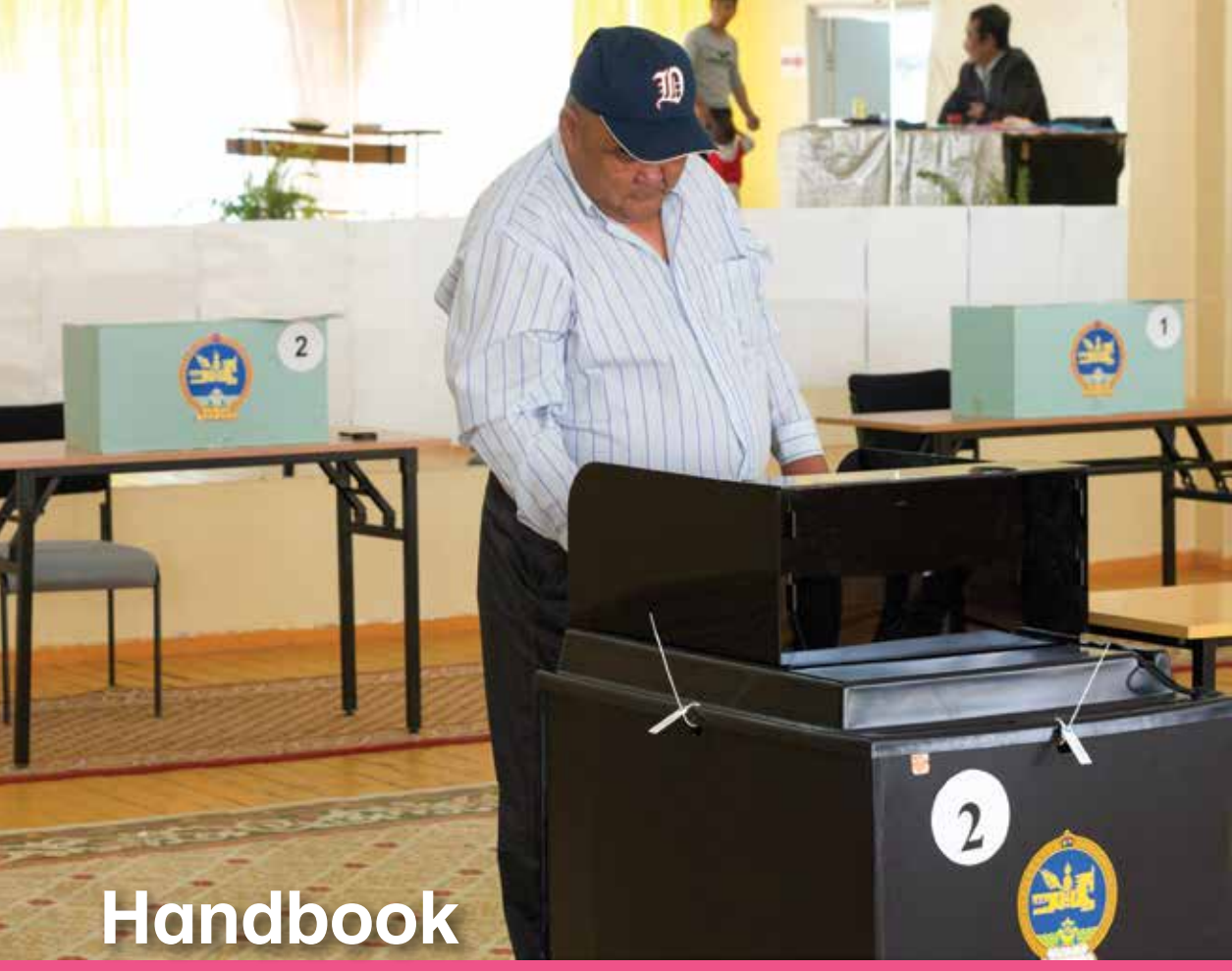

Handbook

For the Observation of New Voting Technologies

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ODIHR

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Cover photograph by Agnieszka Rembowska. *A voter casting his ballot into a ballot scanning machine, Erdenet city, 26 June 2013 presidential election in Mongolia.*

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Contents

Introduction

About the Handbook for the Observation of New Voting Technologies

The use of information and communication technologies (ICT) in elections has increased considerably in recent years. Today, almost all electoral processes make some use of new technologies (from voter registration to tabulation of results). New technologies have also been utilized in the voting and counting of votes in some countries, which has raised certain questions about the extent to which such applications are in line with Organization for Security and Co-operation in Europe (OSCE) commitments and other international good practices for democratic elections.

Several OSCE participating States have implemented or tested new voting technologies (NVT) during their elections. This has involved the use of electronic voting machines, ballot scanners, Internet voting or other electronic means. Some of these states continue to use NVT, while others have stopped using them and have returned to paper-based electoral methods. Given the considerable amount of discussion currently underway regarding potential advantages, as well as challenges, related to the use of NVT in elections, the OSCE Office for Democratic Institutions and Human Rights (ODIHR) has given increased attention to this issue in the context of its election observation mandate.

At the same time, the use of NVT poses certain challenges to election observation. NVT are often implemented in a manner that makes direct physical observation of some important procedures difficult. An additional complication is that NVT may not be widely understood by the typical observer. There is, therefore, scope for ODIHR's election observation methodology to take greater account of technological developments in the field of elections.

This handbook is designed to provide basic guidance to all ODIHR Election Observation Missions (EOMs) on how to observe the use of NVT in electoral processes.[1] It has been developed as part of ODIHR's continued effort to improve its methodology and to increase professionalism in the observation of certain, specialized aspects of

1 Throughout the text, unless otherwise noted, the term "EOM" also encompasses other types of ODIHR election mission formats, including Limited Election Observation Missions, Election Assessment Missions and Election Expert Teams.

elections. The handbook sets out practical guidelines for EOMs to integrate the observation of NVT in their work. This handbook complements and should, therefore, be read in conjunction with the ODIHR Election Observation Handbook (sixth edition) and other publications issued by ODIHR.[2]

Often, many of the issues related to NVT require specific, technical expertise and should be the primary responsibility of an NVT Analyst on an EOM. Nevertheless, NVT issues are also closely tied to the legal, political and administrative aspects of the election process. Reaching accurate conclusions, therefore, requires the awareness and input of all EOM members. Observing the use of NVT in an electoral process is thus the responsibility of the NVT Analyst, in close co-operation and collaboration with other members of the EOM, including the core team, long-term observers (LTOs) and short-term observers (STOs), if applicable.

How to Use this Handbook

This handbook has been designed as a working tool. It should assist all EOMs in identifying and assessing the various elements of NVT that may impact the conduct of democratic elections. The handbook has been structured to enable EOM members to quickly focus on the material most relevant to their specific responsibilities.

- The opening chapter provides a general overview and background of NVT, including an introduction to various forms of technologies commonly used in voting, counting and tabulation processes.
- The second chapter discusses the role of the election observation mission in observing NVT and the roles of the various mission analysts. It also describes important aspects, such as the scope of a Needs Assessment Mission in this field and the Code of Conduct.
- The third chapter examines the context in which NVT are used and identifies issues that need to be considered and analyzed by several EOM core team analysts in a collaborative effort. These include elements such as decision-making regarding the introduction of NVT, the legal framework, the impact that the implementation of NVT may have on the overall electoral system, and the public discussion around the use of NVT among political parties, civil society and in the media.
- The fourth chapter focuses on the role of the NVT Analyst during an EOM, as well as on the specific elements that should be observed, systematically analyzed and assessed.
- The fifth and sixth chapters identify those aspects of NVT that LTOs and STOs can meaningfully observe in order for the EOM to collect information regarding the implementation of NVT at regional and polling station levels.

2 Also see: <http://www.osce.org/odihr/elections/75352>. In 2008, ODIHR released a discussion paper on the topic of NVT (see <http://www.osce.org/odihr/elections/34725>). This handbook addresses the issues raised in the discussion paper and replaces it.

- The seventh chapter discusses EOM reporting and what elements missions should consider in making assessments, drawing conclusions and presenting recommendations with regard to NVT in elections.
- The final chapter presents ways in which ODIHR can assist participating States in following up on past recommendations with regard to NVT.
- The annexes provide a glossary of useful terminology, a master checklist and the ODIHR Observer Code of Conduct, as well as the texts of key OSCE commitments and references to international good practice, including selected court cases, relevant to the use of NVT in elections.

A number of checklists have been included throughout the text to assist observers at various levels to get a quick start in pursuing points of inquiry related to NVT. They also serve as a list of reminders of issues that each team member should consider during the course of the mission. Not every question will necessarily be relevant to every EOM given the diversity in NVT practices, as discussed in the following chapter.

Since each election is unique, not all issues explored in this handbook will be relevant to every election in which NVT are utilized. In some elections, NVT may be used extensively; in others, there may be only limited testing. By the same token, different EOMs will be able to place more or less emphasis on issues involving NVT depending on their size, length, and resources. Within resources and where relevant, however, EOMs should take account of NVT and include any issues in their reporting and recommendations, when appropriate.

OSCE/GORAN PETROV

Observers discussing internet voting processes and how they are monitored with officials in Norway, 2013.

1

Background to Observing New Voting Technologies

1.1 Overview

In this handbook "new voting technologies" (NVT) are defined as the use of information and communications technologies (ICT) applied to the casting and counting of votes. This understanding includes the use of electronic voting systems, ballot scanners and Internet voting. The term "electronic voting" is also used in this handbook; unless otherwise noted, this term should be considered synonymous with "new voting technologies".

The analysis of NVT sometimes requires a review of supporting technologies, like electronic election administration systems, and other new technologies that may be used in electoral processes, such as voter registration systems or (biometric) voter identification; analysis of these, however, is not covered in this handbook.

1.2 Advantages and Challenges of NVT

The rationales that OSCE participating States have given for introducing NVT in their electoral processes vary. Among the advantages cited are that NVT have the potential to increase voter turnout, make it easier to involve citizens living abroad, lower election administration costs, facilitate the conduct of simultaneous elections, reduce human error (including invalid ballots), improve the accuracy of counting, and increase the speed of tabulation and publication of results. NVT may also have the potential to increase access for voters with disabilities and voters who speak minority languages.

At the same time, NVT also present certain potential challenges. One challenge is the need to preserve the secrecy of the vote, while at the same time ensuring the integrity of the results. It has thus far proven difficult for electronic voting processes – especially Internet voting – to respect both of these fundamental democratic principles simultaneously. Another challenge is that NVT introduce additional complexities into the electoral process, such as the need to amend legislation; to plan how NVT will be acquired, tested, evaluated, certified and secured; and to provide voter education and training of election officials; as well as general concerns about the transparency of the process and access for observers. The use of NVT does not, therefore, necessarily build confidence; rather, it seems to require pre-existing confidence in the election administration for successful implementation. These challenges, if not fully addressed, may weaken public confidence in the election process.

1.3 Types of NVT

As with traditional paper voting, NVT can be used in controlled environments, such as in polling stations, or remotely in uncontrolled environments, such as voting from a home computer or a smartphone. While there are many types of devices available, NVT currently being used in the OSCE area can be divided into four main categories:

1. Ballot scanning technology uses a ballot paper that is either marked by a voter him or herself or with assistance of a ballot marking device in a polling station, which is then inserted into a scanning device and counted by electronically "reading" the voter's mark on the ballot. Such devices can be located in polling stations or counting centres, which are considered controlled environments.[3]

3 In some instances, ballot scanning technology is also used to count postal ballots that were marked at home and mailed to the authorities.

2. Direct recording electronic (DRE) voting systems record the voter's choice in the polling station, usually through touch-screen or push-button devices, and count the votes electronically. Similar to ballot scanners, DRE systems are also usually located in controlled environments.

3. Internet voting can allow voters to vote anywhere, in an uncontrolled environment. Votes are stored and aggregated electronically in a centralized location. The Internet is the primary voting channel currently in use in remote electronic voting systems.

4. Hybrid forms of NVT combine the controlled environment of the polling station with the centralized recording and counting of Internet voting. In these systems, voters must vote on a computer in a polling station and the votes are then transmitted electronically to a central server.

The following table gives an overview of voting technologies currently being used in the OSCE area according to the environment where the vote is cast and the medium used to cast the vote. It helps to better understand the properties of the available new (electronic) voting technologies and how they relate to traditional ones.

Medium	Use in an Controlled Environment	Use in an Uncontrolled Environment	Use in Mixed Environments
Voting with paper ballots	Voting with paper ballots in polling stations	Postal voting	Mobile ballot box voting
Voting with NVT	**Direct recording electronic (DRE) voting systems**	**Internet voting**	**Hybrid NVT**: DRE systems using Internet voting technology
Paper ballots and electronic counting	**Ballot scanner**		Centrally counted postal votes using **ballot scanners**

Table 1: Forms of Voting in the OSCE Area

An important consideration for any NVT is providing for the sum of the votes to be verifiable while preserving the secrecy of each individual voter's choice. The standard practice of conducting a random, manual recount can be an effective means of verification; however, a manual recount requires the use of paper in the system. This is only possible for NVT installed in controlled environments.

Ballot scanning technology offers the possibility of a manual recount. The ability of such devices to scan the voter's choice depends on the voter marking the ballot properly and is subject to the devices' margin of error and reliant on a legal definition of a valid ballot.

Some DRE systems include a paper record retained by the system that allows a voter to verify the paper record, ideally before the vote is actually cast. Such a paper record is called a "voter-verified, paper audit trail" (VVPAT). DRE systems with VVPAT offer the ability to manually recount. DRE technologies that retain a paper record that is not verified by the voter may also provide for a manual recount, but this recount will only tally what the system has recorded, which may not necessarily be the voters' intended choices.

