provided those in attendance—which included committee members, candidates, and invited IT experts—with a demonstration of the security features of the system as well as opening memory cards that had been found to have fallen outside of the chain of custody of the BEI after the election. The testimony produced no concrete evidence of fraud and did not impact the proclamation and certification of electoral results.

Postelection Audits

In an automated system such as the Smartmatic AES, the burden of building public trust in the results rests largely on the audit process. Postelection audits must be both comprehensive and well-implemented, in order to verify that the machines performed as intended and were not subject to any manipulation or programming error.

The postelection audit scheme employed in the Philippines consisted of two processes: a random manual audit to verify the accuracy of the machine count and an unofficial audit conducted by the PPCRV, an officially accredited citizens group, to verify the accuracy of the results of the printed election returns against the electronically transmitted results.

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62 According to the May 26, 2010, statement of Sara Jane Suguitan, spokesperson of the Philippine watchdog group Legal Network for Truthful Elections (LENTE): "Despite the claims of losing candidates, a group of lawyers watching over the country's first automated polls has yet to see solid proof that fraud had marred the elections. The allegations so far have no concrete proof." http://newsinfo.inquirer.net/inquirerheadlines/nation/view/20100527-272269/All-hearsay-no-solid-proof-sayswatchdog.

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Random Manual Audits

According to Republic Act 9369, a random manual audit (RMA) was to be conducted in at least one clustered precinct in each of the country's 229 legislative districts on election night. In the face of criticism by some groups about the small size of the sample, COMELEC adopted Resolution 8837, dated April 30, which required that five clustered precincts be audited per district, resulting in an audited total of 1,145, or 1.5 percent of the total number of PCOS used on election day.[63] Three hundred and fifty barangays (neighborhoods) were excluded from the RMA selection pool because they are too difficult to reach.

The RMA was known as a "cold audit," as it had no impact on the election proclamation but rather was merely a step to verify the accuracy of the electronic counting by the PCOS machines. RMAs were to be conducted according to the following procedure: immediately after the tabulation and electronic transmission of results were complete, the random manual audit team (RMA team) would enter the selected precinct and take custody of the sealed ballot box.[64] If the number of ballots counted exceeds the number of votes recorded to have been cast, the RMA team would randomly select a number equivalent to the excess and remove them prior to counting. Witnessed by party representatives, the RMA team would count votes for president, vice president, Congress, governor, and mayor and record the totals on a large tally board posted on the wall of the precinct. After completing the audit, RMA teams would determine the reason for any variance between the AES and RMA results and record this on the audit return, which would then be transported to the provincial election supervisor and subsequently to COMELEC for analysis by the National Statistics Office and the random manual audit technical working group.

The random selection of precincts was to be conducted at noon on election day at the operations center for COMELEC and led by the RMA technical working group.[65] Selection was to occur through the drawing of five numbered balls for each district, corresponding to precinct numbers to be audited. Carter
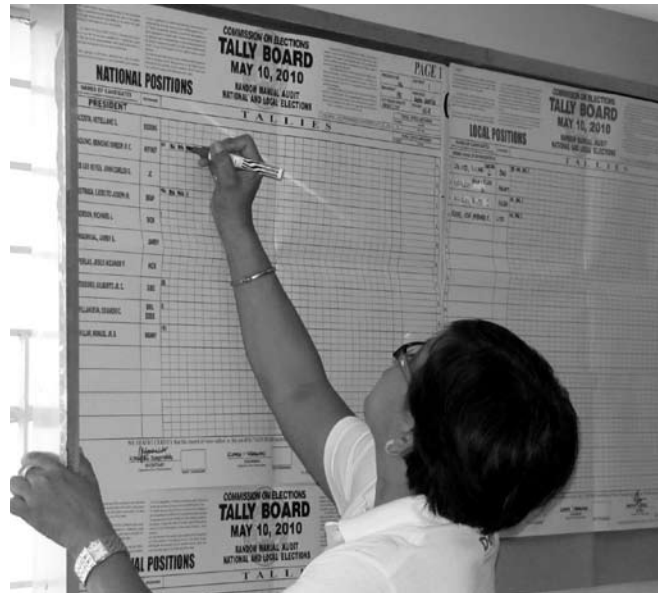
A COMELEC official conducts the postelection random manual audit of tally votes received for candidates.

Center observers were not present at the drawing but did receive reports that this process was not followed, resulting in a significant lack of transparency. COMELEC reported to Carter Center observers that confusion around the order of selection of the precincts led to a delay in drawing the balls, and with limited exceptions, no information was distributed or posted publicly as to which locations were to be audited. As no official minutes of the RMA selection were kept, it was also unclear who was present at the drawing.

In addition, there was a delay in informing the RMA teams of their assignments until after polls had closed and the ballot boxes had been taken to the

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63 It is good practice, when performing postelection audits, to select machines from each local jurisdiction, given that each will have a different configuration based on local races.

64 It is important to note that the RMA team had not served as BEIs during election day so that they would be able to conduct the RMA without being fatigued.

65 The selection of random precincts on election day itself, rather than prior to it, is an effective policy, as it reduces the risk of targeted fraud based on a predetermined list of precincts to be audited.
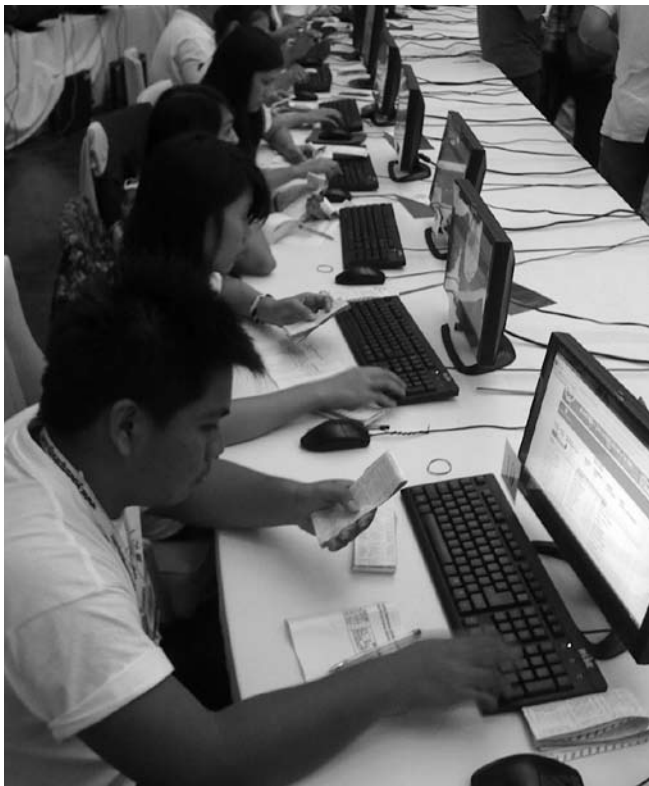
municipal treasurer's office for storage. To remedy these difficulties, COMELEC passed a resolution allowing for the audits to take place at the treasurer's office rather than in the precinct. In many cases, when the RMA teams arrived at the municipal treasurer's office to conduct the RMA, the treasurers were reluctant to allow them access to the ballots, as they had not been informed of any changes in procedure. COMELEC cited a malfunctioning fax machine as the reason for the delay in notifying the treasurers of the RMA teams' assignments. This compounded the initial delays in communication and caused significant delays in the conduct of the RMA as a whole.

Despite delays, once completed, the RMA did not show significant discrepancies in results. As reported on May 29 by the Parish Pastoral Council on Responsible Voting (PPCRV), which was responsible for reporting on the RMA to COMELEC, with 1,063 audits completed, "minimal variance" had been deter-

PPCRV volunteers compare hard-copy results from polling stations with results on the online server.

mined. There was 100 percent accuracy in 80 percent of RMA tallies on a candidate-by-candidate basis, while 6 percent of precincts recorded single-digit variances, and 14 clustered precincts reported double-digit variances.[66] The largest discrepancy reported between digital and manual results was 99: 352 on the printed election report as compared with 253 on the audit report. Because of the similarity in numbers, however, it seems likely that this was due to a transcription error made by the BEI.[67]

According to COMELEC, discrepancies were generally attributable to errors in manual transcription by the RMA team when recording the totals to the AES and RMA tallies. In the event that unexplained discrepancies existed after this process, a root cause analysis took place — the PCOS and compact flash cards of the clustered precinct in question were retrieved and examined, including hash code and configuration audits. Carter Center observers were informed that one errant PCOS machine, which had registered a large number of overvotes for one local race, was determined to have an ink mark on the scanner inside the machine. Observers were shown a picture of the scanner in question; however, it was unclear to COMELEC officials how this mark was made on the scanner or whether the discovery would lead to an expanded audit of the PCOS machines.

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66 Because results of the RMA were not made public, The Carter Center has relied on interviews with civil society groups and election officials for accounts of the RMA's accuracy.

67 Carter Center observers requested to enter the RMA verification room at COMELEC where manual RMA forms were being verified against the election returns printed by the AES on three occasions. On two of these occasions, observers were denied access by COMELEC for "security reasons." On the one occasion when observers were granted access, they noted that most audit returns they were able to view had only minor discrepancies between the AES and RMA tally, which were generally fewer than five votes. However, they observed one precinct audit form that contained an unusually high number of differences in votes for mayor and governor, with variances of up to 94 votes. No explanation was recorded for this variance. Carter Center observers were informed by COMELEC officials that in the event of discrepancies, a thorough examination of the returns and paper ballots would be conducted by COMELEC staff in Manila; however, The Carter Center was unable to determine whether or how this process took place.

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In a report issued by COMELEC on June 11, audits on 53 clustered precincts still remained incomplete. Of the 1,092 that had been completed, 10 required root cause analyses. Although the audits themselves were to be performed immediately following the close of polls, in some cases The Carter Center observed RMAs taking place two days after the election, and reports of incomplete audits continued for at least five weeks after election day. Carter Center observers also had significant difficulty obtaining up-to-date and accurate information regarding the status of the random manual audit. Officials from PPCRV, COMELEC, and the National Statistics Office were unable to answer requests for data about when and where the RMAs were taking place until 16 days after the election. Some political parties and domestic observer groups also reported a lack of communication from COMELEC about when and where the audits were occurring in order to send watchers.

Because the national results of the election so closely mirrored the pre-election polls, the audit's role as a check on the accuracy of the system received minimal attention in the postelection period and was not subject to scrutiny by watchers or political parties. While there were very few variances between the AES and RMA results as reported by COMELEC and PPCRV, the utility of this audit was severely curtailed by a lack of transparency and ineffective administration. In future elections, significant focus on ensuring an effective and efficient audit of election results would serve to significantly increase public confidence and the credibility of electoral results. This could be especially important in elections where results are more controversial.

PPCRV Results Audit

COMELEC certifies a limited number of civil society organizations as the "citizens arm" for each electoral cycle. These groups serve as a civil society watchdog and play a number of supportive roles throughout the electoral process, spanning—among many other duties—voter education in advance of election day, voter assistance and poll watching on election day, and assistance in overseeing the random manual audit process in the postelection period. The Parish Pastoral Council for Responsible Voting (PPCRV) served in this capacity in the 2010 election. PPCRV, in liaison with the Association of Broadcasters of the Philippines (KBP), also housed one of the two national-level canvassing servers that received transmitted voting results directly from polling stations.

As the primary citizens arm, PPCRV poll watchers held the right to obtain multiple copies of the printed results at each polling station. Although not part of its mandate from COMELEC, PPCRV gathered these printed results to its headquarters in Manila and manually input them into computers in order to conduct an unofficial parallel vote count by comparing the hard copy results from each with precinct with the results transmitted directly from the PCOS to the KBP/PPCRV server.[68]

PPCRV used a method that required manual, double-entry of the results in order to verify data accuracy. The computer program would flag any discrepancies between the two manually entered results, which would then be verified by a floor manager, who would retrieve the election return in question and manually enter the correct data. Once the correct data had been entered, the program would verify the manually entered result from the election return with the results transmitted to the PPCRV server; any discrepancies were flagged.

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68 Located at the Pope Pius X Building in Manila.

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As of May 18, PPCRV had received 70,255 of the 76,347 returns (92 percent nationwide) and had entered approximately 50,000 of them. Of the encoded election returns, 29 discrepancies had been discovered, which reflected four types of discrepancies, as illustrated below in Figure 3. COMELEC officials explained to Carter Center observers that the types of discrepancies covered in #3 and #4 of Figure 3 have occurred when BEIs did not follow the correct procedures and transmitted testing and sealing results that were contained on the backup compact flash card. No explanation was offered to The Carter Center for the #1 and #2 discrepancies.

Figure 3. Four Types of Discrepancies in Vote Returns

Discrepancy Type	Fourth Election Return of PPCRV, Manually Encoded	Transmitted Data in Server (Pius)	Number of Incidences to Total Election Returns Entered
1	Reflects votes cast	Transmitted zero votes	4 precincts (0.01 percent)
2	Reflects votes cast	Transmitted all votes cast with exception of one candidate wherein transmitted result was lower by one count	2 precincts (0.005 percent)
3	Reflects votes cast	Transmitted votes with numerical values of less than 10	19 precincts (0.05 percent)
4	Reflects votes with numerical values of less than 10	Transmitted votes cast	4 precincts (0.01 percent)

Source: PPCRV

Conclusions and Recommendations

The Carter Center conducted a limited observation mission to the Philippine elections of May 10, 2010, to assess the impact of automated voting technology on the electoral process. Therefore, in adherence with the Declaration of Principles for International Election Observation, the Center is unable to offer recommendations or observations about the election as a whole; however, the limited scope of the mission did allow The Carter Center to consider a variety of issues regarding election automation. The recommendations below are based on such direct observation of challenges faced in the implementation of the automated election system (AES).

The May 2010 elections were marked by relatively high public confidence and trust in the use of optical mark recognition technology. Such a success is a credit to the hard work of COMELEC and Smartmatic as well as the commitment of the people of the Philippines toward increasingly transparent elections. The implementation of AES technology, however, like any significant change to an electoral system, included significant challenges. The Carter Center is committed to the process of continued democratization in the Philippines and offers the conclusions and recommendations below in a spirit of cooperation with the Philippine government and COMELEC. These recommendations are meant to address existing challenges and provide illustration of potential alterations or amendments to improve the use of AES technology in future electoral processes.

The May 2010 elections were marked by relatively high public confidence and trust in the use of optical mark recognition technology.

To the Philippine Government:

1. Develop a single, comprehensive electoral law that fully considers and integrates provisions for automation.

Elections in the Philippines are governed primarily by the 1985 Omnibus Election Code; however, since its promulgation the Philippines has undergone significant changes to its electoral process, including the synchronization of elections and the adoption of electoral technology. The Omnibus Election Code retains provisions that are outdated or inapplicable to automated voting systems. As such, significant amendments have been made to the election code in the form of various republic acts and subsequent COMELEC resolutions that at times directly contravene the electoral law without clearly amending or repealing the original provisions.

The Carter Center recommends that the election law be revised in response to the Philippines' changing electoral structure and use of automated voting. The creation of a comprehensive election law encompassing the amendments regarding electoral technology would improve the transparency and efficiency of future election processes.

To the COMELEC:

2. Increase the technical capacity of COMELEC and BEIs to administer elections using AES and address challenges faced therein.

As COMELEC becomes more familiar with running an automated election, the body should take specific and measured steps to build institutional capacity

around the implementation of the AES. Training in electronic voting technology for COMELEC commissioners is highly recommended, and efforts should be made to recruit commissioners who have a background in engineering or the physical sciences. Increased public confidence in COMELEC's ability to administer automated elections in partnership with election technology vendors will result from such efforts.

More training for BEI officials should also be provided in order to adequately equip them to fully and effectively administer all aspects of the election, especially postballoting procedures. Furthermore, such training should explicitly instruct BEI officials to be more demonstrative in explaining to poll watchers and other individuals who remain present after the close of voting how and why they are conducting the postvoting process—from printing of election returns, to transmission of results, to disposition of printouts and equipment; for example, the disposition of compact flash cards, while not done secretively in 2010, should be handled more conspicuously, with BEIs stating what they are doing in plain language. BEI training manuals should clearly state such actions as requirements of the position.

3. Ensure that the electoral calendar provides adequate time for implementation of all stages of automation.

COMELEC should consider initiating the request for proposals and the bidding process for automated electoral technologies sooner so as to have more time prior to the scheduled election date. The 2010 election was hampered by a compressed electoral calendar after legal challenges seeking an injunction to the use of electronic voting delayed the process for several months. In the future, COMELEC should ensure that plans for the adoption of technology and implementation of the AES include sufficient time to complete all stages of the process, including resolution of any duly filed legal challenges. While challenges related to the shortened electoral calendar appear to have been adequately addressed in 2010, The Carter

Center did observe instances where the tight electoral calendar led to hasty operational decisions or implementation, which may be avoided in the future.

4. Conduct pre-election testing in a real-world setting at an earlier date in order to ensure adequate time to correct any issues identified.

In the future, pre-election testing that conforms with the "real world" voting environment should be conducted earlier. In 2010, testing and sealing began only on May 3 and 4, 2010. As a result, an error that required all 76,000 compact flash cards used in the election to be reconfigured was not discovered until one week before the election. Had earlier pre-election tests used the final ballots rather than a modified sample ballot, such a discrepancy may have been discovered and remedied at an earlier date. While reconfiguration was not observed to negatively impact the final use of the AES, it led to significant concerns on the part of the public and potentially lowered public confidence in the technology and election administration bodies.

The Carter Center also recommends that the number and scope of mock elections mandated in the election law be increased, with additional guidance provided as to their form and conduct. Currently, the law only requires "the successful conduct of a field testing process followed by a mock election event in one or more cities/municipalities." While COMELEC voluntarily increased the number of mock elections conducted in 2010, a strengthened provision in the electoral code would ensure that more voters in future elections have an opportunity to familiarize themselves with the AES in advance of election day and could help to identify technological issues earlier in the process.

5. Advance measures to ensure transparency in the use of the AES.

The Carter Center recommends the use of a third-party certification authority to generate the public and private keys (or digital certificates) used in results transmission. In 2010, the production of

such keys was completed by the technology vendor, Smartmatic, rather than an external body, potentially leading to questions about the transparency of the process. Furthermore, review of the AES's source code was limited to an on-screen presentation conducted under the auspices of COMELEC. Concerned that such a review was inadequate to identify potential problems, many watchdog groups chose to forgo participation and were unable to review the code at all. In the future, consideration should be given to increasing access to the source code while maintaining necessary security. Whether the source code is ultimately made fully public or not, legal regulations should be made more specific as to the conditions under which source code review is permitted by non-contracted parties outside the official certification and software audit.

The Carter Center notes positively COMELEC's commitment to make available pertinent electoral information on its website, including the electoral calendar, all COMELEC resolutions, and portions of its vendor contracts; however, in order to promote even greater transparency in the procurement and contracting process, The Carter Center recommends that all pertinent documentation regarding vendor and commission relationships be made publicly available.

6. Amend procedures to ensure secrecy of the ballot, in law and in practice.

The Carter Center observed significant curtailment of the right to vote by secret ballot in the 2010 elections. While this lack of secrecy did not appear to lead to voter intimidation or to undermine the credibility of the process, it does represent a departure from recognized international law and should be rectified in future elections. Amendments to the election law removing the requirement for a provision of voting booths may be reconsidered. In addition, while ballot secrecy folders were provided in each polling station, in practice these proved ineffective and were often abandoned altogether. This, coupled with the common practice of BEI staff's checking of ballots initially

rejected from the PCOS machine for stray marks, effectively undermined secrecy. Future electoral processes will benefit from increased measures to ensure privacy during voting and increased secrecy measures during the casting of ballots.