Other DRE devices record votes only electronically and do not provide for a manual recount. These paperless systems rely on electronic memory to store the record of ballots cast on separate hardware, such as a hard disk or a memory card, and most keep a log of operations (an "audit log"). Inspection of this data may clarify matters if questions arise, but this requires the intervention of an expert and might not be successful if there are hardware failures.

Internet voting, by its nature, does not allow for a manual recount of votes. Internet voting systems, therefore, rely on computer security measures, certification and, ultimately, on a degree of trust in the system programmers and operators. Some Internet voting technologies also attempt to provide individual voters with the possibility to verify that their votes have been recorded as cast. Hybrid systems can have a manual recount facility if a VVPAT is included; otherwise, these systems rely on the same mechanisms as Internet voting systems for the purpose of ensuring the integrity of the results.

New electronic measures that use cryptography[4] are currently being tested, with the aim to provide similar end-to-end verifiability.[5] Such systems are designed to be used without a paper trail and are intended to be used mainly in uncontrolled environments, for example Internet voting. Some of these solutions, such as checking by mobile phone, would allow individuals to verify their vote through a separate electronic channel, although not universal verification. As is the case in all NVT systems, they should operate under an appropriate legal framework and within an appropriate organizational environment that provides for electronic voting integrity.

Finally, it is important to note that the current trend in the OSCE participating States that have introduced NVT has been to use electronic voting together with some form of paper trail.[6] In some cases, electronic voting is provided as an alternative voting channel available to all or to only some voters. In other cases, NVT are used exclusively in certain geographical areas, typically for citizen abroad, while paper ballots are used in others.

4 Cryptography is a technique to keep communication (data) secure from any third party.

5 End-to-end verifiability is a functionality of NVT systems that allows for the validation of results on a universal and/or individual basis. Systems with universal verifiability provide means for an independent third party to establish that the result of an election was reported honestly and without manipulation through either manual or mathematical checks. On an individual level, voters are provided with the opportunity to verify that their votes were cast as intended, stored as cast, and (ideally) counted as recorded.

6 Either by using VVPAT or ballot scanners.

1.4 OSCE Commitments and International Good Practice

NVT systems are intended to fulfil the same functions as paper-based or mechanical systems and must, therefore, meet the same standards that apply to these systems. The OSCE commitments define principles for democratic elections, regardless of the technology used. These principles were agreed by OSCE participating States in the 1990 Copenhagen Document, and in subsequent OSCE commitments.[7] In particular, the voting process requires the exercise of universal, direct, equal and secret suffrage through the casting, counting and tabulation of ballots in an honest, transparent and accountable manner.

To date, no specialized commitments with regard to NVT have been developed by the OSCE participating States. However, over the last decade there has been a concerted effort within the Council of Europe to develop standards for NVT.[8] In 2004, the Committee of Ministers of the Council of Europe issued its Recommendation on Legal, Operational and Technical Standards for Electronic Voting, which constitutes the only specialized international legal document in this regard.[9] This Recommendation followed a report by the Council of Europe's European Commission for Democracy through Law (Venice Commission) concerning the compatibility of remote and electronic voting with the requirements of Council of Europe documents.[10] More detailed documents regarding transparency and certification of electronic voting systems were adopted in 2011, supplementary to the 2004 Recommendation.[11] At the national level, several OSCE participating States have come up with initiatives to develop their own requirements.

Together with OSCE commitments for democratic elections, such standards constitute the basis for assessing NVT. In particular, the 2004 Council of Europe Recommendation recognizes the importance of ensuring that electronic voting processes are observable. The Council standards are often technical in nature, emphasizing some aspects of electronic voting that may exceed the scope of an election observation or assessment mission. They, nevertheless, offer some benchmarks for domestic authorities, observers and academics. EOM analysts, particularly the NVT Analyst, should be familiar with these documents.

7 For a full list see: *OSCE Human Dimension Commitments*, Volume 1, 3rd edition (Warsaw: Office for Democratic Institutions and Human Rights, 2011), Chapter 2.2 on Elections, <http://www.osce.org/odihr/76894>.

8 Forty-five of the 57 OSCE participating States are also members of the Council of Europe.

9 Council of Europe, Rec(2004)11 "Recommendation Rec(2004)11 of the Committee of Ministers to member states on legal, operational and technical standards for e-voting", Strasbourg, 30 September 2004, <https://wcd.coe.int/ViewDoc.jsp?id=778189>.

10 "Report on the Compatibility of Remote Voting and Electronic Voting with the Standards of the Council of Europe", European Commission for Democracy through Law (Venice Commission), 12-13 March 2004, <http://www.venice.coe.int/WebForms/documents/?pdf=CDL-AD%282004%29012-e>.

11 "Guidelines on Certification of E-voting Systems", Council of Europe, November 2011, <http://www.coe.int/t/dgap/democracy/activities/GGIS/E-voting/E-voting%202010/Biennial_Nov_meeting/Guidelines_certification_EN.pdf>; and "Guidelines on Transparency of E-enabled Elections", Council of Europe, November 2011, <http://www.coe.int/t/dgap/democracy/activities/GGIS/E-voting/E-voting%202010/Biennial_Nov_meeting/Guidelines_transparency_EN.pdf >.

1.5 Key Principles in Observing the Use of NVT in an Election Process

Any election process in the OSCE area, including those using NVT, should ensure full respect for all OSCE commitments. In particular, they can be summarized in the following seven key principles that apply when observing and assessing the use of NVT. It is worthwhile to examine these principles and their implications for NVT in more detail.

1.5.1 Secrecy of the Vote

Paragraph 7.4 of the 1990 OSCE Copenhagen Document requires participating States to "ensure that votes are cast by secret ballot or by equivalent free voting procedure". This requirement is at the heart of a democratic election process, and any voting and counting process that does not meet this commitment cannot be considered democratic.

Secrecy of the vote means that it should not be possible to associate a vote with a specific voter. This secrecy permits the voter to exercise her or his choice freely, without the potential for coercion, intimidation or vote-buying. NVT systems must be consistent with this requirement. Voters must not be able to prove to anyone how they voted, and the system itself must not allow identification of a voter with her or his vote. When NVT systems provide voters with receipts or codes in order to verify whether the vote was recorded as cast, supplementary measures should be implemented in order to safeguard secrecy in accordance with OSCE commitments. Likewise, a system that retains an electronic log that could be used to associate a voter with her or his choice would also fail to provide for the secrecy of the vote.

1.5.2 Integrity of Results

The integrity of the results – the honest counting of votes and reporting of results as required by paragraph 7.4 of the 1990 OSCE Copenhagen Document – implies a chain of actions. All votes must be cast in the ballot box as the voters marked them, all votes must be counted as cast and no votes should be illegally added to or subtracted from the results. There must be no possibility for undetected fraud or error to alter the results. In a paper ballot process, the integrity of this chain can be ensured through observation of each step of the process and verified, if necessary, through the possibility of a manual recount.

Similar to secrecy of the vote, NVT systems must provide a guarantee of the integrity of results in order to comply with OSCE commitments on counting and reporting results. There must be the possibility for meaningful verification of ballots cast electronically, such as that provided by a manual recount or end-to-end verifiability. NVT that rely solely on public trust in the honesty of election officials, vendors, programmers or technicians do not provide an effective means of verifying electoral integrity. The verification mechanism must also fully guarantee the integrity of the results without compromising the secrecy of the vote.

In all cases, verification should be able to be performed by a body independent from that conducting the election and – in conjunction with verifying individual votes – should be able to be performed for the entire number of votes counted. Systems that allow individual voters to verify that their own votes have been recorded correctly are not necessarily effective in guaranteeing the integrity of the overall results, unless verification can also be performed on a broader basis.

1.5.3 Equality of the Vote

Paragraph 7.3 of the Copenhagen Document says that participating States will provide "equal suffrage to adult citizens". While this requirement has broader ramifications, one of the aspects of the principle of equality is that no voter will be able to cast more votes than another, nor will citizens be prevented from participating in voting. This means that NVT systems must prevent any person from casting more votes than is established by law and must prevent any votes from being subtracted from the system. Some Internet voting systems allow voters to cast their vote more than once, with the condition that only the last cast vote counts. This helps to reduce the risk of voter coercion and vote buying. Consequently, it must be possible to verify that no violations of the principle of equality have taken place. At the same time, the principle of equality means that voting should be accessible to all voters, especially for voters living within the country. The use of technology in the voting process that discriminates against certain groups of voters or discourages them from participating would not be in accordance with OSCE commitments. NVT systems often also support voters in making their intended vote, e.g. by helping to avoid unintentional over- or under-votes.[12] NVT systems should determine whether an invalid vote is cast intentionally or unintentionally. While intentional casting of invalid ballots should be possible, NVT systems should advise voters how to avoid casting an invalid vote if they do not intend to. If NVT systems are used together with traditional, paper-based voting channels, then all means of voting should be equivalent and voters choosing either should receive equal treatment. Otherwise, the equality of the vote could be endangered.

1.5.4 Universality of the Vote

Universal suffrage is enshrined in paragraph 7.3 of the Copenhagen Document. This commitment means that all eligible adult citizens must have the opportunity to participate in an election and effective means for their participation should be provided. If NVT are used in polling stations, they should not be the exclusive method of voting, as less computer-literate voters may have problems operating NVT systems. In such cases, citizens should be provided with the option to use paper ballots if they wish. Internet voting has the potential to provide easier access and more options for participation in elections, especially for voters with barriers to accessing polling stations, including those living outside their home country or voters with disabilities. As with all forms of remote voting, including postal voting, this comes with a greater risk of voter coercion or vote buying.

12 For more on over- and under-voting please see section 4.4 on Usability and Ballot Design.

1.5.5 Transparency

Transparency is a cornerstone of the OSCE election-related commitments, as it is necessary to verify that elections take place in accordance with the law and with democratic principles. Election observation is a key aspect of transparency, recognized by paragraph 8 of the Copenhagen Document. Political parties, candidates and observers should have the opportunity to observe the work of election authorities at all levels, and especially the voting, counting and tabulation processes.

Such observation must be meaningful.[13] The possibility of meaningful observation is particularly important when significant changes, such as NVT, are introduced into the election process. In the case of electronic voting and counting technologies, the mere observation of voters and officials operating machines is not likely to be meaningful. Observers need to have additional access in order to be confident that the election is in full accordance with the law and with democratic principles. Observers should not interfere in the process; however, they should have full access to documentation about the system, including certification and testing reports. Observers should not be obliged to sign non-disclosure agreements in order to have access to documentation or be able to observe processes, as this would jeopardize the ability of the EOM to report on its findings. Legislation and practice that do not allow for sufficient access by observers cannot be assessed as fully meeting OSCE commitments.

Transparency also includes the obligation that all election stakeholders, including voters, should be provided sufficient means to learn in detail how NVT systems function.

1.5.6 Accountability

The 2003 Maastricht Ministerial Council Decision No. 5/03 underlined the importance of the accountability of those involved in an election process to the electorate.[14] For NVT, this includes election officials, vendors, certification bodies and others involved in procurement, management and utilization. Election officials should be responsible for the overall conduct of elections, including the oversight of NVT. If NVT involve technology supplied by private vendors, the roles and responsibilities of these vendors must be clearly defined. Similarly, certification agencies and other bodies must be held strictly accountable in order to ensure that they fulfill their respective responsibilities.

Accountability also means that detailed minutes should be kept that describe the ways election administrations or other eligible personnel interact with the system, when this is done and who actually performs the work. The procedures described in these

13 For example, in paper ballot systems counting cannot be considered transparent if observers are present during the counting but are kept at such a distance that they cannot see the content of ballots and cannot verify that votes are being counted honestly.

14 OSCE Ministerial Council, Decision No. 5/03, "Elections", Maastricht, 2 December 2003, <http://www.osce.org/mc/40533>.

minutes should ideally be certified by an independent auditor or by means of separation of duty.[15]

1.5.7 Public Confidence

Public confidence is an important element of a democratic election process and has been affirmed in OSCE documents, including the 2003 Maastricht Ministerial Council Decision No. 5/03. Public confidence is always taken into consideration in ODIHR's election observation activities. Public confidence is based, in part, on the extent to which political authorities, election officials and courts respect and uphold the principles identified above. Public confidence in elections may be damaged by perceptions that elections are mismanaged or may not fully reflect the will of the people.

Public confidence is a helpful building block for the use of NVT. Where a significant level of distrust or dissatisfaction with the election administration exists, the introduction of NVT may be problematic and may further diminish public confidence in elections. An incremental approach to introduction, together with thorough testing, verifiability and full transparency, can help develop public confidence in NVT.

15 Separation of duty means that at least two people are required to operate on a system at the same time, thereby providing checks and balances of each other's conduct in an effort to curtail malfeasance.

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Election officials demonstrating new voting technology to voters in Kazakhstan, 2004.

2

The Role of EOM Analysts in Observing NVT

When a country uses technology to automate the voting and counting of votes, this may affect different aspects of the electoral process and cannot be considered in isolation. Therefore, analysis of NVT needs to be an integral part of an EOM's work and its observation should be mainstreamed throughout each EOM.

Like other elements of an EOM, NVT observation is intended to analyze information obtained, to assess the extent to which laws and practices meet OSCE commitments, other international good practice and national legislation, and to then make constructive recommendations for the participating State to consider following up upon.

2.1 Role of the NAM

For the implementation of NVT, complex and time-intensive preparations are needed that present challenges not only to national stakeholders, but also to EOMs. Many of the preparations for the use of NVT take place before the arrival of a normal full-scale EOM, which usually occurs six to eight weeks before election day. This gives Needs Assessment Missions (NAM), which are sent to OSCE participating States whenever elections are called to assess the need for ODIHR election-related activities, an important role when NVT are used. The NAM should inquire about the plans for NVT-related events to help assess whether key events will take place before or after the deployment of the EOM core team. Such key events could include the production of voter credentials,[16] public tests of the NVT equipment, the key signing events[17] ensuring the integrity of the election, or the data destruction of essential NVT equipment.[18] Based on such information, the NAM may recommend that the experts deploy ahead or after core team deployment dates. Teams of experts may be composed of two or more analysts, such as NVT Analysts, sometimes together with election, legal or political analysts in order to follow these key events.

2.2 Specific Tasks for an EOM

In order to effectively analyze the use of NVT in an election with respect to the above-mentioned seven principles, each EOM will need to collect and assess certain information about the technologies in use, including:

- the type of NVT being used;
- the stated reasons for using NVT and the perceived advantages over traditional voting and counting processes;
- the process for choosing, procuring and implementing the NVT system;
- whether the decision to introduce NVT was widely agreed upon by political parties, voters and other election stakeholders or, conversely, was controversial;
- the legal regulations in place regarding the use of NVT, including observer access, as well as any ongoing discussions regarding the introduction or provisions for their use;
- which documentation is publicly available about the NVT and which documentation is only available to a restricted audience;

16 Voter credentials can be voter identity cards; unique, one-time passwords; smart cards; or other means to unequivocally identify the user as an eligible voter.

17 A key signing event is a meeting (mainly in Internet voting) in which essential members of the election management body create a secret electronic "key", which is used to protect the integrity of the electronic voting. This key often is divided into several parts, stored on separate smart cards, which are then kept by individual members of the election management body until after the closing of the election. Then these members reconvene to put their parts of the key together, open the electronic ballot box and start the decryption of the electronic votes, similar to the closing and counting process for paper ballots.

18 Data destruction is a method to make data unusable, once they are no longer needed, in a way that cannot be recovered. This can be done in various ways, most commonly through magnetic, physical or thermal destruction of the storage medium.

- the usability[19] of the NVT system; and
- the training and voter education efforts for the use of an NVT system.

EOMs with an NVT Analyst will be able to obtain and analyze information in greater depth, considering issues such as the conduct of feasibility studies ahead of decision-making, selection and procurement of the system, certification and testing, usability, security of software and hardware, data protection, transparency, management of the system by election administrators, accountability of vendors and election officials, verification of the results and audits.[20] However, other EOM analysts will play an important role, especially in situations where an NVT Analyst is not present for the entire duration of the mission.

Regardless of the technology used, a crucial task for the EOM is to understand whether the NVT ensure the principles as outlined above, including the secrecy of the vote and the guarantee that the results fully reflect voters' choices, or whether there are gaps that could compromise their fulfillment.

Beyond assessing the technology, an EOM should also acquire other types of information about NVT use, based on meetings with state officials, candidates, political party representatives, civil society organizations, vendors, media representatives, judges, academics and specialists in the field, and others. Information, conclusions and recommendations resulting from the observation should be included in the EOM's reporting. The following sections of this handbook provide more detail on all of these aspects of observing and assessing the use of NVT in elections.

2.3 Role of Different EOM Analysts

Where relevant and possible, an NVT Analyst will be recruited for an EOM. The NVT Analyst should be able to brief mission members and to provide additional guidance on circumstances that may warrant special attention. All EOM members should be aware of how NVT issues relate to their specific areas of concern and work together to analyze the context in which the use of NVT take place.

The roles of different EOM analysts that are likely to process NVT-related information in the framework of a mission are described in the following paragraphs.

2.3.1 NVT Analyst

The NVT Analyst plays the lead role in observing and providing an assessment of the use of NVT in an election and the implications this has on the overall process. The main task for this person is to get an understanding of how the NVT are supposed to function and how they function in practice, and to systematically analyze them according to the seven principles mentioned above. This includes the process by which voting

19 "Usability" is defined as an analysis of the ease of use and learnability of a technology.

20 An audit is an evaluation of a system as to whether or not it fulfils pre-defined criteria. The result of such an evaluation can be an audit report or a certificate.

is conducted, how votes are counted and how votes or voting results are transmitted for tabulation at the central level. In some cases, it may also include the electronic identification of voters. It is also necessary to know what hardware and software is used at each stage of the process. This position, therefore, requires broad information technology expertise, computer security experience with election systems and a policy background with regards to NVT in order to properly analyze all aspects of NVT, as well as advanced reporting skills. In cases where the needs of an EOM require specialized knowledge in technical or policy aspects of NVT, the EOM may hire more than one NVT analyst in order to cover all aspects.

The NVT Analyst should be prepared to brief the other members of the EOM core team and any long-term and short-term observers on the system, and to identify critical issues for observation. In addition, the Analyst will work closely with the members of the core team listed below, in order to provide an analysis of the context in which the NVT use takes place, as well as provide input to the drafting of observation forms.

2.3.2 Legal Analyst

The Legal Analyst is responsible for analyzing and assessing the constitutional and legal provisions related to the use of NVT. This should be an integral part of the more general assessment of the legal framework undertaken as part of every EOM. The methodology for undertaking an assessment of the electoral legal framework as a whole is outlined in the ODIHR "Guidelines for Reviewing a Legal Framework for Elections".[21]

The work of the Legal Analyst will touch on several issues reviewed in this handbook, since many of the practical implementation issues – for instance, certification, audits and transparency – must also be regulated by law. The Legal Analyst will, therefore, need to work closely with the NVT Analyst.

2.3.3 Election Analyst

The Election Analyst's primary responsibility is assessing the work of the election administration bodies. This includes the use of NVT in the election process. While the Election Analyst would not necessarily be expected to have technical expertise regarding NVT, this person must be aware of the specific issues involved and how these issues affect the overall conduct of elections.

21 "Guidelines for Reviewing a Legal Framework for Elections", OSCE Office for Democratic Institutions and Human Rights, January 2001, <http://www.osce.org/odihr/elections/13960>.

2.3.4 Political Analyst

The Political Analyst is the EOM's primary point of contact with political parties and candidates, and also maintains contact with domestic observers and civil society organizations. This analyst is, therefore, well-placed to gather information and analyze the attitudes of various political actors towards NVT and to assess their confidence in this technology.

2.3.5 Media Analyst

The Media Analyst conducts quantitative and qualitative media monitoring for the EOM and maintains regular contacts with broadcasters and print media. This analyst, particularly in smaller, Election Assessment Missions, is in the position to support the work of the NVT Analyst in observing the public attitude regarding the use of electronic voting in an election. In a situation where NVT are newly introduced to an electoral process, media monitoring can play an important role in assessing the value added of using NVT.

2.3.6 LTO Co-ordinator

The LTO Co-ordinator is the core team member who gathers and analyses regional information gathered by LTOs, including that related to the use of and attitudes towards NVT. The LTO Co-ordinator may task LTOs to follow specific aspects at the regional and local levels. This is especially helpful in countries where different types of NVT are used in different regions in the same election.

2.4 Code of Conduct for OSCE/ODIHR Election Observers

It is important to highlight that, in accordance with the ODIHR Observer Code of Conduct, all EOM members must avoid any interference in the election process. Particularly, this means that an EOM cannot certify that an NVT system is working properly, as this is the role of national authorities. Non-interference also means that observers must not offer advice or suggestions to election officials or candidates, and that they must not express any personal viewpoints on the NVT used in the election. Observers must never handle NVT devices or equipment in a way that could be misconstrued as tampering, nor should they conduct unauthorized tests, attempt to "hack" the system, or otherwise compromise the impartiality and unbiased approach of the EOM.[22] In addition, observers should be careful not to violate the secrecy of the vote when trying to obtain information about NVT.

22 "Hacking" is an activity intended to find out and make use of weaknesses in computer hardware, software or computer networks, which could allow unauthorized use of the system.

OSCE/DAVID BISMARK

Destroyed hard drives formerly containing encrypted votes in Estonia, 2011.

3

Analyzing the Context for New Voting Technologies: Observation by the EOM Core Team

3.1 Decision Making on Whether and How to Introduce NVT

Like any change to an election process, NVT are not introduced and used in a vacuum. The EOM should consider the background and the reasons leading to the implementation of electronic voting. In particular, the EOM should identify what challenges or problems the NVT are meant to address. In addition to noting the benefits of the NVT stated by interlocutors, the EOM should additionally inquire about other motivations for using new technologies.

The EOM should also consider the process for deciding to implement NVT. Significant changes to an election process can affect voter rights, incur substantial costs and can have far-reaching impact on public confidence in the process. Such changes are therefore normally made after careful study and broad public discussion, in addition to debates within national legislative bodies. The EOM should look at how public discussion was organized and to what extent this discussion allowed for the input of different views. It is important to note whether all political parties, civil society groups and relevant experts were consulted and to what degree their concerns, if any, were taken into consideration.

Another aspect of the decision to use NVT is the extent of agreement among political parties. Opposition to the use of NVT may be an indication of a lack of trust in the technology or in the capacity of the election officials to administer it. A decision taken over the objections of some parties or significant sectors of civil society could damage public confidence in the election process as a whole.

A further consideration for an EOM is the manner in which the NVT were put into practice. The decision to implement NVT can create challenges for meeting election deadlines. Often decisions to use NVT are made close to calling an election, providing little time for proper preparation of such a complex endeavor. The gradual introduction of NVT through a period of small, regionally limited pilot projects that include testing and gradually extend NVT use over several elections can serve to identify and correct problems and may help build public confidence in the technology.

Such a gradual introduction may be done, for example, through trials in non-binding elections, in a few municipalities during local elections or for a limited number of polling stations in national elections. The usage of NVT on a large scale in a single election cycle, on the other hand, exposes the election process to increased risks. The EOM should carefully examine the motives for any large-scale introduction and whether this is driven by concrete electoral needs, vendor interests or other considerations. Furthermore, decisions to use NVT should not be made immediately applicable to the next elections, in order to allow time for feasibility studies, procurement, planning, testing, evaluation, certification, voter education, public confidence building and implementation.

The familiarity of the general public with information technology and the ability to use it comfortably are important factors when introducing NVT, especially when no alternative paper ballots will be available. For example, if automated banking machines are not widely used, or are only available in urban areas, then touch-screen voting technology has the potential to confuse voters. Other indicators of public information technology literacy are the extent of computer ownership and Internet access. A lack of computer literacy could lead to a considerable number of voters requiring assistance, which could impinge upon the secrecy of their vote or on their ability to choose freely. Another risk is that technology could intimidate certain voters and cause them to abstain from voting.

The EOM should also consider the potential impact of the selected NVT on the electorate as a whole, as well as in regards to specific groups of voters. NVT can become obstacles for all voters in cases of technical problems and usability issues, when security or cost considerations are prioritized over usefulness, or simply when too many voters are assigned to each voting machine. In such cases, the voting process may be complicated, take longer or may result in long queues. Also, if voters believe that the system allows others to know how they voted, or if the system introduces additional complexities in the voting process, they may be less likely to exercise their right to vote as a result. Likewise, NVT offer the possibility to expand access for disabled voters or speakers of minority languages but, if not implemented carefully, the technology can be an obstacle to their participation.

After considering these issues, the EOM can make an overall assessment of the decision to use NVT. A determination can be made as to what extent the decision reflects real needs; whether it was based on thorough study and public discussion; whether it was the result of broad agreement or was strongly opposed by some sides; whether NVT are being introduced gradually or hastily; the extent to which voters feel comfortable using the technology; and the impact on voting rights. This assessment will be useful in evaluating the effect of the introduction of NVT on public confidence in the election process as a whole, an issue that the EOM should discuss with all interlocutors.

Possible questions:
➲ What were the reasons for introducing NVT? What were the problems or challenges the technology intends to address?
➲ Was the decision to introduce NVT taken after conducting a feasibility study? If so, what group or groups conducted studies? What issues were covered? Was a cost-benefit analysis made? Were reports made public?
➲ What was the extent of public discussion? Were civil society groups and academics able to contribute in a meaningful way? What are their positions regarding the introduction of NVT and to what degree have their concerns been taken into consideration?
➲ Was there broad agreement among political parties or was there substantial opposition? Do all sides feel that their concerns were adequately considered?
➲ Was NVT introduced in a gradual way, such as through pilot projects? If so, how many such projects have been conducted? Were they conducted in real and legally binding elections? Is information available as to how authentic and realistic the pilot projects or tests were? If NVT were introduced on a wide scale, what was the reason for doing so? To what extent were lessons drawn from the pilot integrated into successive uses of NVT in the country?
➲ To what extent are voters familiar with new information technologies in general, such as automated banking machines, computers and the Internet? Have studies been conducted on information technology literacy among the general public?

- How does the system affect the voting process for potentially vulnerable groups of voters? What are the views of elderly voters, women voters, national minority or disabled voters? Are they more or less likely to vote as a result of the introduction of NVT?
- To what extent is there public confidence in NVT? Do NVT command the same level of confidence as the system they are supplementing or replacing?
- What regulations are in place to ensure against possible conflicts of interests among vendors, certification agencies and election officials? Is there a code of ethics to prevent biased decision-making or the acceptance of anything of financial value between vendors and officials?

3.2 The Legal Context

This section focuses specifically on whether the legal framework fully ensures that the use of NVT complies with OSCE commitments and other international good practices for democratic elections, and whether the application of NVT is in line with these principles, as well as with national legislation.