7. Ensure measures to increase security meet their ends while upholding fundamental rights and ensuring cost-effective electoral processes.

COMELEC took significant measures to provide for ballot security in the 2010 election. COMELEC ordered the creation of only the exact number of ballots necessary for registered voters and ensured the printers and ballot design files were incapacitated after printing was complete. In addition, each ballot was to contain an ultraviolet mark of authenticity. The intent of such measures was commendable, attempting to address a legacy of electoral fraud.

In practice, however, these measures were not always effective. For example, when the PCOS scanners could not read and authenticate ultraviolet markings on the ballot, COMELEC procured and distributed handheld UV lamps for ballot authentication. These lamps were not widely used. The utility of such security measures, in light of other authentication measures, such as the timing codes present on all ballots, should be reviewed in light of efficiency and economic concerns.

More significantly, the decision not to provide additional ballots that could be used in the case of ballot spoilage has the potential to severely impact the universality of suffrage by unfairly disenfranchising voters. As such, the Philippines should reconsider these restrictive provisions in the law, potentially returning to past provisions that allowed a set percentage of additional ballots to be distributed to each polling station.

8. Consider expanding the number of polling stations and dividing larger clustered precincts in order to minimize delays in the voting process.

As a cost-saving measure to reduce the number of PCOS machines required, COMELEC decreased

the number of voting precincts in the Philippines by nearly 75 percent, necessarily increasing the number of voters per precinct as a result. Given automated counting and the transition away from written ballots, this increased number of voters per station was not in itself unreasonable; however, in practice, the high number of clustered precincts allocated to each polling center led to significant crowding and long lines on election day. While most crowds dissipated by late afternoon, these delays did require COMELEC to extend the voting day by one hour. Therefore, in the future, COMELEC may consider increasing the number of voting precincts or reducing the number of precincts per polling center.

9. Improve the process and quality of random manual audit.

Public trust in the AES can be significantly enhanced through a successful random manual audit (RMA) process, which is based on a statistically significant sample of PCOS machines and performed in a publicly visible and timely manner. Given the difficulties and delays in the RMA process in 2010, The Carter Center recommends that clearer and more effective procedures be adopted for completing this audit in a timely manner. In addition, legal provisions regarding the RMA should be amended to provide a clearer indication of the purpose of the RMA and its relationship to dispute resolution and recounting procedures. Currently it is unclear whether RMA results can form the basis for a post-proclamation dispute,

or whether they can initiate a larger manual count on the basis of discrepancies. The legal relationship that exists among the paper ballot, the digital image created during scanning, and the electronic result, or "interpretation," that is logged after ballot scanning also requires clarity, with an official statement of what serves as the vote of record. As was done voluntarily by COMELEC in 2010, The Carter Center also suggests that legal provisions regarding the RMA be amended to increase the number of districts audited, ensuring statistical significance.

To Candidates and Political Parties:

10. Promote increased participation by political parties and candidates in pre-election testing of the AES system.

Carter Center observers noted relatively low participation by candidates and their agents in the pre-election-period testing and review of the AES. Increased efforts by parties and candidates to familiarize themselves with election technology prior to election day may bolster public confidence and increase awareness and understanding of the AES system. As a result, political parties and candidates may be better able to differentiate between spurious and valid complaints in the postelection period. Therefore, The Carter Center recommends to political parties and candidates that they participate in pre-election activities related to observation of the AES system, such as audits and system testing.

APPENDIX A
ACKNOWLEDGMENTS

The Carter Center would like to thank a number of organizations and individuals whose contributions made the limited international observation mission to the 2010 election in the Philippines possible. In particular, The Carter Center thanks the Philippine government and COMELEC for allowing The Carter Center to observe the May 10, 2010, elections. In addition, the Center graciously acknowledges the contributions of Philippine political party members, civil activists, journalists, and citizens who welcomed the Center's staff and observation efforts.

The Carter Center wishes to recognize the collaborative efforts of several international groups that actively supported the Philippine electoral process and provided assistance and guidance to the Center in its observation efforts. These include the Asian Network for Free Elections, the National Democratic Institute for International Affairs, and the International Foundation for Electoral Systems. Additionally, the Center commends the vital work of the Philippine domestic observer groups, notably the Parish Pastoral Council for Responsible Voting, Legal Network for Truthful Elections, and National Citizens' Movement for Free Elections, for their unwavering commitment to supporting democracy in the Philippines.

The Carter Center offers sincere thanks to its dedicated field staff, who completed a three-month observation of the pre- and postelectoral periods. This Manila-based team bore the brunt of observation efforts with diligence and care. The efforts of technical expert Ben Madgett, electoral expert Gabriel Morris, Field Office Director Jeremy Wagstaff, Office Manager Giselle Kasilag, and financial assistant Lolita Beng were critical to the mission's success. Additional thanks go to the Electoral Institute for Sustainability of Democracy in Africa, International Institute for Democracy and Electoral Assistance, and the Georgia Institute of Technology, the latter having partnered with The Carter Center to provide delegates for the short-term election observation mission and volunteered their time, expertise, and insights to the mission.

Finally, the Center is grateful for funding for the 2010 Philippine election observation mission from Irish Aid and the Canadian International Development Agency,[69] without which the mission would not have been possible.

Carter Center Democracy Program staff in Atlanta had overall responsibility for the mission. Assistant Director Avery Davis-Roberts served as project manager, with assistance from Assistant Program Coordinator Amber Charles. The primary drafters of this report were Benjamin Madgett, Gabriel Morris, and Jeremy Wagstaff. Significant contributions were also made by Democracy Program staff members Avery Davis-Roberts and Amber Charles.

Appendix B
Carter Center Election Observation Delegation and Staff

Short-Term Observers

Michael Hunter, Georgia Institute of Technology, USA

Karen Ogle, Electoral Institute for the Sustainability of Democracy in Africa (EISA), South Africa

Duncan Osborn, Georgia Institute of Technology, USA

Joyce Pitso, EISA, South Africa

Karthik Rangarajan, Georgia Institute of Technology, India

Peter Wolf, International Institute for Democracy and Electoral Assistance, Austria

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Giselle Kasilag, Coordinator, Philippines

Benjamin Madgett, Technical Expert, Canada

Gabriel Morris, Election Observation Expert, USA

Jeremy Wagstaff, Field Office Director, United Kingdom

Atlanta Staff

Amber Charles, Assistant Program Coordinator, Democracy Program, USA

Avery Davis-Roberts, Assistant Director, Democracy Program, USA

Appendix C
Terms and Abbreviations

AES	Automated election system
AFP	Philippine Armed Forces
Barangay	Neighborhood
BEI	Board of Election Inspectors
BOC	Board of Canvassers
COMELEC	Commission on Elections
DRE	Direct-recording electronic voting
EMS	Election management system
KBP	Association of Broadcasters of the Philippines
MBOC	Municipal Board of Canvassers

NBOC	National Board of Canvassers
NPO	National Printing Office
OMR	Optical mark recognition
PBOC	Provincial Board of Canvassers
PCOS	Precinct count optical scanner
PNP	Philippine National Police
PPCRV	Parish Pastoral Council for Responsible Voting
RMA	Random manual audit
TEC	Technical Evaluation Committee

Appendix D
Election Day Observer Checklists

Opening						
THE CARTER CENTER PHILIPPINES GENERAL ELECTION MAY 10 2010	**Observer Team Number:**			**Date (mm/dd):** ☐☐.☐☐		
	City/Muni.:		**Province:**	**Arrival Time (24hr):** ☐☐:☐☐		
	Barangay:			**Departure Time (24 hr):** ☐☐:☐☐		
	Polling Center:			**Clustered Precinct #:** ☐☐☐☐		
	# of precincts at clustered precinct ☐☐☐☐	**# of registered voters** at clustered precinct ☐☐☐☐		**# of ballots received** at clustered precinct: ☐☐☐☐		

		YES	NO	N/A
	OUTSIDE THE POLLING CENTER/CLUSTERED PRECINCT			
1	Was the environment around the **polling center** (please check one): ☐ calm ☐ somewhat calm ☐ tense ☐ violent	▨	▨	▨
2	Are there long lines outside the **precinct**? If YES, describe this line (check one below): ☐ orderly ☐ somewhat orderly ☐ disorderly ☐ very disorderly			
3	Is the **precinct** accessible to all voters, including those with disabilities?			
	INSIDE THE CLUSTERED PRECINCT			
	Note: Questions 4 - 12 require you to speak directly to polling officials and domestic observers. Please do so only when this will not disrupt voting			
4	On what date was the PCOS delivered to the precinct? MAY ☐☐ 2010	▨	▨	▨
5	Who delivered the PCOS to the precinct? _____			
6	Where was the PCOS machine stored prior to delivery to the precinct (check one below)? ☐ COMELEC hub/warehouse ☐ Municipal Treasurer's Office ☐ Other _____	▨	▨	▨
7	Was a record/chain of custody of the PCOS delivery kept? If YES, who maintained this documentation? ☐ BEI ☐ COMELEC ☐ Smartmatic ☐ Other _____			
8	On what date was testing and sealing performed? MAY ☐☐ 2010	▨	▨	▨
9	Were there any problems with the PCOS during testing and sealing? (If YES, please indicate in comments)			
10	Who has been watching the PCOS since testing and sealing took place (select all that apply)? ☐ PPCRV ☐ Other Poll Watchers ☐ PNP ☐ Political Party/Candidate reps ☐ BEI ☐ Other _____	▨	▨	▨
11	Are all members of the BEI present and accredited? If NO, who was absent/not accredited (check all that apply)? ☐ BEI Chair ☐ Poll Clerk ☐ Support Staff ☐ IT-capable BEI member			
12	Is a PCOS Technician present at the polling center?			
	OPENING THE PCOS BOX			
13	Is the PCOS case sealed?			
14	Do the numbers on the seals match the serial number recorded during testing and sealing?			
15	Is the package of ballots sealed?			
16	Have the correct ballots been delivered to the precinct?			
17	Is the ballot box shown to be locked and empty?			
18	Are all the correct materials inside the PCOS box? If NO, what was missing (check all that apply)? ☐ Checklist of contents ☐ PCOS (w/ correct serial number) ☐ Envelope with spare iButton ☐ Power cord ☐ PINs for BEIs ☐ 2 copies of testing and sealing minutes ☐ 3 thermal paper rolls ☐ Other _____			
19	Where is the transmission device for this precinct located? ☐ Inside precinct ☐ At another precinct in the polling center ☐ Other _____	▨	▨	▨
20	What type of transmission device will be used? ☐ Modem ☐ BGAN ☐ Other _____	▨	▨	▨
21	Upon removing the PCOS from the box, did the BEI complete the following procedures:	▨	▨	▨
	a. Break printer cover seal and remove iButton key?			
	b. Leave memory card slots and transmission ports sealed?			
	c. Install PCOS on ballot box?			
	d. Connect battery and plug in power cord?			