A key task of the EOM is to understand how NVT are regulated for the election being observed. This requires careful examination of constitutional requirements, laws and regulations governing elections. It may also require review of other legislation, such as that relating to data protection. Previous court challenges to NVT and the resulting jurisprudence should also be considered.

Detailed regulation may be provided primarily in electoral laws regulating the election itself or, alternatively, the legal framework could establish only general rules, leaving the detail to binding regulations issued by the electoral authority. While the latter is advantageous in terms of flexibility, it can give too much scope for election procedures to be adapted to the needs of the technology, instead of the other way around, and to circumvent important safeguards if time becomes scarce due to delays in the implementation of the NVT system. There must also be no significant gaps in the legal framework; for instance, it should be clear what steps are taken if the NVT partially or completely fail in one or more polling stations.

A second key task is to examine whether the electoral legislation clearly defines at least the principles for secrecy, equality, universality, transparency, accountability and the integrity of the results. The equality and secrecy of the vote are included in the constitutions of many participating States. If special provisions are required to ensure that NVT systems guarantee these principles, these should ideally be set out in the electoral legislation. The EOM should, therefore, confirm that the legal framework requires equality and secrecy of the vote and assess whether the provisions related to NVT are consistent with these requirements, as well as whether it regulates the use of NVT in a similar way to paper-based voting. As such, the law should clearly delineate and regulate all stages of the use of NVT in the electoral process, including the distribution, set-up, starting, operating, stopping and closing of the system, as well as the storing,

counting and tabulation of the votes. As is the case in paper-based voting, the law needs to establish clear criteria to determine the validity of an electronic ballot, especially in cases of NVT system malfunction.

The electoral legislation should also address how the NVT system can ensure that votes are counted honestly. This means that, in the event of a legal challenge or an audit of the results, the NVT system should provide the possibility of meaningful verification of electronically cast ballots. As noted above, the possibility of a manual recount of paper records can provide a means of verification when systems are operated in controlled environments. For this to be meaningful, the law should require that the paper record be both verified by the voter and retained by the system (a VVPAT). The law should determine who may request a recount and under what circumstances.

Another important consideration is how the principle of accountability is established in the election legislation and regulations. If the NVT involve technology supplied by private vendors, legislation should regulate the vendors' responsibility in order to ensure that there are no grey areas in which vendors could usurp responsibilities vested in public authorities. Private contractors or vendors should not replace any relevant functions of the electoral administration, which should remain in full control of the electoral process. Similarly, certification agencies must be held strictly accountable in order to ensure that they fulfill their respective responsibilities.

The law should also determine the extent of access for observers, political parties and voters. The EOM should consider whether the law adequately and appropriately provides for observer access to the system in accordance with the principle of transparency. Access can be provided through the possibility to test NVT in an adversarial manner (in which specialists attempt to identify security weaknesses or other flaws in an unscripted manner), to review documentation such as feasibility studies, procurement material, manuals, evaluation and certification reports, source code[23] or electronic logs of the system.

In terms of security of the NVT, it is important to know whether and what kind of provisions are foreseen in the criminal code for attacks on IT systems, and whether special provisions exist for attacks on IT systems used for electoral purposes.

Special attention needs to be given by the EOM to the assessment of the legal framework for the consideration of complaints and appeals, as well as to observe the functioning of the complaints and appeals process in practice, including cases of legal challenges related to NVT issues. Such challenges may be related to the use of the system itself during the voting and counting process or they may be about other elements of the process, such as certification of the system or what happens if the NVT system fails to function. Although NVT allow for rapid reporting of results, this should not preclude the possibility to appeal decisions or to challenge results, and the deadlines established by law should appropriately reflect this right.

23 Source code is human-readable text written in a specific computer language that can be readily translated into a set of computer instructions, i.e., an executable program.

In the event of legal challenges to the results, there should be guidance as to what the legal basis is for conducting a recount, and what body has the authority to order a recount. A recount may be required if there is a complaint claiming evidence of an anomaly or failure that could have affected the results.

If a paper record is retained by the NVT, the legal provisions should require a random audit of electronic and paper results in at least a statistically relevant percentage of polling stations as a further means of verifying results. Such audits should be open to observers. System flaws, printer malfunctions or intentional malfeasance might result in situations where the electronic and paper records do not reconcile and correspond in the event of a manual recount or audit. In cases of discrepancies that do not seem to result from simple human error during the conduct of the manual recount, the law should clearly state how the discrepancy affects the results and whether any portion of the results must be invalidated. The legal framework regulating challenges of election results should address the issue of whether paper or electronic records prevail in the event of legal disputes.[24]

If the law provides for a means of verification of the integrity of the results other than through manual recounts or manual audits of results, the EOM must carefully assess whether the mechanism fully guarantees the integrity of the results without compromising the secrecy of the vote.

Finally, the EOM should consider data protection issues. Paragraph 24 of the 1991 OSCE Moscow Document recognizes the right to privacy. This is especially relevant in technological applications where a voter's identity may be recorded in some way, such as in an Internet voting process. The EOM should determine what data protection requirements exist and whether the NVT system complies with these requirements, including any special requirements that may exist for systems processing sensitive personal data, such as voters' political opinion. Furthermore, an EOM should try to assess whether the benefits of using NVT, especially when personal data is involved, are proportional to their added value to an electoral process. Data protection standards require that every voter is made aware of the existence of automated processing, the kind of data collected and the identity of the data collector; that the data is only processed in relation to the respective election and not used for any other purpose; and that it is not kept for a period longer than is necessary (i.e., it is destroyed after the end of the complaint and appeals process).

24 In general, preference should be given to the paper record. The main focus should lie in ensuring that both paper and electronic records come up with comparable results. If doubt persists, a repeat of the election could be considered.

Possible questions:

- How is the use of NVT defined and regulated by law? Are the laws and/or regulations regulating the election sufficiently detailed so as to provide clear guidance on all NVT issues?
- Has the use of NVT been previously challenged in court? If so, on what grounds and how were the cases resolved?
- Does the law fully provide for the equality and secrecy of the vote? Are legal provisions relating to NVT consistent with these principles? For example, does the law give the voter an opportunity to retain any document or data that could enable the voter to prove the content of the vote when coerced, or does the verification process associate voters with their votes?
- Does the legislation provide a means for full verification that the results represent the authentic choices of the voters?
- Does the legislation require that the NVT system retain a paper record of votes cast? If so, is it verified by the voter, i.e., a VVPAT?
- What are the provisions for auditing voter-verified paper records? Are these audits conducted automatically or on request? Does the law allow voter-verified paper records to be considered in conducting recounts? Which record, electronic or paper, is considered the legally binding ballot?
- Does the legislation adequately define the accountability of election administrators, regulatory bodies and vendors involved in the procurement, administration and oversight of NVT systems?
- To what extent does the law require that actions of the election administration regarding the electronic voting system be documented?
- Does the law establish what happens in the event that NVT fail to function properly?
- In what ways does the law provide for observer access to NVT? Are observers granted access to the documentation regarding NVT? Are there any restrictions? Are observers legally entitled to obtain the source code, as well as certification and auditing reports?
- Do the legal provisions for complaints and appeals allow for effective review of NVT-related complaints? Who is entitled to file a complaint regarding the use of NVT? What can be considered as evidence? Does the law provide for random manual recounts of votes? Under what circumstances?
- What are the legal requirements for data protection? Do the election procedures respect these requirements, especially in the processing of sensitive data?
- Does the legal framework provide enforceable sanctions for attacks on the NVT system?
- Does the legal framework provide adequate time-frames for key decisions related to NVT, including procurement and testing?

3.3 NVT and the Electoral System

The EOM should analyze a basic set of data on the extent to which NVT will be used in the election. If NVT are used in polling stations, it is important to know how many polling stations are equipped with NVT, where they are located, how many voters are affected and whether such voters represent a particular group (for example, a national minority or people with disabilities). It is also important to know whether voters in the selected areas will use NVT exclusively or, alternatively, whether they will also be able to use paper ballots. Similar information should be gathered if Internet or another remote electronic voting method is used.

Another initial task of the EOM is to consider the electoral system and its impact on the potential implementation of NVT. For parliamentary elections, a nationwide, proportional system with closed lists may require only one type of ballot, used by all voters. A preferential list system allows voters to choose one or more candidates within a list, or even across multiple lists. A constituency-based system, whether multi-mandate or single-mandate, will require different ballots for each constituency. Multiple elections conducted simultaneously, such as local and regional elections, will require multiple electronic ballots for each constituency. All these would impact the ease with which NVT could be implemented.

Regardless of the relative complexity of the system, it is important that every voter in a given constituency receives the correct ballot or ballots. This is analogous to elections conducted with paper ballots, with a key difference being that NVT must be programmed for each ballot type in advance of each election. The uploading of the ballot can be done by different technical means and can happen centrally or at a lower level. An important consideration is that uploading data entails certain computer security risks and should be done according to a pre-determined protocol available to observers.

In addition to system security, the type of ballot needed also has implications for ballot design. In contrast to paper ballots, which are not restricted by size, the size of computer screens limits the number of options that can be shown at one time.

Both topics are dealt with in greater detail in the following section.

Possible questions:
➲ What is the scope of NVT used in the election? If NVT are used in polling stations, what percentage of polling stations will use NVT and what percentage will use paper voting (or both)?
➲ Will voters in polling stations using NVT devices be able to vote by paper ballot, if they prefer this method?
➲ If Internet voting or other remote electronic voting technologies are in use, what percentage of voters will have access to this technology? Is such use limited to any geographic region or voter group (for example, a national minority or people with disabilities)?
➲ What are the implications of the electoral system in place for the NVT?

3.4 Political Parties, Civil Society and Media

The views of political parties regarding the introduction of NVT are an important indicator of public confidence. The EOM should ideally seek the views of all parties competing in the election, but where this is not possible due to a large number of parties, the EOM should especially discuss NVT issues with the parties represented in parliament or major parties in government and the opposition. The reasons for either support for or opposition to electronic voting will be important for understanding the overall context. Parties should also be asked what steps, if any, have been taken by the election administration or other authorities to address their concerns. The confidence of parties in the professional capacity and objectivity of election administration – which may be different from that related to NVT – should also be discussed.

Civil society groups are another source of information for EOMs. Domestic observer groups may be observing the use of NVT and may have public positions in this respect. In some countries, small groups of academics or computer experts may be active on this issue, and the EOM should seek their views. Where this is not the case, the EOM should attempt to speak to relevant information technology experts, as this will often be helpful in obtaining insights on the background for introducing the system, the vendors involved and public computer literacy.

The EOM should assess the extent to which political parties and civil society groups are observing the use of NVT. If they seem to be rather inactive, this may be a sign of overall trust, but it may also be due to restrictions on observing or to lack of expertise. The EOM should ask whether parties, domestic observers or others have requested access to any aspect of the process and, if so, what checks they were able to perform and what information they were unable to obtain, if any. The EOM should also find out whether such groups are able to obtain access to all the documentation requested, including system documentation, certification reports and source code.

It is also useful to monitor whether the use of NVT is a campaign issue, and to what extent there is public discussion on the topic. The EOM's media monitoring can generate statistical data on the coverage of the issue in various media and on the amount of voter education material in the media, including its diffusion by media.

Another relevant issue may be the extent of Internet access and use in the country. The extent to which the Internet is freely accessible is an important contextual issue. If political information is censored or certain websites are made inaccessible, this may impact the public perception of the use of computer technology in an election process.

Possible questions:

- What are the views of political parties regarding the introduction and use of NVT? Did any political parties oppose introduction? If so, do they still maintain that position? What are the reasons cited for any opposition? Is the use of NVT a campaign issue?
- To what extent are political parties and candidates familiar with NVT?
- What are the views of domestic observer organizations?
- Have political parties, candidates and domestic observer groups observed any aspect of NVT?
  - If not, why?
  - If so, what have they found?
  - Were there any aspects of the process or any documentation that they were unable to access?
- What are the views of information technology experts and academics?
- What is the extent of public discussion regarding NVT issues? To what extent is this discussion present in the media?

OSCE/ROBERT KRIMMER

An election official demonstrating ballot scanning technology in the Russian Federation, 2011.

4

Assessing New Voting Technologies: The Work of the NVT Analyst

The NVT Analyst has the primary role within an EOM in providing an assessment of the use of NVT in an election. In addition to collaborating with other members of the core team to assess the context, the analyst will pay detailed attention to a number of aspects of NVT requiring technical expertise in information technology and computer security.

4.1 Procurement and Acquisition of NVT

One issue for the NVT Analyst to consider is the way in which the technology was procured and acquired. Although an EOM does not determine whether the "best" system

was chosen, the process by which a particular system was chosen may provide important background information.

OSCE participating States have acquired their NVT systems in different ways. In some cases, authorities have developed the technology themselves, often in co-operation with a private or public company. In other cases, the authorities have purchased or leased existing systems from specialized private vendors. No matter the source, the background and experience of the vendor or developer should be considered. If the vendor has little experience with NVT or if previous experiences have demonstrated serious flaws with its technology or its application, then there may be cause for concern. Links between a vendor and any political party or public official, or other factors that may cast doubt on the perception of the vendor as a neutral supplier, may also be indicative of a flawed procurement process.

Another important factor to consider is the overall transparency of the selection process. The criteria used for selecting a particular type of system should be clearly established in advance of selection and made publicly available. This includes not only technical criteria but also purchasing and procurement criteria. The EOM should attempt to determine if there was an open, competitive bidding process based on pre-determined, publicly available criteria. If this is not the case, or if there are indications that the criteria were "tailored" to a particular vendor, the EOM should take this into account.

Possible questions:
➲ Who developed and produced the NVT?
➲ Who owns the NVT? How long is the contract between the election management body and the vendor? Does the contract contain security or maintenance fees or costs for data storage that result in high long-term costs? Who is responsible for handling incidents on election day, the election management body or the vendor?
➲ In addition to meeting technical and procurement requirements, did the selected vendor have prior experience with electronic systems used in elections? Was that prior experience evaluated as positive or negative?
➲ Does the vendor or developer have any links with particular political parties, candidates, political figures or public officials? If so, have interlocutors raised concerns about these links?
➲ When all stages and phases of the process are viewed as a whole, was the process transparent and subject to public scrutiny?
➲ Was the selection process open so that all vendors had the opportunity to participate or, does it appear that the process was "tailored" to a particular vendor?

4.2 Role of the Election Administration in the Use of NVT

Analysis of whether the election management body has full control over the implementation and management of the NVT system is an important consideration for the EOM. Given that NVT are interconnected with several aspects of the election process – including not only voting but also party and candidate registration, tabulation of results, voter registration and maintaining voter lists and information – the election administration should see NVT as an integral part of the election process, rather than as a feature to be delegated to technicians or other institutions.

The EOM should identify which election administration bodies are responsible for issuing NVT regulations, for programming and operating the system, and for providing oversight of electoral integrity.

In some election administration systems, all tasks may fall under a single hierarchical system with one primary authority, such as a central election commission. In others, these tasks may be divided in a decentralized way, with one body (for example, a government ministry) being responsible for issuing regulations, local authorities being responsible for deployment and operation of the system and a third body being responsible for ensuring that implementation of the NVT takes place in accordance with the law. While this structure may correspond to that used to conduct paper-based elections, there may be important differences that need to be acknowledged when NVT systems are used.

The EOM should also identify the structures, such as departments or units, within each election administration body that have primary responsibility for NVT issues and the scope of their responsibilities. It would be useful to determine whether these structures are dedicated solely to NVT or also deal with other issues, such as voter lists, production of voter education materials or IT management for the election administration body. If these are not dedicated structures, there is the potential for them to become overstretched by taking on the added NVT management role.

4.2.1 Voting Process Re-Structuring

Proper planning is a prerequisite for the successful conduct of an election, especially when using NVT. In addition to technical specifications for the technology itself, the election administration should consider a re-structuring of the voting process to explicitly take account of the use of NVT as an essential element, especially when they are being introduced for the first time. Changes may be required in the procedures for advance voting, printing voter material, setting up voting booths, identifying voters and in other elements. If the management of the voting process is not reviewed and redesigned, this may have unanticipated consequences for the electoral process. For example, insufficient numbers of NVT devices or voters taking more time than anticipated to vote using the devices may result in long waits. Consolidation of polling stations in order to accommodate limited numbers of electronic voting devices may generate problems with voter lists or in voter confusion regarding their polling locations.

4.2.2 Multiple Voting Channels: Integration of Electronic and Paper-Based Voting Processes

The complexity of the overall voting process may be increased when NVT are used in parallel with paper-voting systems, as is often the case. The procurement and distribution of electoral materials, management of voter lists, instructions for polling officials, training, voter education and tabulation of results will all be affected to some extent by the use of multiple methods of voting (or "channels").

The EOM will need to check that the availability of multiple channels does not disenfranchise voters, allow them to vote more than once or force them to use an electronic system against their will. This requires communication between channels. For instance, there must be a system in place to prevent a voter from casting ballots by both Internet and paper ballot. In systems in which voting by paper legally cancels and replaces a vote cast by Internet, the EOM should check that the cancelling of electronic votes or duplicate electronic votes is done properly and before votes are counted. This should be done in such a way that the content of the vote cannot be associated with the voter. If this mechanism is implemented on election day, this should be carefully assessed by observers.

For the tabulation and announcement of results in elections using multiple voting channels, the EOM must identify the method for transmitting the results in the paper-based system and in the NVT, and how the multiple sets of results will be aggregated. If the data from the NVT and the paper-based process are transmitted by different methods, then there will be a need to aggregate the data at some point.

To ensure the transparency of the tabulation of results, it is important that it is possible for political parties, candidates and observers to verify that polling station results have been tabulated correctly at higher levels of the election administration. This requires that the tabulation system provides clear, detailed information that is readily and publicly available. The complexity of having multiple systems or any resulting delays in reporting should not be used as excuses for not providing adequate information.

4.2.3 Oversight

After identifying the management structure for the use of NVT, the EOM should consider how management and oversight of the technology is done in practice. The roles and responsibilities of each level of the election administration should be clear for the respective election officials, and the EOM should verify that each level receives the necessary materials, instructions, training and financial resources in a timely manner. The EOM should also verify the extent to which in-house capacity to manage the NVT exists and/or that effective oversight mechanisms are in place to ensure that each election administration body is carrying out its responsibilities appropriately.

In addition, an assessment should be made of the degree to which election administration officials understand the technology in use and the potential risks. If officials believe that NVT issues are primarily technical in nature and should, therefore, be left to technical experts, they may be less prepared to provide proper oversight or to take corrective action if problems arise. The EOM should also attempt to identify any concerns that election officials have about the NVT or its management.

4.2.4 Risk Management

The election administration may plan for unexpected problems or even failure of the NVT system, due to either technological or human factors. The EOM should assess what contingency planning has been prepared by the election administration regarding possible system failures on election day. This includes ensuring that electronic data are preserved and recovered in the event of physical failure, such as loss of electricity; identifying who is responsible for fixing the problem and the maximum response time; providing a manual to assist polling staff in addressing problems; and providing voters the opportunity to cast their ballots even if the system cannot be returned to working order. The voting period in Internet voting may be stopped several days before election day in order to give voters the opportunity to vote on paper, should major problems be detected during that period.

4.2.5 Role of the Vendors

It is important that the EOM understands the relationships between the election administration and any vendors or other outside companies. While vendors often have a role to play in maintaining and updating NVT, due to their technical knowledge, election officials are responsible for the conduct of elections and should have full authority, oversight and accountability over technicians. Where there is a significant degree of reliance on vendors, even on a temporary basis or through intellectual property rights to implemented products and software, observers should inquire further to assess if this reliance has fundamentally altered the ability of the election administration to properly control implementation of voting processes. Any indication that vendors, rather than election officials, control the process is a cause for concern, as this can compromise the impartiality and independence of the election administration.

The EOM should look into whether essential parts of the electoral process are outsourced to vendors and suppliers and the vendors' liability and responsibility. The vendor should have a continuing responsibility to maintain and service the system. This includes addressing design errors, malfunctions or other problems with the NVT. It should be clear that the role of the vendors and suppliers is to support the conduct of genuine and democratic elections. They should not replace any relevant functions of the electoral administration, which should remain in full control of the electoral process.

4.2.6 Training of Polling Officials

As with paper-based election systems, training of election administration officials is critical for the use of NVT in a manner consistent with legal and democratic principles. Given the complexities and challenges of using NVT, extended training for polling officials is likely to be necessary. Commissioners must have a basic understanding of how the NVT work, in order to respond to minor and major technical problems, to explain the technology and answer questions about its use, to inform voters and, last but not least, to help build their confidence in the system.

The EOM should assess the overall effectiveness of training, to the extent possible. Training plans should reflect the timelines and budgets necessary for extended training, and the methodology should focus not only on legal requirements and procedures, but also on what to do in case of problems. The EOM should attempt to observe the training of polling officials and to review training materials. This may provide a better understanding of the electronic voting process and could be particularly valuable for the STO briefing. Observation of training sessions and review of training materials could also reveal shortcomings in training that might lead to potential election day problems about which observers should be aware.

4.2.7 Voter Education

Voters should generally be able to make their choices and cast ballots without assistance. Thus, voter education is critical for the implementation and use of NVT. The EOM should assess the extent to which information about the system has been made available to voters and the completeness of this information, particularly when a new system is being implemented or where significant modifications have been made to an existing system. In addition, such voter education should give a balanced overview of the benefits and challenges of voting by electronic means or, in cases when both voting channels are available, by paper means. Special attention should be given to whether the voter education material is also available in minority languages.

Detailed information on voting procedures should be made available before election day, in different forms of media. Such information should also be available at polling stations on election day (if relevant). In addition to being informed on how to use the NVT, voters should be informed about how the system works overall, how secrecy of the vote is ensured and how the results can be meaningfully verified. As voters themselves will often be the first to notice any problems with a given machine, voter education materials should include information on how to deal with potential problems (normally, the appropriate course of action is to inform a polling official).

Ideally, election day should not be the first occasion when a voter uses the electronic voting system. Apart from a gradual approach in introducing NVT, hands-on testing by the public prior to election day or mock elections can be an effective method of voter education.

Possible questions:

- What steps of the electoral process are supported through electronic means? Apart from new technologies used in the voting and counting process, what ICT systems are used to manage the election process? In what ways are the interfaces between these systems standardized and tested?
- If multiple voting channels are used, has the election administration taken into account the different requirements of these channels for distribution of materials, instructions for polling officials and electoral deadlines?
- How is the voter list managed? Are measures in place to prevent voters from voting more than once by using different voting channels?
- How will results from paper-ballots and electronic ballots be tabulated? Do political parties, candidates and observers have access to the results at each stage of the counting and tabulation process? Is the publication of results detailed and complete?
- Is the use of NVT proportional in regards to adding value to the overall electoral process? Was this elaborated in a feasibility study prior to decision-making?
- What measures are in place to ensure secrecy of the vote?
- How do NVT address the situation when a candidate is de-registered or pulls out of an election?
- In cases of Internet voting, how may out-of-country voters participate (including registration, receipt of voting credentials, etc.)?
- How is the management of NVT structured within the election administration? Are the roles and responsibilities clearly defined? Are there departments or units in the election administration dedicated to NVT? How does the management of NVT function in practice?
- What level of understanding do election officials have of NVT, both in practice and in general? To what degree are they involved in oversight of the use of NVT? Do they have any concerns about the use of NVT in the election?
- How thorough is the election administration's planning for the introduction and use of NVT? Have election officials received information, materials and financial resources sufficiently in advance to enable them to manage the system appropriately? Have contingency plans been made for potential breakdowns of the technology or for problems in the deployment and use of NVT?
- What is the extent of vendor (or other outside organizations') involvement in the management and operation of NVT? Does such involvement compromise the impartiality or independence of the election administration? What accountability provisions are in place for vendors?
- What legal or contractual provisions are in place regarding the maintenance and update of NVT? What is the contractual relation between the vendors and suppliers and the electoral administration?

- Is training effective in ensuring that election officials are able to manage polling procedures? Does training on the operation of NVT cover their interaction with other parts of the polling process?
- How are voters being educated on NVT? Do education materials go through each step of the voting process? Is hands-on testing available for the public? If so, how well did voters appear to understand the voting process? Were any problems observed?
- To what extent is voter education material presented in the media? Is it available from multiple sources and throughout the country?
- What is the level of computer and Internet literacy in the country?
- What is the level of Internet penetration in the country?

4.3 Security and Secrecy of the Vote and Integrity of the Results

Safeguarding the secrecy of the vote and ensuring the integrity of the results in a verifiable manner must be part of the fundamental design of the NVT system. These key principles can be adversely affected by technological or design flaws. The integrity of the process is violated when the system does not record the choice made by the voter properly or does not count it properly. For instance, this could occur if an incorrectly calibrated touch-screen device records a choice for candidate A when the voter has touched the button for candidate B, or if ballot scanning devices do not record voter choices correctly. Software bugs that cause errors in counting or tabulation of votes for any candidate would damage the integrity of the results.

However, even when the basic architecture of the system is appropriately designed to safeguard the secrecy and integrity of the results, NVT will still be subject to a number of potential security threats. These threats may be external to the system, such as hacking, or may come from within, such as manipulation by election officials, vendors or other technicians. While security threats also exist in traditional paper voting processes, a key difference is that attacks on NVT may require technological skills and significant resources not possessed by the typical voter to be detected or observed. The EOM should verify that the NVT and their management include robust security measures against potential threats and that the legal framework regulates measures to be taken against such attacks.

In the context of NVT, hacking is considered to be any illegitimate entry into the system made by anyone external to the management of the process. For direct recording electronic (DRE) voting and ballot scanning systems, safeguards must be in place to prevent physical tampering with devices. The EOM should check, for instance, that USB ports or other external connections are not easily accessible. Additionally, storage and transport of NVT devices should be done in a secure manner under defined protocols, and access to the devices should be observed when they are not in use, with appropriate records kept. Hacking can also take place if devices are connected to the Internet.

The EOM should check whether NVT devices have the capacity for remote access and, if so, what measures are in place to prevent illegitimate access.

For NVT that rely on the use of the Internet for the transmission of data, the physical protection and operation of the central information systems is especially important in order to avoid significant failures, such as the loss of even a small number of votes or a period of downtime. Ideally, this includes mirrored operation in two access-controlled data centres with physical separation from any other information system operated in the same location.

In addition to physical intrusion, external hacking is a particular threat. The EOM must verify how the system prevents or detects illegitimate access, and should assess the likely effectiveness of these measures. In Internet voting systems, the EOM must consider the way the system verifies the voter's identity and what potential threats that could create. In addition, the overall protection of the information systems from unauthorized external access, through the use of dedicated transmission lines, firewalls and overall security concepts, should be considered.

Manipulation of data by election officials, vendors or technicians is another potential threat created by NVT. The EOM should check what procedures are in place to limit the ability for any individual to compromise the system. For instance, there should be a division of duties within the election administration to minimize the opportunity for internal manipulation. Physical and electronic access to the NVT system should be strictly regulated by written procedures. Any such access should be observable and limited so that election officials or vendors have access only to components that come within the purview of their responsibilities. The EOM should also check whether sensitive system operations are performed by more than one person and whether a written record of all operations performed is maintained. Security procedures must be both effective and fully implemented; only measures that provide justified proof, such as tamper-proof security seals with unique numbering, secure time-stamping of documents and similar mechanisms to prove authenticity of procedures, constitute safeguards against malfeasance.