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PCOS SET UP		YES	NO	N/A
22	Did the BEI chair enter the iButton key and select 'Open Voting"?			
23	Did two members of the BEI enter their PINs?			
24	Did PCOS perform diagnostics successfully?			
25	Did the BEI print, sign and thumbprint the zero reports and put them in the corresponding envelopes?			
26	Does the PCOS screen indicate 'Ballots Cast: 0'?			
27	At any time during set up, did anyone connect an external device (modem, etc.) to the PCOS machine?			
28	Is the PCOS machine positioned:	//////		
	a. With enough distance to ensure voter privacy?			
	b. As to be accessible to disabled voters?			
29	Did the precinct open on time (or at least by 7:15am)? If <u>NO</u>, please check one of the following: ☐ 07:15 - 08:00 ☐ 08:00 - 9:00 ☐ 9:00 - 10:00 ☐ 10:00 - 11:00 ☐ after 11:00 ☐ did not open today *Note: If the PS hasn't opened, please stay until at least 11:00.*			
	If precinct did not open on time, please check one of the following reasons that explains why it opened late: ☐ Polling staff/lack of understanding of procedures ☐ Insufficient/missing materials ☐ Insufficient number of polling staff ☐ Insecurity ☐ Other _____	//////		
30	Did the BEI encounter any problems during setup of the PCOS? If <u>YES</u>, please describe in comments, explaining what issue arose and how long it took to resolve the issue.			
31	If you answered <u>YES</u> to Question 30, which of the following occurred (check all that apply): ☐ BEI resolved issue on its own ☐ PCOS Technician resolved issue with no PCOS replacement ☐ PCOS Technician replaced PCOS ☐ Manual voting took place	//////		
OTHER PERSONS PRESENT				
32	Were domestic observers present? If so, from which organizations (check all that apply)? ☐ PPCRV ☐ NAMFREL ☐ Kontra Daya ☐ Other _____			
33	Were political party agents present? If so, from which parties (check all that apply)? ☐ Liberal ☐ Nacionalista ☐ NPC ☐ Lakas Kampi CMD ☐ PMP ☐ Other _____			
OFFICIAL COMPLAINTS				
34	Were any objections or complaints related to the use of the PCOS machines reported to BEI staff?			
35	If objections or complaints reported to BEI staff, was staff responsive to these complaints?			
OVERALL ASSESSMENT OF OPENING PROCESS				
Instructions for this Section: Put an 'X' next to the statement that best describes your assessment of the opening process for this precinct. If your response is "poor" or "very poor," please elaborate in comments.				
Very Good - No significant incidents or irregularities				
Good - A few incidents or some minor irregularities, but none that had a significant effect on the integrity of the process				
Poor - Incidents or irregularities that significantly affected the integrity of the process				
Very Poor - Incidents or irregularities of such magnitude that the integrity of the process is in doubt.				
COMMENTS				
Instructions: Please provide details of any complaints or irregularities that occurred at the polling station that you observed. If additional space is required, please continue to the back of the form and/or attach additional sheets of paper to the report form.				

CARTER CENTER LIMITED MISSION TO THE MAY 2010 ELECTIONS IN THE PHILIPPINES

Voting			

THE CARTER CENTER

PHILIPPINES GENERAL ELECTION MAY 10 2010

Observer Team Number:		Date (mm/dd): ☐☐ : ☐☐	
City/Muni.:	Province:	Arrival Time (24hr): ☐☐ : ☐☐	
Barangay:		Departure Time (24 hr): ☐☐ : ☐☐	
Polling Center:		Clustered Precinct #: ☐☐☐☐	

# of precincts at clustered precinct ☐☐☐☐	# of registered voters at clustered precinct ☐☐☐☐	# of ballots received at clustered precinct: ☐☐☐☐

		YES	NO	N/A
	OUTSIDE THE POLLING CENTER/CLUSTERED PRECINCT			
1	Was the environment around the **polling center** (please check one): ☐ calm ☐ somewhat calm ☐ tense ☐ violent			
2	Are there long lines outside the **precinct**? If YES, describe this line (check one below): ☐ orderly ☐ somewhat orderly ☐ disorderly ☐ very disorderly			
3	Is the **precinct** accessible to all voters, including those with disabilities?			
	INSIDE THE CLUSTERED PRECINCT			
	Note: Questions 4 - 12 require you to speak directly to polling officials and domestic observers. Please do so <u>only</u> when this will not disrupt voting			
4	On what date was the PCOS delivered to the precinct? MAY ☐☐ 2010			
5	Who delivered the PCOS to the precinct? _____			
6	Where was the PCOS machine stored prior to delivery to the precinct (check one below)? ☐ COMELEC hub/warehouse ☐ Municipal Treasurer's Office ☐ Other _____			
7	Was a record/chain of custody of the PCOS delivery kept? If YES, who maintained this documentation? ☐ BEI ☐ COMELEC ☐ Smartmatic ☐ Other _____			
8	On what date was testing and sealing performed? MAY ☐☐ 2010			
9	Were there any problems with the PCOS during testing and sealing? (If YES, please indicate in comments)			
10	Who has been watching the PCOS since testing and sealing took place (select all that apply)? ☐ PPCRV ☐ Other Poll Watchers ☐ PNP ☐ Political Party/Candidate reps ☐ BEI ☐ Other _____			
11	Are all members of the BEI present and accredited? If NO, who was absent/not accredited (check all that apply)? ☐ BEI Chair ☐ Poll Clerk ☐ Support Staff ☐ IT-capable BEI member			
12	Is a PCOS Technician present at the polling center?			
	PCOS SET UP			
13	Is the PCOS connected to: ☐ Power cord ☐ Battery ☐ Both			
14	Are the memory card slots closed and sealed?			
15	Are the transmission ports closed and sealed?			
16	Is the PCOS machine positioned:			
	a. With enough distance to ensure voter privacy?			
	b. As to be accessible to disabled voters?			
	VOTING PROCESS			
17	Does the BEI instruct voters how to fill out the ballots correctly?			
18	Does the BEI use the UV lamp to demonstrate ballot authenticity to the voter?			
19	Do voters use the secrecy folder effectively when feeding the ballots into the PCOS?			
20	Does the PCOS display "CONGRATULATIONS YOUR VOTE HAS BEEN REGISTERED" after accepting ballots?			

					YES	NO	N/A
21	How long, on average, does it take each voter to mark their ballot and feed it through the PCOS successfully? (Observe 5-10 voters and take an average) _____ minutes						
22	How many times, on average, do voters attempt to feed the ballot before it is accepted by the PCOS? ☐ 1 ☐ 2 ☐ 3 ☐ 4						
23	Did any of the following take place (please count):	Reported to our observers	Observed				
	a. Ambiguous marks (ie. less than 50% of oval shaded):						
	b. Misread ballot (ie. inserted incorrectly):						
	c. Invalid ballot (ie. wrong precinct):						
	d. Scanner/paper jams:						
	f. Other _____ :						
24	Does the BEI explain to voters how to handle returned ballots?						
25	Is voter privacy maintained when ballots are returned by the PCOS?						
26	Did you observe any disabled voters casting ballots?						
	If YES, did they receive assistance in voting?						
27	While you were present in the precinct, approximately how many voters cast ballots? ☐ 0-10 ☐ 11-30 ☐ 31-50 ☐ more than 50						
28	Did you observe any serious problems with the PCOS during voting? If YES, please describe in the comments, explaining what issue arose and how long it took to resolve the issue.						
29	If you answered YES to Question 28, which of the following occurred (check all that apply): ☐ BEI resolved issue on its own ☐ PCOS Technician resolved issue with no PCOS replacement ☐ PCOS Technician replaced PCOS ☐ Manual voting took place						
OTHER PERSONS PRESENT							
30	Were domestic observers present? If so, from which organizations (check all that apply)? ☐ PPCRV ☐ NAMFREL ☐ Kontra Daya ☐ Other _____						
31	Were political party agents present? If so, from which parties (check all that apply)? ☐ Liberal ☐ Nacionalista ☐ NPC ☐ Lakas Kampi CMD ☐ PMP ☐ Other _____						
OFFICIAL COMPLAINTS							
32	Were any objections or complaints related to the use of the PCOS machines reported to BEI staff?						
33	If objections or complaints reported to BEI staff, was staff responsive to these complaints?						
OVERALL ASSESSMENT OF VOTING PROCESS							
Instructions for this Section: Put an 'X' next to the statement that best describes your assessment of the election environment and voting process for this precinct. If your response is "poor" or "very poor," it is important that you provide further explanation in the comments section.							
Very Good - No significant incidents or irregularities							
Good - A few incidents or some minor irregularities, but none that had a significant effect on the integrity of the process							
Poor - Incidents or irregularities that significantly affected the integrity of the process							
Very Poor - Incidents or irregularities of such magnitude that the integrity of the process is in doubt.							
COMMENTS							
Instructions: Please provide details of any complaints or irregularities that occurred at the polling station that you observed. If additional space is required, please continue to the back of the form and/or attach additional sheets of paper to the report form.							