While such security measures are necessary, they may not be sufficient to guarantee electoral integrity or to maintain public confidence. Adequate verification measures, especially audits of voter-verified, paper records, are required to fully guarantee the integrity of the vote.

There are additional threats related to voting by Internet. Distributed denial-of-service (dDoS)[25] and similar attacks can potentially interrupt the work of the Internet voting server or make the system inaccessible to voters. Such attacks are detectable and could necessitate postponement of an election. EOMs should, therefore, check what security measures have been put in place to protect systems from such attacks.

25 A dDoS attack is an attack on a computer system or network in which a simple automated request is repeated at a very high frequency, with the aim of overloading the system's connection lines or computing capacities.

In Internet voting, voters themselves may also be targets of various computer threats. These could include malicious software, designed to change the voter's choice or identify the voter, inadvertently being installed on the voter's computer, or false web-sites designed to make a voter erroneously believe that she or he has cast a vote. While these threats are difficult to address due to the nature of remote voting, the EOM should, nevertheless, check what measures have been adopted to guard against them.

In addition, remote voting procedures – Internet, but also paper-based postal voting – allow voter intimidation, coercion and vote buying, as the voter cannot be protected to the same degrees by the election commission from such undue influence as within a polling station. The EOM should check if safeguards are in place that can potentially reduce the extent of such influence. With Internet voting, some systems provide for the possibility to re-cast a ballot more than once or to cancel the electronic vote with a paper vote prior to election day, including in a polling station.

Possible questions:

- Does the NVT system contain any design elements that could allow a voter to be identified with her or his vote, or that could permit a voter to be directly intimidated or influenced in her or his choice?
- What safeguards are in place to prevent hacking? If NVT are used in polling stations, are these transported and stored in a secure manner? Is there a protocol for handling the devices? Is there any documentation regarding who has had access to the devices since their last use? When were the last updates to software made and by whom?
- Do the devices have any readily accessible interfaces, such as USB ports? If so, how are these secured? What capacity do the devices have for receiving data from external sources? Can they be accessed by Internet, or wireless means? If so, what protection measures are in place to ensure data integrity?
- If the NVT rely on transmission of data by Internet, what measures are in place to prevent or detect external hacking to either retrieve or alter data?
- What measures are in place to prevent illegitimate internal manipulation of the system? Are these likely to be effective?
- For remote Internet voting systems, what measures are in place to identify, thwart and sanction dDoS or similar attacks? Have any measures been taken to address the security of external computers used by voters to cast their ballots? How are voters identified by the system? How does the system ensure that voters do not vote more than once?
- Are measures in place to provide voters with the ability to avoid undue influence, such as the ability to re-cast a ballot electronically or cancel an electronic vote by casting a paper vote? Are these measures effective?

4.4 Usability, Ballot Design, Voter Accessibility and Reliability

Elections should present voters with clear choices and should maximize the universality of suffrage while balancing this against essential safeguards to protect electoral integrity. The EOM should, therefore, carefully consider the extent to which NVT systems are understandable and usable for voters. The main aspects that should be assessed in this respect are the user-friendliness of the technology, ballot design, the ability of the NVT to accommodate all voters and the robustness of the system in terms of malfunction or voter error. In order to assess these aspects, the EOM should attend public and closed pre-election tests, analyze voter education material and conduct interviews with relevant stakeholders to gain an understanding of efforts taken in this regard.

4.4.1 Usability

NVT systems should be designed in such a way that they are easily understandable for voters and relatively simple to use. The usability of NVT will generally be correlated to the overall computer literacy within a country, the scope of voter education efforts and the opportunity for public testing of devices prior to elections. There are also a number of factors regarding NVT devices, themselves, that should be taken into consideration.

The physical design of the NVT should facilitate the voting process. They should not allow voters to switch off the device or to undertake any action that would prevent them from casting their ballots. The size of the screen, brightness and legibility of the display should all be considered. If touch screens are used, the ease with which selections can be made should also be considered, as well as any potential over-sensitivity of the system that could result in the recording of erroneous choices.

Just as important as physical design, the EOM should consider how voters interact with NVT systems. Voters should receive clear feedback and prompts while interacting with the technology. The voter should be made aware of when the electronic ballot is about to be cast and should then receive confirmation that the vote has, indeed, been cast and that the voting process is over. The EOM should check that the NVT clearly indicate what choice a voter has made before the ballot is cast and that it allows the voter to correct mistakes. If the recording or transmission of the vote takes time to complete, the NVT should inform the voter accordingly, so that she or he does not inadvertently terminate the process.

The EOM should check how NVT deal with unintentional under-votes – that is, when the voter does not make a choice in a particular race or makes fewer than the permitted number of choices. Ideally, the system will notify the voter of an under-vote and provide the opportunity to change her or his previous choice. It is possible that the voter may intentionally choose not to vote in a specific race. In some systems, the possibility of a "blank vote" is explicitly provided for; if not, the refusal to make a choice for a given race should not prevent the voter from completing the voting process. However, the NVT system should inform voters in case of over-voting – that is, making too many choices

and thereby invalidating the ballot – and it should do so in a way that allows the voter to understand and correct the error. The EOM may also assess whether intentional spoiled electronic ballots are provided for in the law and identify the reasons for such a provision.

The usability of the NVT should also take account of the amount of time it takes for a voter to complete the process, together with the overall number of voters in the polling station. There should be a sufficient number of devices available so that voters do not face inordinate waiting times.

A relatively frequent occurrence, especially when NVT are first introduced, is that some voters terminate the process before finally casting their electronic ballot. This may occur unintentionally, because the voter mistakenly believes that the vote has already been cast, or intentionally, often because the voter does not understand the system and is reluctant to request assistance. The EOM should check what happens in these cases: whether the device indicates properly the end of voting process, resets after a certain amount of time, or an election official must intervene. If the intervention of an election official is required, the rules should be clearly defined in advance, including how the intervening official is selected. The EOM can attempt to identify how often termination of the voting process occurs during the election, although such data may not be known to election officials.

4.4.2 Ballot Design

As with paper ballots, ballot design is often of crucial importance in NVT, and design problems can potentially cause voter confusion or bias in favour of certain parties or candidates. Ballot design is determined, in part, by the registration of candidates, which may not be concluded until shortly before an election. After the election administration has determined the electronic ballot format, the EOM should assess whether voters experience any difficulties in voting due to the ballot format.

In general, the same principles that apply to the design of paper ballots apply to the design of electronic ballots. The EOM should consider whether candidates or parties are presented equitably on the ballot and whether all information required by law is presented. All candidates or parties contesting the election should be given an equal amount of space on the electronic ballot and it should be possible to see all of the available choices at the same time before the ballot is cast. Ballots that exceed the size of the screen, thus requiring the voter to scroll or change screens to see the entire range of choices, have the potential to confuse voters and to create bias in favour of contestants that are displayed first.

4.4.3 Voter Accessibility

One of the advantages of NVT is that they can increase access for voters, especially those with special needs. The system should be designed to allow voters with disabilities to cast their ballots without assistance, to the extent possible. Consideration should also be given to whether a voter may use NVT in a minority language. Where it is possible to vote in a minority language, the EOM should verify that the minority language ballot contains the same information and is in the same format as the majority-language ballot.

Any special modalities, such as audio ballots for the visually impaired or the use of ballots in a minority language, should not have the potential to compromise the secrecy of the vote. This means that the content of the vote should be electronically recorded independently of the method used to "mark" the electronic ballot.

4.4.4 Reliability

NVT devices must be able to function for the entire duration of the voting process. Although some failure rate is to be expected, the EOM should observe whether there are situations in which extensive malfunctions, power outages, lengthy set-up times or other such technical problems prevent voters from casting their vote, discourage them from doing so or cause votes already cast to be lost.

The EOM should, therefore, consider how the voting device is protected against foreseeable malfunction, whether basic problems can be easily repaired by election officials and whether officials have been adequately trained to deal with problems that may arise.

For Internet voting, in which server failures or other system unavailability could prevent large numbers of voters from casting their ballots, the EOM should find out what measures are in place to ensure the availability and usability of the system in these cases, including for voters with disabilities.

When electronic voting technologies are employed, election administration bodies will often use information systems to manage the process. The EOM should determine what kind of systems are in place and what they are used for. An issue that can negatively impact the functioning of electronic voting processes is the integration of multiple information systems. Problems can arise from interface issues between two different information systems. For instance, if data transferred from election management software (where candidate data is managed and the ballot sheets are compiled) are not correctly read by the NVT system, errors in the electronic ballot could result.

In all cases, such issues for NVT are best addressed in advance through comprehensive testing (see *Testing* section, below).

Possible questions:

- How user-friendly are the NVT overall? How easy is the system to use and how easy is it for the voters to learn how to use the system? If usability tests have been undertaken, what were the main problems found and how were they addressed?
- Is the physical design of the NVT conducive to voting? If NVT are used in polling stations, are sufficient numbers of devices deployed relative to the number of voters and the expected voting time per voter?
- Do the NVT give clear feedback and prompts during the voter's interaction with the system? Does it show which choice was selected and give the voter the opportunity to make changes? Does it indicate when the vote is about to be cast and confirm that it has been cast?
- How do the NVT deal with under-votes, over-votes and termination from the voting process? Do they allow for blank or invalid ballots?
- Are all contestants presented equally on the ballot? Do voters have to scroll or advance screens to see all of their choices for a given contest? Is all information required by law presented on the ballot?
- What facilities have been incorporated to increase access for voters with disabilities? Are minority languages used? Do the NVT ensure the secrecy of the vote for any voters using special modalities?
- How are the NVT protected against physical malfunctions or other problems, such as loss of electricity?
- Can basic problems be repaired by election officials? If so, how is that arranged? Have officials been adequately trained to deal with problems?
- What kinds of information systems are used by the election administration? Are the different kinds of software being used to manage the election process and to run the NVT compatible? Have tests been conducted to ensure that data transfer smoothly where there are interfaces between different software?

4.5 Public Testing

Public testing is a process to test the functionality of a given NVT system without requiring any knowledge of its inner design or logic. It is an important part of the implementation of NVT. However, the value of testing depends, in part, on the type of testing, by whom it is done and how much access is given to parties and citizens. The technology itself should be thoroughly tested prior to election day, but testing should also be conducted on the interaction of voters, election officials and observers with the technology.

Since much of the testing happens before an EOM is deployed, the EOM should review documents related to any testing that has already been conducted. Discussions with those involved in the testing are another source of information. These may include testing authorities, vendors, certification agencies and election administrators, as well as external groups, such as academic institutions, domestic observer groups, candidates

or political parties that were permitted to test the NVT. At a minimum, the EOM should check whether the results of testing have been made available to these groups and what their assessments of the results are.

The EOM should check that laboratory testing of hardware and software has been conducted for the purpose of seeing whether the system or components of the system meet design criteria, and whether all parts of the system function together as designed. This includes end-to-end testing of the entire process, as well as testing of individual components. The criteria used for testing should be reviewed by the EOM for relevance and completeness. The election administration must also ensure that there is complete documentation establishing that the system has been adequately tested. The use of an NVT system that has not been fully tested or for which there is insufficient documentation of such testing, risks jeopardizing the election process.

The EOM should consider whether testing has been conducted properly. This is especially important when considering security measures. For instance, while software tests may be conducted in a predetermined manner, software testing can be significantly strengthened by the use of adversarial testing, in which specialists attempt to identify security weaknesses or other flaws in an unscripted manner. Similarly, NVT relying on the Internet should be subjected to testing involving protection against dDoS attacks. Testing should always be conducted after installation of upgraded or new software.

In addition, the EOM should consider what plans exist for failed tests. These plans should include whether distinction is made between small and large errors, how and when software is updated, if and when re-testing is foreseen, and whether the testing took place sufficiently in advance of real-time implementation.

The EOM should determine to what extent the NVT system was tested with the public and with election officials. Such testing is necessary to check the usability and robustness of the system, ballot design and, potentially, the sufficiency of training and voter education. Public tests should involve collection of data regarding use, identification of any problems and proposals for modifications needed in response to significant issues identified in the testing. The absence of these elements is an indicator that the event was not testing in the true sense of the term, but rather voter education or a publicity exercise.

It is important to note that the EOM should not be involved in testing any systems or devices. It should also be noted that testing is never a guarantee that the NVT system is fully secure or that it will work properly on election day.

Possible questions:
➲ Has the election administration ensured that the NVT system has been completely tested before use? Has end-to-end testing been conducted, including transfer of data between multiple information systems, or have only individual components been tested?
➲ Is complete documentation about testing available to the EOM? Is it available to political parties, civil society and others? What is their assessment?
➲ How rigorous does the testing appear to have been? Has software gone through adversarial testing? Was testing done after new or upgraded system components were installed?
➲ Was official testing observed by outside groups? Did any external group have the opportunity to conduct their own tests? If so, under what conditions?
➲ Were the NVT tested with the public? What was the extent of such testing? Were such tests conducted in mock elections or in binding elections? Were any problems identified in the testing? If so, how were they addressed?

4.6 Evaluation and Certification

Certification is a systematic process to evaluate whether a given NVT system satisfies previously established standards and legal requirements. The certification process may include hardware and software, but also operating systems, management processes and personnel. It is not the function of an EOM to certify particular NVT. It is the responsibility of the public administration in the country to ensure that the NVT system has been properly certified before it is used in elections. However, the EOM should assess the certification process that was used. In doing so, the EOM should review relevant certification documentation and understand the views of interested parties, domestic observers, the academic community and other technical experts.

Certification requirements or criteria should exist prior to the introduction of the NVT, rather than being tailored to match the NVT system. These requirements should be public and in accordance with relevant national legal provisions and international standards. The EOM should try to determine how specific the standards are and to what extent the certifying body has latitude in assessing compliance with the requirements. Over time, certification requirements may become outdated and changes in technology may create issues that were not previously addressed by the standards. Potential gaps in certification requirements should, therefore, also be identified.

Since the certifying body is part of the certification process itself, information about the certifying body is relevant to the EOM. In order for certification to be meaningful, the certification body should be competent and independent from vendors, suppliers and election administrators. An assessment should be made to this effect. To do so, the EOM should attempt to determine the prior experience of the certifying body, whether the certifying body is itself accredited, the source of funding for the certification process and the views of experts, observers and political parties.

Consideration should also be given as to how the certifying body conducted the certification process. The EOM should carefully assess whether the certification was meaningful or merely a "rubber stamp" approval. The steps taken, the personnel involved and the amount of time devoted to the certification process are all potential indicators. Another indicator is whether the remuneration provided to the body was sufficient to provide for a robust certification process. The EOM should also attempt to determine whether the certification body had full access to all information regarding the system, and that no information was withheld on security or proprietary grounds. The EOM should also check whether the certification body required the vendor or manufacturer to modify any hardware or software in order to meet certification standards.

If the NVT system was modified subsequent to its certification, the EOM should identify whether such changes have themselves been certified. Rules regarding de-certification and re-certification, or their absence, may also be important.

In OSCE participating States where there is only one type of NVT system in use or where the State has developed its own system, often no certifying body exists and, hence, no independent and competent certification takes place. This should be noted by the EOM and the EOM should ask electoral administrators how they can be sure that the NVT will perform correctly.

Similar to the results of public testing, the EOM should check whether final evaluation and certification reports are available to academic institutions, domestic observer groups, candidates or political parties, and what their views thereof are.

Possible questions:
➲ What are the views of electoral administrators, political contenders, civil society groups, academics and other stakeholders regarding the certification process?
➲ Were certification standards determined before acquisition of the NVT, or do they appear to have been tailored to an already existing system?
➲ Are the certification requirements publicly available? Do they fully match legal provisions regarding the use of NVT and electoral rules as a whole? Are the criteria sufficiently specific?
➲ Are there any significant gaps in the certification requirements?
➲ Is complete documentation about the evaluation and certification available to the EOM? Is it available to political parties, civil society and others? What is their assessment?
➲ To what extent is the certification body truly independent? Is it accredited? How is it funded? How is it perceived by domestic interlocutors?
➲ To what extent was the certification process meaningful? Were sufficient resources available to the certification body, including time? Did it have full access to documentation? What remuneration was paid to the certification body? Was this amount sufficient to ensure a meaningful certification process?

- Did the certification body require any modifications to the NVT in order for it to meet certification criteria?
- Were any modifications made to the system's hardware or software subsequent to the original certification? If so, were these modifications themselves certified?
- If no formal certification process exists, are there any means available to election administrators, political parties and other domestic interlocutors in making sure that the NVT system will perform correctly?
- How can observers verify that the system used in the election is in fact the same as the independently evaluated and certified system, for example by digital signatures?[26]

4.7 Verification Methods

A crucial aspect of NVT systems is the ability to verify that the technology has performed during an election as envisaged. In particular, it should be possible to verify that the secrecy of the vote has been respected and that the results are the honest tabulation of all voter choices. While it is not the role of an EOM to conduct verification, the EOM should be able to assess whether full verification is possible and to observe the verification process.

There are different ways of conducting verification, and these may be performed in various combinations, depending on the technology in use. Observers should be aware of the limits of verification methods, and the EOM should carefully consider how verification is done and whether there are any gaps in the verification process that could allow malfeasance or errors to remain undetected. Voting and counting procedures that rely solely on trust in the honesty of election officials and vendors cannot be assessed as meeting OSCE commitments for democratic elections.

Verification can be universal or individual. Universal verifiability implies that any person or group with sufficient expertise can confirm that the election results correspond to the votes cast and the process has been conducted accurately. Individual verifiability refers to the ability of any given voter to confirm that her or his specific ballot is recorded correctly and corresponds to her or his intention. If all aspects of an election, including the accuracy of the overall results, can be fully and independently verified, the NVT can be said to be verifiable end-to-end.

26 A digital signature is a mathematical function that allows anyone to verify the authenticity and integrity of a given message, file or software. It proves that it was signed by a known signatory (authenticity) and has not been altered since the point of signature (integrity).

4.7.1 Audits

Verification of NVT processes can be undertaken through audits of different types, including audits of the functioning of the technology, audits of the procedures followed in administering and securing the system, and audits of the results. The EOM should determine what audits are required by law and whether audits are conducted by independent bodies. The EOM should observe the conduct of audits wherever possible.

The EOM should check whether audit criteria and mechanisms provide relevant information for all levels of the NVT system, from the specific voting device to tabulation of the results. Audit mechanisms should preserve the secrecy of the ballot, but should also reveal whether any violations of secrecy of the ballot have taken place. The EOM should consider whether representatives of political parties, candidates, domestic observers and other interested parties are allowed to be present during audits.

Another consideration for the EOM is whether additional action is required by law should an audit reveal discrepancies and what affect, if any, this has on the results. An audit requirement is of little value if it does not necessitate some form of corrective action in case of discrepancies.

4.7.2 Voter-Verified, Paper Audit Trails and Scanned Ballots

When DRE devices are used, universal verifiability can, in principle, be achieved through the use of a "voter-verified, paper audit trails" (VVPAT). That is, the paper record for any or all devices can be compared with the electronic results through partial or full recounts. Although the use of a VVPAT ensures that a crosscheck is available for electronic results, this mechanism must be implemented properly to achieve the goals of transparency and to ensure public confidence.

If the NVT system in the election observed produces a paper record, the EOM should consider a number of aspects. First, the EOM should check whether the paper record can be verified by the voter before the electronic ballot is actually cast. The voter's choice should be clearly indicated and easily visible for the voter, and should not be in the form of a bar code or other marks that the voter cannot interpret. The EOM could consider if mechanisms are provided for blind voters to verify their ballot. The voter should have the opportunity to cancel the vote if the paper record does not match what the voter believes she or he has chosen. The EOM should also assess whether the voters have been informed about the functionality of the VVPAT and, therefore, know what they should verify.

A second aspect that is important to observe is the way in which the VVPAT ensures the secrecy of the vote. For instance, paper records that are maintained in a continuous scroll could allow votes to be associated with individual voters.

Third, technical issues, such as the type of paper, printing, cutting and deposit of paper in the ballot box, can significantly impact the effectiveness of the VVPAT. For example, printers can malfunction or run out of ink and paper. If problems are not detected and

corrected quickly, the utility of the VVPAT is limited. A paper record must also be of sufficient quality to permit a recount.

Fourth, some NVT systems print VVPAT records and then the voters have to take them and put them into a physical ballot box. Sometimes voters accidently or intentionally take these VVPAT records with them. The EOM should assess how that may impact the subsequent management of the receipts and the accuracy of the recount.

A fifth important consideration for VVPAT records is whether they are used in post-election recounts in practice. The EOM should observe any post-election audits or recounts to assess whether the process meets legal requirements. For audits, it is likely that only a certain percentage of paper records will be checked. The selection of paper records to be audited should be determined randomly. The percentage to be checked should be sufficient to provide a statistically valid sample.

Ballot scanning can also provide universal verifiability if implemented appropriately. In this case, there are also technical aspects that should be evaluated by the EOM. The ballot paper used should be readily understandable for the voter and marking it should be straightforward. When ballots are scanned in polling stations, voters should be able to insert the ballot into the scanning device themselves, without assistance and without the secrecy of their vote being violated. In some elections, voters are provided with special privacy sleeves, which they can use to prevent anyone, including a person "assisting" the voter, from seeing the content of their ballots while inserting the ballot into the scanner. If the ballot is not marked in a valid manner, the device should clearly indicate this to the voter, and the voter should have the opportunity to cast a correct ballot.

Since scanners can be subject to error and fraud, it is important that at least some ballots are subsequently counted manually through audits and, if required, recounts are conducted. Audits of the paper record should be random and of a statistically relevant scale. The EOM should also find out the overall margin of error of the scanning devices, and whether there is any provision for automatic recounts in case the margin between two electoral contestants is within this margin of error.

4.7.3 Verification and Internet Voting

For Internet voting systems, universal verifiability is difficult to provide without jeopardizing the secrecy of the vote, especially in cases where ballots are very complex. The EOM should carefully examine verification processes that purport to provide universal verifiability for Internet voting.

In some Internet voting systems, mechanisms are provided for individual verifiability. In principle this means that the voter is able check – combining several pieces of information – if the cast vote was recorded correctly according to her or his intentions. Any single piece of information should not reveal the content of the vote, which would violate the secrecy of the vote if it provided the voter with a way to prove to third parties

how she or he voted. Where such mechanisms are used, the legislation should always provide for verification to be undertaken to determine whether or not any falsification has occurred and what sanctions should be taken in the event that it has.

Possible questions:

- What methods of verification are used to prove the integrity of the results? Can these methods result in the end-to-end verification of the results, or are there gaps in the verification process?
- How thoroughly is the verification process conducted by the organization and voters in practice?
- Do all observer groups, political party representatives and other relevant persons have full access to the observation of the verification process? Have any such individuals or groups attempted to observe the verification process? If not, what are their reasons for not observing the result?
- What audits are undertaken and by whom? What happens in the event that an audit reveals errors or discrepancies?
- If DRE voting systems are used in polling stations, do these devices have a paper record? If so, can it be verified by the voter prior to casting the ballot?
  - Does the VVPAT preserve the secrecy of the vote?
  - Can the VVPAT serve as a reasonable verification method, or do technical or design weaknesses reduce its value in this respect?
  - Are random audits of the VVPAT conducted?
  - Have any manual recounts been requested and conducted?
  - Were any problems identified with the VVPAT itself (printing, storage)?
  - Were any discrepancies or problems identified as a result of partial or full recounts of the VVPAT? If so, how were these addressed?
- If ballot scanning devices are deployed, does their use preserve the secrecy of the vote? Are the scanned paper ballots audited or manually recounted to verify the electronic results? Does verification take place before or after results are announced? How are discrepancies addressed?
- If Internet voting is used, how do the verification methods ensure end-to-end verification?
  - Is the voter given any data during the voting process for verification purposes that could potentially violate the secrecy of the vote?
  - What audits are conducted on the system and who conducts them?
  - What types of verification does the method provide (cast as intended, recorded as cast or counted as recorded)?
- Regardless of the verification method used, what is the assessment of political parties, candidates and domestic observer groups of the verification process?

4.8 Observer Access, Documentation and Other Transparency Measures

As with any electoral process, an integral part of the assessment of the use of NVT is the transparency of the system. The transparency provided by election observation is a crucial element for the verification of an electoral process and for building public confidence. At the same time, transparency is important for those charged with ensuring the integrity of the election process. The use of NVT must also be fully transparent for election administrators and judicial institutions.

Overall, transparency can be affected by different factors. Where any component or process of the system is secret or protected by law from disclosure, overall transparency decreases. As elections are a public process exercised collectively by and for voters in order to realize basic human rights, the electronic voting system should not be made secret by a private agreement between a vendor and the state authorities. The EOM should, therefore, carefully examine how independent observers, party representatives and voters can observe an electronic voting process, as well as how election officials and the judiciary can duly fulfill their oversight obligations.

While not all aspects of NVT can be directly observed, there are a number of activities that can be observed and which should be open to observers. These include not only the activities of election administrators and vendors in deploying, setting up and modifying the system, but also the activities of certification, testing and audit authorities. In this respect, the EOM should consider what aspects of the process can be observed, in principle, and whether observers are allowed sufficient access to do so.

The EOM should note whether any observers utilize the opportunities available to them. The reasons for not observing may be of interest. For instance, political parties or civil society groups may state that they do not have the capacity to observe effectively, or they may report that the access provided does not afford meaningful insight into the operation of the system. On the other hand, they may state that they trust the use of the NVT.

Consideration should also be given to any efforts made by the election administration or vendors to maximize transparency. This could include offering domestic observer groups and political parties the opportunity to test the NVT system independently. It should also include whether the election administration has attempted to identify additional means of facilitating observer access.

Generally, testing should be observable by political parties, candidates and domestic observer groups. At a minimum, the EOM should check whether the results of testing have been made available to these groups. The EOM should also consider to what extent political parties, candidates, domestic observer groups, academics and other groups are permitted to test the technology themselves. While opportunities for external testing may necessarily be limited due to security, logistical and time constraints, the existence of such testing is an indicator of transparency.

An important element of background analysis is to identify what documents are unavailable. The existence of relevant documentation does not conclusively prove the reliability of the NVT. However, the absence of relevant documentation may be an indication of problems. The absence of documentation for dealing with known technological problems may be more telling than the documentation that is available for examination.

Another factor that affects overall transparency is the issue of source code for the software that operates the NVT. Transparency is enhanced if the source code is a matter of public information. The EOM should determine if the source code for all software used in the NVT system is available publicly, or at least to registered observers or other relevant groups. Making source code open may be of limited value unless the general public, including political parties, candidates and domestic observers groups, have the opportunity to check that this source code and the resulting compiled software is actually that used in the electronic voting system. While it is unlikely that EOMs will have the time or capacity to assess source code, it is, nevertheless, important for the EOM to determine if any meaningful assessment has been made by others and to evaluate its conclusions. If the EOM has access to the source code, it should be made clear to the authorities that reviewing the source code does not equate to certifying the system or its implementation.