CARTER CENTER LIMITED MISSION TO THE MAY 2010 ELECTIONS IN THE PHILIPPINES

Closing

THE CARTER CENTER PHILIPPINES GENERAL ELECTION MAY 10 2010	Observer Team Number:		Date (mm/dd):		
	City/Muni.:	Province:	Arrival Time (24hr): ☐☐:☐☐		
	Barangay:		Departure Time (24 hr): ☐☐:☐☐		
	Polling Center:		Clustered Precinct #: ☐☐☐☐		
	# of precincts at clustered precinct ☐☐☐☐	# of registered voters at clustered precinct ☐☐☐☐	# of ballots received at clustered precinct: ☐☐☐☐		

		YES	NO	N/A
	CLOSE OF POLLS			
1	Was this precinct selected for a random manual audit?			
2	How many voters were in line at 6pm? ☐☐☐☐			
3	Were all voters in line within 30 meters of the precinct at 6pm allowed to vote?			
4	Time last ballot cast: ☐☐:☐☐ 'BALLOTS CAST' displayed on PCOS LCD at closing: ☐☐☐☐			
	ELECTION RETURNS			
5	Did the BEI Chair tap their iButton key and close voting?			
6	Did the BEI Chair decline the option to apply their digital signature when prompted by the PCOS?			
7	Did the PCOS print 8 copies of the national returns, followed by the local returns?			
8	Does the number of ballots cast on the election return match the number of ballots cast on the LCD screen at close?			
9	Were the returns signed and thumbprinted by the BEI and watchers and placed in the appropriate envelopes?			
10	Did the poll clerk post a copy of the ER in the premises? (Please take a picture of the results if possible)			
	TRANSMISSION			
11	Did the BEI Chair attach the transmission device without difficulty? (select which device was used): ☐ Modem ☐ Broadband Global Area Network (BGAN) ☐ Other _____			
12	How many attempts were made to transmit results successfully? Municipal/City Board of Canvassers ☐ 1 ☐ 2 ☐ 3 ☐ Failed to transmit COMELEC Central Server ☐ 1 ☐ 2 ☐ 3 ☐ Failed to transmit KBP/Citizens Arm/Parties ☐ 1 ☐ 2 ☐ 3 ☐ Failed to transmit			
13	After disconnecting the transmission medium, did the PCOS print a transmission report?			
	CLOSING PROCEDURES			
14	Did the PCOS print 22 copies of the national and local returns? (Please ask the BEI for a copy, if possible)			
15	Did the PCOS print 2 copies of the statistics report and 1 audit log?			
16	At at anytime during the printing process, was the thermal paper replaced?			
17	Did the BEI and watchers sign the returns and place in appropriate envelopes?			
18	Did the PCOS LCD screen display 'automatic back up and write protect' of the election data?			
19	Did the PPCRV obtain 2 copies of the ER and a statistics report?			
20	Were the following items placed in the ballot box? ☐ **Printed election returns** ☐ Copies of BEI minutes ☐ Torn half of unused ballots ☐ Rejected ballots			
21	Did the BEI Chair seal the ballot box with a seal and padlocks?			
22	Was **the PCOS** turned over to the support technician in the polling center?			
23	Were the following materials prepared for delivery to the Election Officer at the Board of Canvassers? ☐ Envelope containing **back up memory card, initialization/zero report, audit log, stats report** ☐ Envelope containing copies of **election returns for BOCs and COMELEC** ☐ Voters lists, book of voters, torn half of unused ballots, ballot box keys, minutes, rejected ballots			
24	Was **the main memory card** of the PCOS placed inside an envelope labeled 'Transmitted' or 'Not Transmitted' and delivered to the Reception and Custody Group (RCG) for the Board of Canvassers?			
25	Did representatives from the following accompanied the BEI to deliver the materials (check all that apply)? ☐ PPCRV ☐ PNP/AFP ☐ Political party/candidate representatives ☐ Other _____			
26	What time did the BEI leave the precinct with the election materials? ☐☐:☐☐			

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		YES	NO	N/A
27	Did you observe any serious problems with the PCOS during closing and transmission? If YES, please describe in the comments, explaining what issue arose and how long it took to resolve the issue.			
28	If you answered <u>YES</u> to Question 27, which of the following occurred (check all that apply): ☐ BEI resolved issue on its own ☐ PCOS technician resolved issue with no PCOS replacement ☐ PCOS Technician replaced PCOS ☐ Moved to another PCOS for counting/transm. ☐ Manual count took place			
	OTHER PERSONS PRESENT			
29	Were domestic observers present? If so, from which organizations (check all that apply)? ☐ PPCRV ☐ NAMFREL ☐ Kontra Daya ☐ Other _____			
30	Were political party agents present? If so, from which parties (check all that apply)? ☐ Liberal ☐ Nacionalista ☐ NPC ☐ Lakas Kampi CMD ☐ PMP ☐ Other _____			
	OFFICIAL COMPLAINTS			
31	Were any objections or complaints related to the closing of the PCOS machines reported to BEI staff?			
32	If objections or complaints reported to BEI staff, was staff responsive to these complaints?			
	OVERALL ASSESSMENT OF CLOSING PROCESS			

Instructions for this Section: Put an 'X' next to the statement that best describes your assessment of the election environment and closing process for this precinct. If your response is "poor" or "very poor," it is important that you provide further explanation in the comments section.

Very Good - No significant incidents or irregularities	
Good - A few incidents or some minor irregularities, but none that had a significant effect on the integrity of the process	
Poor - Incidents or irregularities that significantly affected the integrity of the process	
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COMMENTS

Instructions: Please provide details of any complaints or irregularities that occurred at the polling station that you observed. If additional space is required, please continue to the back of the form and/or attach additional sheets of paper to the report form.

Appendix E
Baseline Survey Template

Introduction

Instructions for Completion

This baseline survey has been developed with the intent to help observers collect and process all relevant data associated with electronic voting technologies. The information gathered by answering these questions should create a comprehensive picture of the voting system in use and thus allow a fuller assessment of its use.

Information should be gathered through review of appropriate legislation, decrees, bylaws and rules, and interviews with election administration officials, technical and legal experts, representatives of political parties and domestic observation and civil society organizations.

Any supporting documentation should be retained including the elections law, certification procedures, technological standards against which the technology is measured, reports on past processes, etc. Please be sure to include details on how, where, and when the information was attained and, particularly in the case of interviews, the name, title, and affiliation of the source of the data. It is anticipated that this process will occur over a number of weeks in the months leading up to election day.

After collecting as much data as possible regarding the use of the electronic voting system, a synopsis of your findings will be written. This synopsis will provide an overview of the system that can be used by other observers (long-, medium-, and short-term) as a point of reference for their observations. In addition, data collected will be used to formulate and modify more generic election day (and other) checklists to capture information on the actual functioning of the system.

Use of Associated Question Database

Given the large amount of data to be collected through the completion of this baseline survey, The Carter Center has developed a companion database, which allows observers to filter by information source. Ideally, this will allow observers to group questions when preparing for interviews and meetings, minimizing the need for observers to contact the same stakeholders repeatedly to complete the survey.

Each question within the baseline survey has therefore been tagged with between one and three acronyms, indicating where such information will likely be located. Acronyms are listed in a primary, secondary, and tertiary order, meaning the first acronym listed is likely to be the best or most complete source of this data. This tagging is meant as a tool to help expedite completion of the baseline survey and does not preclude the need to rely on other sources not included here or to receive information from sources beyond what is listed.

The list of acronyms is as follows:
- Election Law: EL
- Election Management Body: EMB
- Civil Society: CS
- Political Parties: PP
- Vendor: V
- Independent Inquiry: I

Use of Associated Question Database with Regard to the Legal Framework

A comprehensive review of the legal framework regarding elections and the use of electoral technology is fundamental to a complete understanding of the process. The information gathered through review of the legal code informs and provides a foundational understanding for all other aspects of this baseline

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survey. Many questions asked under the legal framework section are inextricably linked to other sections of the survey. However, for ease of use, all questions relevant to a review of the election law have been grouped together. Therefore, legal framework questions (excluding those dealing with the complaints and disputes procedures, which do not appear elsewhere in the survey) are tagged with a second acronym identifying them to their relevant section of the survey. These acronyms are based on the subheadings which appear in the baseline survey and are as follows:

• Technology and System in Use: TS
• Public Confidence in the Technology: PC
• Accessibility: A
• Institutional Organizations: IO
• Technology Vendors and Procurement of Equipment: VP
• Certification and Testing: CT
• Acceptance Testing: AT
• Other Pre-election Testing: PE
• Election Day Testing: ET
• Security and Integrity of the System: SI
• Software: S
• Central Tabulating Computer: CC
• Contingency Planning: CP
• Tabulation: T
• Voting Operations: VO
• Postelection Audits: PA
• Ballot Counting: BC

The relevant acronyms appear in the question database as a secondary heading, allowing information from the legal framework to be sorted according to relevant subject of the larger baseline survey.

Purpose of the Baseline Survey

As election observers, The Carter Center must seek to understand the role of electoral technologies within the larger electoral framework, assessing how they impact and are impacted by the process as a whole. As such, this baseline survey must be understood as one tool that contributes to a larger assessment methodology, focused not only on technological aspects of

the process. Other reporting tools commonly used by The Carter Center include weekly narrative reports prepared by long-term observers, legal framework and gap analyses prepared by legal experts, and election-day checklists completed by short-term observers. At times, assessments are also informed by the findings of high-level political meetings as well as through analysis of the media environment, complaints procedures, and political finance systems.

The baseline survey has been designed to track, as neatly as possible, with these other reporting tools, focusing on a general set of subjects relevant to the assessment of elections regardless of the use of technology (for example, accessibility and voting operations). Upon completion, this survey should be considered in light of other reports and findings to develop an overall picture of the electoral process, upon which determinations of its strengths and weaknesses can be made in an objective manner.

Carter Center's Assessment Methodology: The Relation of a Human Rights Approach

The Carter Center assesses elections on the basis of human rights obligations, determined by the domestic and international commitments of a state and the international community as a whole. While this baseline survey focuses only on the aspects of the electoral process dealing with electoral technology, it is critical that observers understand and assess such technology against these human rights commitments. Electoral technologies can be an important tool to help provide for the fulfillment of obligations (particularly given their ability to make voting accessible to historically disenfranchised communities). However, malfunctions or misapplications of such technologies also have a significant ability to undermine such critical obligations.

Therefore, throughout completion of the baseline survey, understanding the underlying impact technology has on electoral process and the enjoyment of fundamental rights is a central concern. The Carter Center has identified 21 obligations based in public international law that are of critical importance to

the electoral process. Such human rights obligations include:

1) ***The will of the people forms the basis of government*** —That the will of the people shall form the basis of the authority of government was first established in the Universal Declaration of Human Rights (UDHR) and subsequently made legally binding in Art. 25 of the International Covenant on Civil and Political Rights (ICCPR).

2) ***Genuine elections*** —The holding of genuine elections is an essential obligation. It is generally understood to mean that the election offered voters a real choice and that a wide array of other fundamental rights have been fulfilled.

3) ***Periodic elections*** —The obligation to hold periodic elections as established in the ICCPR and other treaties and instruments is generally understood to mean that elections must take place at reasonable intervals.

4) ***The state must take necessary steps to ensure realization of rights*** —Public international law requires that the state take steps to ensure the effective realizations of the rights contained in the relevant international instruments.

5) ***The rule of law*** —Implicit in the international human rights treaties and instruments is the obligation of the state to abide by the rule of law. While not explicitly articulated as an obligation in the ICCPR, the rule of law is recognized as an essential condition for the fulfillment of human rights and representative democracy.

6) ***Universal suffrage*** —The obligation to hold elections by universal suffrage requires that the state take measures to ensure that the broadest pool of voters be allowed to cast their ballots.

7) ***Equal suffrage*** —Similar to universal suffrage, equal suffrage is a collective right that requires that every voter be granted a vote of equal value to that of other voters.

8) ***Secret ballot*** —Voting must be by secret ballot; that is, the cast ballot cannot be identified with the voter who cast it. That secrecy must be maintained throughout the entire electoral process.

9) ***Prevention of corruption*** —While recent anti-corruption instruments lay the foundations for transparency, they also obligate the state to regulate the behavior of public officials.

10) ***Every citizen has the right to vote*** —While universal suffrage establishes a collective right to vote and be elected, the right of every citizen to vote is an individual right.

11) ***Every citizen has the right to be elected*** —Similar to the right to vote, the exercise of this individual-focused obligation is limited to citizens.

12) ***Every citizen has the right to participate in public affairs*** —This obligation protects the ability of citizens to participate in the public affairs of their country, for example, by joining civil society organizations and/or serving as a domestic observer.

13) ***Freedom of association*** —Freedom of association has been recognized as essential to democratic elections for some time. This right is particularly relevant in the context of political parties and campaign activities and includes the ability to freely establish political parties.

14) ***Freedom of assembly*** —Similar to freedom of association, freedom of assembly has been recognized as essential to democratic elections for many years.

15) ***Freedom of movement*** —Freedom of movement is an essential right during the electoral process, not only for political parties and their supporters but also for poll workers, domestic and international observers, and of course, voters.

16) ***Equality before the law and absence of discrimination*** —Many treaties establish the right to equality before the law, while separately calling for absence of discrimination in the exercise

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of human rights and fundamental freedoms. The latter obligation is explicitly tied to the rights enshrined in Article 25 of the ICCPR but is also, in fact, applicable to all of the obligations in the ICCPR.

17) *Freedom of opinion and expression*—Everyone has the right to freedom of expression Free communication of information and ideas between voters and candidates is essential during the electoral process and extends to the right to make monetary contributions to political candidates or parties.

18) *Access to information*—Closely related to the right to freedom of opinion and expression and the obligation of transparency is the right of access to information. Everyone has the right to seek and receive public information. In addition to being an important right in and of itself, it is also a critical means of ensuring transparency and accountability throughout the electoral process.

19) *Right to security of the person*—The right to security of the person includes not only protection for arbitrary arrest, detention, and exile but, in the context of the electoral process, includes the protection of voters, candidates and their agents, poll workers, and domestic and international observers from interference, coercion, or intimidation.

20) *Right to a fair and public hearing*—Everyone has the right to a fair and public hearing in the determination of their rights in a suit of law. This right includes the ability to have your case heard publicly and expeditiously by an impartial tribunal, to have equal access to the judicial proceedings, and equality of arms.

21) *Right to an effective remedy*—International law requires that an effective and timely remedy by a competent administrative, legislative, or judicial authority be available for all violations of human rights included in the instruments.

While not specifically referenced in the following baseline survey, consideration of such rights, and their fulfillment in practice, will enrich the completion of this survey, linking the use of electoral technologies directly back to the fundamental principles and obligations underlying a credible, genuine election.

Legal Framework

1) Is the use of electronic voting technologies anticipated in the current electoral legislation (or other binding legislation), or has it been introduced via subsequent decree, regulations, or other ad hoc measures? (EL, EMB) (TS)

2) Does the legal framework prescribe the type of electronic technology that is used? If so, please describe, including any outlined objectives for the introduction of this technology. (EL) (TS)

3) Does the law (legislation and/or subsequent decisions, decrees, and regulations) outline the roles and responsibilities of public authorities, independent bodies, and vendors relating to the implementation of the electronic voting system? Please describe. (EL, EMB) (IO)

4) Does the law (legislation and/or subsequent decisions, decrees, and regulations) provide a framework for contractual obligations between the state and the vendor or the independent certification bodies that is unique from standard contract law? Please describe the regulatory framework for these relationships. (EL, EMB) (VP)

5) Is certification of the voting technology required by law (legislation and/or subsequent decisions, decrees, and regulations)? (EL, EMB) (CT)

6) Does the law (legislation and/or subsequent decisions, decrees, and regulations) require that acceptance testing take place? (EL) (AT)

7) Does the law (legislation and/or subsequent decisions, decrees, and regulations) require that pre-election testing take place? (EL, EMB) (PE)

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8) Who is responsible for pre-election testing, and does the law (legislation and/or subsequent decisions, decrees, and regulations) require that the equipment is tested by an independent body? Please explain these procedures, including who is allowed to observe testing. (EL, EMB, V) (PE)

9) Does the law (legislation and/or subsequent decisions, decrees, and regulations) require that pre-election testing include:

a) Testing the power-up of every machine?

b) A simulation of likely voting orders, patterns, and ranges?

c) Stress testing with large numbers of votes?

d) Vote tally checking?

e) Correct date and time information testing?

f) Date set to election day run-throughs?

g) Simulations of error conditions in order to evaluate system response to problems and mistakes?

h) Reboot/restart functionality testing?

i) Testing equipment recovery from system crashes?

j) Testing for unexplained flashing or otherwise inconsistent or potentially suspicious behavior?

k) Checking for complete list of candidate names, party affiliations, ballot initiatives of proposition options?

l) Testing the use of an independent log to compare the system count and the selections made by the voter?

m) Testing the use of an independent log to compare the paper ballots (if used) produced with the system count and the selections made by the voter?

n) Testing of display calibration?

o) Testing of audio ballot functionality?

p) Testing of the security and authentication techniques used in connecting the voting machines to the network (if applicable)?

q) Testing to ensure that the ballot information for each precinct is correct?

r) Other (please describe)? (EL, EMB, V) (PE)

10) Does the law (legislation and/or subsequent decisions, decrees, and regulations) allow independent inspection of the software? Please provide further details including any pertinent reports that might be available. (EL, EMB) (S)

11) Does the law (legislation and/or subsequent decisions, decrees, and regulations) provide for security and/or transparency promotion measures, such as the use of an independent certification body and/or pre- and postelection audits that are open to party agents and observers? If so, please describe and indicate whether, in your opinion, access of party agents and observers to the audit process appears adequate? (EL, EMB) (A)

12) Does the law or official rules and regulations require that:

a) Contingency plans are in place in case of equipment failure?

b) Replacement equipment is available in the event of malfunctions? If so, is this replacement equipment the same model as the technology it replaces? Is it deployed from a central location or kept at each polling place? (please describe)

c) Substitute technology is subject to the same testing and evaluation procedures as equipment originally deployed to polling places?

d) Chain-of-custody procedures are in place for equipment taken out of service during an election? If so, is this chain of custody documented and are any of these documents available to the public?

e) A process for documenting malfunctions, failures, or errors be in place?

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f) A process for obtaining election day performance records (i.e., errors and malfunctions) of specific equipment be in place?

g) Contingency plans and procedures for partial or total power outage are in place? (EL, EMB, V) (CP)

13) Please describe the intricacies of election day procedures as specified by the election law and/or the rules and regulations of the electoral management body, including:

a) Poll opening and setup of all equipment (including production of zero tape, ensuring that all items are present and accounted for)

b) Connectivity of equipment during the course of the day (including when, why, and how long the machines are connected to a network and what security and authentication measures are in place)

c) The voting process

d) Storage of spare equipment

e) Poll closing procedures

f) Vote counting and tabulation procedures

g) Storage and transportation of polling place results (EL, EMB) (SI)

14) Does the law (legislation and/or subsequent decisions, decrees, and regulations) require that appropriate technical steps be taken to ensure that the secrecy of the vote is guaranteed (for example, measures to ensure that the voting sequence cannot be reconstructed or that the votes cast cannot be tied to a specific voter)? (EL, EMB) (BC)

15) Does the law (legislation and/or subsequent decisions, decrees, and regulations) provide guidance on how voter intent is to be determined by poll workers? (EL, EMB) (BC)

16) If applicable, does the law (legislation and/or subsequent decisions, decrees, and regulations) provide detailed guidance on the transcription of ballots? (EL) (BC)

17) Does the law (legislation and/or subsequent decisions, decrees, and regulations) require that poll workers complete incident reports or file "minutes" for the polling place? If so, in what circumstances are they required?

18) What information is collected in the report? How is information collected?

19) What happens to that information at the end of the election? (EL, EMB) (VO)

20) According to the law (legislation and/or subsequent decisions, decrees, and regulations) what procedures are in place if there is a discrepancy between the paper ballot count and the electronic tally? (EL, EMB) (T)

21) Does the law state the process and deadline for the certification of results? (EL) (T)

22) Is a postelection audit part of established procedures? (EL, EMB) (PA)

Complaints and Disputes

23) Do electoral offense provisions of the electoral law also apply to the new technologies in use? (EL)

24) Does the law (legislation and/or subsequent decisions, decrees, and regulations) make special provision for complaints and remedial actions based on the use of electronic technologies? Please provide a detailed description of the provisions and how they are related to the standard complaints procedures. (EL, EMB)

25) What triggers a re-count?

a) Voter application

b) Candidate application

c) Narrow margin of victory

d) Automatic random re-count

e) None of the above

f) Other (please describe) (EL, EMB)

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TECHNOLOGY OVERVIEW

Technology and System in Use

26) Which types of voting system technology are used?

a) Direct recording equipment (DRE)

b) Precinct count optical scan equipment

c) Central count optical scan equipment

d) Lever machines

e) Electronic poll book

f) Ballot marking devices (EMB, V)

27) Are these technologies used throughout the country? If no, please attach maps indicating where different technologies are used. (EMB, V)

28) What version or versions of all hardware and software (vendor and model number) are deployed in the voting system technologies, including but not limited to any version of:

a) Smart card devices

b) Firmware used in touch screens

c) Vote-counting server

d) Other (please describe) (V, EMB)

29) Please include a diagram, detailed descriptions, and, where possible, photographs of the election office components, how they are connected to one another, and their respective roles in the election process. (EMB, V)

30) Please include detailed descriptions of the devices used in the polling place (for example, DREs, supervisor's cards, voter's cards, memory cards, etc.) including physical descriptions, photos (if possible), diagrams, and descriptions of how they work and when and how they interact with one another. (EMB, V)

31) Are there any documents available to the public containing information on the version numbers, makes, models, and functional status of these technologies? If so, please attach any relevant reports. (EMB, CS)

32) Does the technology produce a voter-verified paper trail (VVPT) or have a paper ballot? If yes, please describe how the VVPT works, including whether or not the voter is able to verify that the paper ballot matched his/her choice before the vote is cast.

a) What happens to the paper trail during and after voting? Please describe.

b) If the machine produces a VVPT, is the voter able to verify that the paper ballot matched his/her choice before the vote is cast?

c) What happens to the paper trail during and after voting?

d) Do rules and regulations ensure that the VVPT does not undermine the secrecy of the ballot and that voters are not able to remove evidence of how they have voted from the polling station? (EMB, V)

33) Is this the first time these technologies have been used? If no, how long have e-voting systems been used? In which previous elections were they used?

a) If e-voting systems have been recently introduced, why were they introduced?

b) Who made the decision to introduce e-voting systems? The state or a vendor? (EMB, CS)

PUBLIC AWARENESS AND ACCESSIBILITY OF ELECTRONIC VOTING SYSTEMS

Public Confidence in the Technology

34) Are civil society organizations reporting on issues related to electronic voting? If so, please attach any pertinent documentation. (CS, I)

35) Is the media reporting on issues related to electronic voting? If so, please provide a sample of relevant pieces. (I, CS)

36) Have any opinion polls been conducted related to the use of electronic election technology? If so, what are their results? (CS, I, EMB)

37) Are there public information drives about the use of electronic voting? If so, how widespread are these drives? (CS, PP, EMB)

38) In your opinion, does there appear to be a sense of concern among the general public about the transparency of electronic voting systems, and if so, has the state responded to these concerns at all? Please explain. (I, CS)

39) Have voters, political party agents, domestic observers, and/or others received training on the electronic system in use? (PP, EMB, CS)

40) Are simulations of the opening, voting, closing, and counting procedures provided and open to the public? If so, please provide further information about location, timing, and attendance of the simulations. (EMB, CS)

41) To what degree were political parties consulted during the technology procurement process? (PP, EMB)

42) Are there any political parties or individual candidates who are campaigning on issues related to the use of electronic voting? Please provide further details. (PP, I)

Accessibility

43) Do voters in the following circumstances use electronic voting technologies to cast their ballots?

    a) Confined to a hospital

    b) Confined to their home

    c) In prison

    d) Unable to get to a polling place

    e) Outside their electoral district on election day (please circle all that apply) (EMB)

44) If voters in the circumstances described in question 41 use electronic voting technologies to cast their ballots, does this equipment undergo the same testing as the equipment deployed to polling places? (EMB, V)

45) Are provisions made to ensure that polling places are generally accessible? (EMB)

46) Are provisions made for voters who are disabled or illiterate? (EMB, CS)

47) If the machines produce a voter-verified paper trail, does the paper ballot appear in such a format that it is clear to illiterate or disabled voters that their vote has been correctly cast? (EMB, V)

48) Are ballots available in minority languages? (EMB)

Administration of electronic voting

Institutional Organizations

49) Please provide an overview of the institutions responsible for the administration of the electronic voting systems, including the vendor, any certification and/or testing bodies, organizations responsible for maintenance or election official training, etc. (EMB, V)

50) Do these organizations provide checks and balances on one another? If so, please explain how they do so. (EMB, V)

51) What is the role of the election management body in the administration of electronic voting? (EMB)

Technology Vendors and Procurement of Equipment

52) Who designed and developed the electronic voting system? (V, EMB)

53) What were some of the factors taken into consideration when choosing and designing this technology? (EMB, V)

54) Is this technology leased or purchased? Who owns the equipment? (EMB, V)

55) Who owns the source code for the technology? (EMB, V)

56) At what level of government (local, district, national) was the procurement process of this technology initiated and conducted? Please

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describe the bidding and tendering process for e-voting technology. Is it transparent and competitive? (Please describe and attach any supporting documentation.) (EMB, V)

57) What vendor/s provide which components of the electronic voting systems? Please describe. (V, EMB)

58) Have the vendors described in question 55 made contributions to political parties or campaigns? If so, please describe and attach any relevant documentation. (PP, V, CS)

59) Are any of the following services included in the contract with the vendor? If so, please explain in greater detail.
   a) Timely supply of equipment
   b) Pre- and postelection testing
   c) Regular physical maintenance
   d) Regular software upgrades
   e) Replacement of equipment in case of failure
   f) Ballot design
   g) Ballot printing
   h) Warranties
   i) Other (please describe) (EMB, V)

60) Please describe the plans in place for troubleshooting during each element of the process? (V, EMB)

61) What, if any, penalty or reimbursement provisions are triggered by technical problems with the technology? (V, EMB)

SECURITY MEASURES AND CONTINGENCY PLANNING

Security and Integrity of the System

62) Please provide a detailed description of the technologies in place to ensure the physical security of the electronic voting system (for example, tamper-evident seals) before, during, and after election day, including who is allowed physical access to the equipment, what measures are taken to prevent physical tampering with the election equipment, whether or not physical access is documented, and who maintains those records. (EMB, V)

63) Are vendors permitted access to the voting systems after they have been delivered? If so, for what purposes and when are they permitted access? Is this access controlled and documented? (EMB, V)

64) Are records kept of all upgrades and repairs that are made to voting equipment? (V, EMB)

65) Who is responsible for transporting the machines from their storage location to testing centers and polling places? Please provide relevant documentation, including the chain of custody during transportation. (V, EMB)

66) When will transportation of the equipment from central storage to the polling places take place? (V, EMB)

67) Who pays for the transportation of the equipment? (EMB, V)

68) Where and how are machines to be stored in the period immediately around election day? (V, EMB)

69) Are any components of the system stored in escrow? (For example, in Georgia, USA, the source code is stored in escrow by a university.) Are there written procedures and requirements regarding the storage of voting system software stored in escrow? If so, please provide further details on these requirements and who has access to the software. (EMB, V)

70) Is there a cutoff date after which no further changes or updates may be made to the voting system? What is that date? (EMB, V)

71) Is any equipment used for any purpose other than election administration (e.g. a personal computer)? If so, please provide further details of the

other uses of the equipment, including the purpose, who has physical access, other software that is required for this secondary use, etc. (V, EMB)

72) What is the method of transmission of information between the components of the system? Please describe. (V, EMB)

73) If possible, please provide a detailed description and diagram of all of the data paths in and out of the components of the system. (V)

74) How is access to the data ports secured? (V)

75) How are transmissions secured from alteration and interference? Please provide a detailed description. (V)

Software

76) Is any of the voting system software open source software? If yes, please include information on location and availability. (V, EMB)

77) Who is responsible for inspecting the software used in this electronic system? (V, EMB)

78) Who has access to the software used in this electronic system? (V, EMB)

79) Under what conditions does the official software inspection take place? Please provide a detailed description of the software inspection process, including the length of time allotted for the inspection and the means of inspection. (EMB, V)

80) Does the software inspection (either by an independent body or the official organization responsible) include checking the source code against the executable code? (EMB, V)

81) Who is responsible for creating the executable code from the source code, and is this process (above) subject to independent verification? (EMB, V)

82) Under what conditions are independent software inspections (including representatives of political parties and civil society) conducted? Please provide a detailed description of the inspection process, including the length of time allotted for the inspection and the tools that inspectors are allowed to use. (EMB, CS, PP)

Central Tabulating Computer

83) Are there procedures in place that encourage independent verification of the transmission of data (such as printing of polling place election results prior to transmission to the central tabulating computer, which can then be compared to the final or interim results)? (EMB, V, CS)

84) Who has physical access to the central tabulating computer, and what measures are taken to prevent physical tampering with election equipment? (EMB)

85) Are vendors permitted access to the central tabulating computer? If so, for what purposes and when are they permitted access? Is this access controlled and documented? (EMB, V)

86) Is physical access documented, and if so, who maintains these records? (EMB)

87) Are records maintained of all upgrades and repairs made to the central tabulating computer? (EMB, V)

88) Is the central tabulating computer used for any purpose other than election administration? Is any extraneous software installed on the central tabulating computer? If so, please provide further details of the other uses of the equipment, including the purpose, who has physical access, other software that is required for this secondary use, etc. (EMB)

89) When is this computer networked to the other hardware in use? (EMB)

90) What contingency plans are in place in the event of failure of the central tabulating computer? Please describe. (EMB, V)

Contingency Planning

91) What contingency planning training is in place for polling officials? Please describe and attach any pertinent information. (EMB)

92) How do polling places and central offices communicate in case of emergencies, such as power outages, telecommunications failure, etc. (EMB)

93) What happens if a machine is found to have been tampered with? Please describe any contingency plans that may be in place for such an event. (EMB, V)

Certification and Pre-election Testing

Certification and Testing

94) What is the certification process? Please describe the process in detail, including the relationships between the different certification processes, and attach any relevant documentation. (EMB, V)

95) Does certification occur before or after the procurement process? (EMB)

96) What standards are applied to the certification of e-voting technologies? Please attach relevant documentation. (EMB)

97) Who is responsible for this certification? (EMB, V)

98) Who pays for the certification of the technology? (EMB, V)

99) Is the technology recertified after every upgrade and repair? (EMB, V)

100) What is the relationship between the certification body and the organization whose technology is being certified? (EMB, V, CS)

101) Is the certification process accessible to the public, political party agents, domestic observers, or international observers? (CS, PP, EMB)

102) In your opinion, after systematic review, what are the weaknesses of the certification standards? (I)

Acceptance Testing

103) Where and under what conditions are acceptance tests conducted? (V, EMB)

104) Please describe the acceptance testing process, including who is responsible for the testing, who designs the testing, how often/when does testing occur, and who pays for acceptance testing. (V, EMB)

105) Are the acceptance tests open to:
   a) The public?
   b) Political party agents?
   c) Domestic observers?
   d) International observers? (EMB, CS, PP)

Other Pre-election Testing

106) Does the state have recommended procedures for the testing and use of each type of election equipment? If so, please describe these procedures and attach any supporting documentation. (EMB, V)

107) What is the timetable for pre-election tests, and where are they conducted (in a central location, provincial locations, or elsewhere)? Please provide further details and any relevant documentation. (EMB, V)

108) How many machines are tested? Please provide details of the sampling method used to conduct the pre-election tests. (EMB, V)

109) Who designs and who conducts the pre-election tests? (EMB, V)

110) Are pre-election tests open to the general public, political party agents, domestic observers, or international observers? Please attach relevant documentation. (EMB, CS, PP)

111) Is equipment to be retested after every upgrade and repair? If not, why not? (EMB, V)

112) Please provide any relevant documentation outlining the regulations and procedures for pre-election testing. (EMB)

ELECTION DAY PROCEDURES

Voting Operations

113) Where will polling take place?
    a) Schools
    b) Religious buildings
    c) Public buildings
    d) Other (please provide details) (EMB)

114) When selecting polling locations, have election administrators taken into account the specific demands posed by the use of electronic voting, for example, the availability of electrical outlets? (EMB)

115) If applicable, how are write-in votes processed? Who is responsible for processing write-ins? (EMB)

116) Can a voter spoil their ballot? If so, how? Please describe how a vote can be spoiled and what happens to spoilt ballots. (EMB, V)

117) Can a voter cancel their vote prior to casting their ballot? If yes, what is the process of cancellation? (EMB, V)

Election Day Testing

118) What tests or audits, if any, are required on election day? Please describe in detail and attach any relevant documentation outlining regulations and procedures for election day auditing/testing. (EMB, V)

BALLOT COUNTING, TABULATION, AUDIT, AND RE-COUNT PROCEDURES

Ballot Counting

119) How and where are ballots (taking into account the different kinds of ballots that may be in use) counted at the end of the election? Please describe. (EMB)

120) Are paper ballots or VVPT counted at the end of election day? If so, is the tally compared to the electronic result tally produced by the voting machine? (EMB)

121) Are paper ballots or VVPT from all machines counted, or is this process conducted on a statistical sample? If so, what is the sampling method used? (EMB)

122) Are multiple ballot databases in use (e.g. separate ballot databases for absentee and in-person votes)? If so, how are they aggregated? (EMB, V)

123) Who is responsible for the aggregation of these databases? (EMB, V)

124) Are results printed and publicized prior to their transmission to the central tabulation system? (EMB)

Tabulation

125) What is the procedure for the transmission of results? (EMB, V)

126) Are there separate transmittal paths for unofficial and official results? (EMB)

Postelection Audits

127) What are the procedures for a postelection audit? (EMB, V)

128) If the audit is conducted on a sample of machines, how is that sample created (e.g. with dice, computer algorithms, etc.)? (EMB)

129) When does the postelection audit occur relative to the certification of results? (EMB)

130) Are the public, party agents and observers allowed to observe the postelection audit? (EMB, CS, PP)

131) Is the public notified of the time and place of the postelection audit, and if so, how? (EMB, I, CS)

Glossary of Terms

Acceptance Testing—A series of tests run on an operating system to test particular features of the system prior to launch of the product.

Audio Ballot Functionality—The working capacity of the audio verification component of automated election machine technology.

Ballot Database—The electronic database within a server that maintains records of all votes recorded.

Central Count Optical Scan (CCOS)—A voting system that tabulates ballot results from multiple precincts in one location and, depending on the technology, creates either/both a printed report or/and an electronic report.

Central Tabulating Computer—A single server that collects all precinct polling data and tabulates the results together at a national level.

Certification—Also known as product qualification, a process by which a certain product (in this case an electronic voting machine) is ascertained to have passed certain previously stipulated qualification requirements.

Certification Body—An independent and administrative authority that determines whether the voting equipment has met the set of preapproved standards through a process of certification.

Chain of Custody—Chronological documentation of the seizure, custody, and transfer of an item.

Cold Audit—An audit of electoral results completed sometime after election day, used as a way to verify that all technology was functioning correctly but generally not intending to impact the electoral results.

Direct Recording Equipment (DRE)—A voting machine system technology that records votes by means of a touch screen or keyboard-user interface.

Election Audit—A verification process, ideally through the keeping of a paper record of electronic voting data, used to authenticate results and verify the validity of the electoral contest.

Executable Code—As opposed to a file that only contains data, executable code contains instructions or commands for a computer processing unit or its software.

Firmware—The programmed instructions that compose the circuitry of an electronic device.

Functionality Test—A type of testing that determines whether or not the data entry interface correctly recognizes and records data entry inputs.

Hardware—The physical and tangible components of a computer system.

Hot Audit—An audit of electoral results conducted simultaneously with vote counting and tabulation, generally on election day.

Independent Log—Hard-copy record of votes, which can be used to substantiate and audit electronic results. See also voter-verified paper trail (VVPT).

Open Source Software—Software whose source code falls under a software license that allows it to be open to the public domain.

Optical Mark Reader (OMR)—A voting machine system technology that electronically records votes from a human-marked document.

Precinct Count Optical Scanner (PCOS)—A voting system that tabulates ballot results at the polling place. With the involvement of electronic technology, records may be stored electronically at each polling place and transmitted to a central location.

Smart Card—A small card with built-in circuitry that enables it to store and process data.

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Software—Digitally stored data, sometimes in the form of a computer program.

Source Code—The mechanism, normally a human-readable text file, through which programmers specify the actions to be taken by a particular program.

Stress Test—A type of testing that determines the stability of a system by testing it beyond normal operational capacity.

Testing—An investigative process that examines the integrity and quality of the software and hardware at issue.

Testing Body—Often associated directly with the software/hardware developer, oversees and conducts the testing of a particular technology.

Vendor—The provider of a good or service; in this case, the electronic voting machine.

Vote Counting Server—The component of the voting machine wherein voting data is stored and tabulated.

Voter Application—Document that determines voter's capability of participating in an electoral contest.

Voter-Verified Paper Trail (VVPT)—Also known as a voter-verified paper audit trail, a printed record of electronically tabulated votes intended to serve as independent verification of electronic voting data.

Write-in Vote—Space on a ballot for voters to write in a choice other than the pre-printed selection specified on the ballot.

Zero Tape—A printout produced by electronic voting machines prior to the commencement of voting that should indicate zero votes are stored in memory at that time.

The Carter Center at a Glance

Overview: The Carter Center was founded in 1982 by former U.S. President Jimmy Carter and his wife, Rosalynn, in partnership with Emory University, to advance peace and health worldwide. A nongovernmental organization, the Center has helped to improve life for people in more than 70 countries by resolving conflicts; advancing democracy, human rights, and economic opportunity; preventing diseases; improving mental health care; and teaching farmers to increase crop production.

Accomplishments: The Center has observed more than 80 elections in 30 countries; helped farmers double or triple grain production in 15 African countries; worked to prevent and resolve civil and international conflicts worldwide; intervened to prevent unnecessary diseases in Latin America and Africa; and strived to diminish the stigma against mental illnesses.

Budget: $90.5 million 2009–2010 operating budget.

Donations: The Center is a 501(c)(3) charitable organization, financed by private donations from individuals, foundations, corporations, and international development assistance agencies. Contributions by U.S. citizens and companies are tax-deductible as allowed by law.

Facilities: The nondenominational Cecil B. Day Chapel and other facilities are available for weddings, corporate retreats and meetings, and other special events. For information, (404) 420-5112.

Location: In a 35-acre park, about 1.5 miles east of downtown Atlanta. The Jimmy Carter Library and Museum, which adjoins the Center, is owned and operated by the National Archives and Records Administration and is open to the public. (404) 865-7101.

Staff: 160 employees, based primarily in Atlanta.

Martin Frank

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