Even with NVT, a key transparency measure remains: that polling stations and higher levels of election bodies produce paper protocols of their result tabulations, so that political parties, candidates and domestic observers groups can check the results at lower levels against the centrally recorded electronic results. The EOM should ascertain whether this is a requirement.

Some observation methods, especially the review of documentation, may need advance preparation in order to be effective. Where NVT are to be used in an election, EOMs should attempt to request relevant documentation in advance in order to ensure that documents can be translated in a timely manner. EOMs should not sign any non-disclosure agreements in order to see documents or to observe processes related to NVT, since this could compromise an EOM's ability to report independently and in an unbiased manner.

Possible questions:

- Are all processes related to the use of the NVT open to observation by the EOM and by domestic observers?
- Has the election administration made efforts to facilitate observer access?
- What documentation is available to the EOM and to the public? How can the documentation be accessed (only physically on paper or publicly on the Internet)? Are there any reports or other documents that are not available (non-existent or considered secret)? Is there any information or documentation that the election administration itself does not have access to?
- Is the source code for the NVT software publicly available? If so, has it been checked by any group? Is there a mechanism for verifying that the source code is the one actually used on election day?
- Are results protocols printed and made available to observers and political parties at each level, including at the polling station level?

ESTONIAN NATIONAL ELECTORAL COMMITTEE/PRIIT VINKEL

Voting on the Internet in Estonia, 2013.

5

The Regional Perspective: Role of Long-Term Observers and Regional Analysts

When a full or limited EOM is deployed to a state using NVT in an election process, the contributions of Long-Term Observers (LTOs),[27] as well as of Short-Term Observers, (STOs), will be important in making assessments of the preparations for and the conduct of electronic voting, counting and tabulation. Their tasks will vary according to the type of technology, the extent and form of NVT, whether NVT are used throughout the country and the way in which NVT are integrated into the overall election process.

27 Throughout the text, unless otherwise noted, the term "Long-Term Observer" also encompasses the role of the Regional Analyst in ODIHR Election Assessment Missions.

The core team of the EOM should adequately prepare LTOs for their tasks by providing them with clear, concise information about the NVT system and by precisely defining the information and data to be collected. LTOs should not be expected to be experts on NVT issues. The NVT Analyst should remain mindful that the observation of the use of NVT will be one of a number of tasks for LTOs and that observers should not focus on one aspect of the election process to the detriment of others.

LTOs will generally focus on four main aspects of the use of NVT: the technical and operational preparations by regional or local election administration bodies, the training of election officials, voter education campaigns and the views of political parties, candidates and civil society organizations at the local level. LTOs will also be able to provide information to the core team on questions and concerns of local election officials and voters.

Where NVT are to be used in polling stations, LTOs should observe how the devices have been distributed and by whom, how they are stored prior to being set up, who has access to them, and what security measures are in place to prevent unauthorized access. LTOs should ask whether the devices have been delivered fully prepared for election day or whether software updates needed to be made, including to the electronic ballot information and security or other software updates, and how they verified the authenticity of the software or update. If ballots are uploaded locally, the LTOs should attempt to observe how this is done, who is responsible for performing the work and what security measures are in place. Such observations should also include potential testing of the NVT prior to its official use.

In countries where different kinds of NVT are used or where NVT are supplied by different vendors, LTOs should identify the kind of NVT that are to be used in their respective regions and communicate such information to the core team.

LTOs should discuss NVT with local and regional election officials. This will give the EOM a better understanding of how these officials view their role in administering NVT and to what extent they feel adequately prepared for their responsibilities and any problems or faults that may appear. LTOs should also determine what role external technicians have in electronic voting preparations and to what extent election officials are able to provide oversight of their work. LTOs should attend training sessions for polling station officials when possible.

Voter education efforts should be observed. For instance, LTOs can try to observe what kind of information campaigns are present in local media and determine the effectiveness of such efforts, although this may be difficult to assess. LTOs should also ask about and observe any tests of the technology conducted with the public. Observation of such tests may provide indications not only of the extent to which voters are comfortable with the devices, but also of potential issues with the usability or robustness of the devices.

In the course of their regular meetings with local political party and civil society representatives, LTOs can include questions about the NVT. In particular, they should obtain information about how parties and observers plan to observe the NVT and whether they are doing so in advance or only on election day. LTOs should inquire about the access parties and domestic observers have had to the NVT system, if there is any documentation that they have been unable to obtain (including source codes), and whether they have had the opportunity to test the devices in any way.

If the NVT takes the form of remote Internet voting, the role of LTOs will be more limited. Nevertheless, they will still need to gather information regarding voter education, as well as any interaction of the NVT with the traditional voting process – for example, how the system prevents voters from casting multiple valid votes through different channels.

Possible questions:
➲ To what extent are election officials familiar and comfortable with their role in organizing or providing oversight of the use of NVT?
➲ What are the plans for training lower-level election officials? How useful does such training appear to be in practice?
➲ How will technical expertise be arranged on election day, especially in the event of problems?
➲ Have a sufficient number of NVT devices been received, and were they received and set up in a timely manner?
➲ How is electronic voting equipment stored? What security measures are in place to prevent tampering? Who has access to the NVT devices, and is such access recorded in a protocol?
➲ Are the NVT systems connected to the Internet? If so, what security measures are in place to guard against possible hacking?
➲ Will the electronic ballot be uploaded or other software updates be made before election day?
➲ Are voter education materials available? How widespread are voter education efforts through the commission or in local media?
➲ Are any tests or trials with voters planned before election day? If so, what are the reactions of voters to the devices? Have any problems been identified as a result?
➲ What are the views of local political party representatives and domestic observers regarding the use of NVT in the local area? What is the extent of their access? Have they had the opportunity to test devices or review documentation about the process? If parties or observer groups do not seem to be making efforts to observe the use of NVT, what are their stated reasons?

OSCE/AGNIESZKA REMBOWSKA

An election official verifies a voter's identity using new voting technologies in Mongolia, 2013.

6

The Role of Short-Term Observers

In accordance with ODIHR's election observation methodology, STOs can play a crucial role in gathering statistically analyzable data regarding the use of electronic voting, counting and tabulation technologies. Although the general task of the STO observing electronic voting should not be different from observing paper-based voting, the information that the STO should be seeking will vary depending on the system used in the

particular country and the extent of its implementation. In this respect, an adequate briefing by the core team's NVT Analyst is important. The NVT Analyst must inform the STOs about the main elements of the system and provide them with specific guidelines to help assess the performance, security and usability of the system. Sufficient attention should be given in the briefing to ballot design and other elements of voter interaction with the technology, in addition to necessary descriptions of the hardware and software of the NVT system itself. STOs, much like LTOs, cannot be expected or required to have a technological background. Their training should be focused on how to observe the correct and secure operation of the NVT systems on election day so that they are able to identify any differences in practice in the polling stations.

A special section on electronic voting should be included in the STO briefing package. This will help STOs assess the level of preparedness of polling station officials in their use of the equipment, as well as the level of voters' confidence and their understanding of procedures. Questions about the performance of the electronic voting system should be included in observation forms to be completed by STOs. As STOs may be unfamiliar with NVT in general, the observation forms used by the STOs must be carefully and clearly designed so as to obtain relevant, usable information and to avoid any potential bias. Where NVT are used in conjunction with traditional paper voting processes, the core team and the LTOs should be careful to ensure that STOs are trained and deployed in such a way that they do not give disproportionate attention to electronic voting issues.

There are a number of aspects of electronic voting that STOs can be asked to observe during the voting process. The key set of issues includes the secrecy of the vote, the storage of NVT devices, the usability of NVT devices, security, the adherence of polling station officials to procedures and how officials deal with any problems that arise.

The set-up of polling stations will be one of the first processes STOs observe (although this may be done by LTOs if NVT devices are set-up in polling stations prior to election day). STOs should report on whether the set-up process follows pre-established protocols, including what steps are taken to ensure that the electronic memory does not contain any votes prior to the start of voting. STOs should also observe any tests that take place during set-up, either of voting equipment or transmission of data to a central server.

STOs should observe where the devices are stored and how it is ensured that voters mark ballots in secret. Potential problems to watch for in this respect are unattended storage, lack of polling booths or other secrecy dividers, or overly bright computer screens that make voter choices visible to others. Another important factor is how election officials assist voters and whether such assistance potentially violates the secrecy of the vote.

STOs should assess the extent to which voters appear to be comfortable using the machines. STOs should watch for significant numbers of voters needing the assistance of election officials or other voters, or voters taking an unusually long time to cast their

ballots. The usability and functioning of VVPAT devices should also be considered, if applicable. STOs may wish to have brief interviews with voters outside polling stations to hear about their experiences and views regarding the NVT voting process. The accessibility of the NVT for people with disabilities, the elderly or speakers of minority languages is another important aspect of the usability of the system.

The physical security of the NVT devices in the polling station is a third issue. This includes who has access to voting equipment and other components of the system in the polling station and whether any vendor service personnel access the machines without the presence of an election management body member. STOs should also observe whether any security measures that should be in place, such as the seals placed over external interfaces, are in fact utilized. Additionally, STOs should verify (using serial numbers or other unique identifying criteria) that the NVT devices in the polling stations are actually the ones supposed to be deployed there (where this information is available).

Regarding the conduct of the voting process, STOs should observe whether election officials adhere to established procedures or whether they deviate from it, which could jeopardize the integrity of the process. This includes situations where NVT are used as an alternative voting means requiring special attention to the voter list in order to avoid multiple voting. STOs should also attempt to assess polling officials' understanding of NVT. They should inquire about the extent of training polling officials have received and observe whether manuals related to the NVT are present in the polling station and whether they are called upon by polling officials. STOs should ask any domestic observers or political party representatives about their views of the process in the polling station and to what extent they are able to observe the process.

If the implementation of electronic voting allows voters in a polling station to choose between voting electronically and voting by paper, STOs should look at how this process is administered, including whether voters can choose their voting method freely or election officials or other individuals recommend any specific voting method. It is also important to note whether voters are marked according to the method of voting in the voter lists and whether the number of voters using each method is reconciled during the closing process.

STOs should observe, if applicable, how officials deal with any problems that arise with the system. They should note what the problem appears to be and how long it takes to remedy, and whether this remedy seems effective and according to regulations. This includes delays in opening polling stations due to longer than expected set-up times. The STOs should assess the impact on the voting process in the observed polling station; if the electronic system is not working, for example, are voters given the opportunity to vote by paper ballot or are they turned away? If the system fails, functions abnormally, or if procedures regarding the operation of the system are not followed properly, STOs should observe whether the incident is written down in the polling station protocol that is to be submitted to the higher level of electoral commission, and whether this transfer actually takes place.

STOs should observe the closing of the polling station and whether this is done in accordance with procedures. Such procedures should include the proper documentation of proceedings, the termination of the vote processing, the start of counting, the operation of any testing and verification mechanisms and any procedure needed to check the integrity of results. They should observe whether a final result protocol is printed and made available to observers and to political party and candidate representatives, and posted in the polling station for public display. STOs should observe how results are transmitted to higher level election commissions, whether this is done by electronic communication of results or by delivery of hardware elements (such as memory sticks or CD-ROMs).

If there is an immediate audit of paper records to verify results, the STOs should observe and report on any verification mechanism and audit procedures of paper records produced during the use of NVT. The observation of this is crucial to the assessment of the NVT, and should include whether such manual recounts of paper records is done in a transparent and accountable way. STOs should also observe if any discrepancies in the results of the electronic tabulation process are detected. They should also report what is done in such cases and what explanation is provided by the authorities for such inconsistencies.

Possible questions:
➲ Do any problems arise during the set-up of NVT devices in polling stations? If so, are election officials able to resolve them? Are polling stations able to open on time?
➲ What steps are taken to ensure that the electronic memory does not contain any votes prior to the start of voting? Is this verifiable?
➲ Does the set-up of the NVT devices in the polling station protect the secrecy of the vote? Do election officials ensure that voters cast their ballots in secret, even if voters need assistance in using the devices?
➲ Do voters appear to understand how the NVT devices function? What number of voters require assistance in order to complete the voting process? Do any voters terminate the process after initiating it, but before casting a ballot?
➲ Do voters approach NVT devices alone? Do election officials prevent two or more voters from using the NVT devices at the same time?
➲ Is there overcrowding? How long do voters have to wait in order to vote? Are there a sufficient number of devices to keep waiting times reasonable?
➲ Are disabled and elderly voters able to use the devices without assistance? If minority languages are used in the voting process, can these be accessed on the device without difficulty?
➲ If any external ports or other elements of the NVT device are supposed to be sealed during the course of voting, can STOs verify that the seals are in place?

- Do any polling officials or technicians operate or handle the NVT devices during the presence of the observers? If so, what reasons are given?
- Do officials adhere to established procedures, or do they deviate from the procedures? For what reasons?
- How well do polling officials appear to understand the process? Are they able to address problems if necessary? If not, are there technicians present who are responsible for fixing problems? If there are problems with devices while STOs are present, are these recorded in an official protocol and then duly transmitted?
- If the NVT are unavailable for more than a few minutes, do voters cast paper ballots or do they have to wait for a replacement device? In case of ballot scanners, are votes deposited in a temporary ballot box? Do any voters leave without voting?
- What are the views of domestic observers and political party or candidate representatives regarding the voting process in the polling station?
- Are closing procedures adhered to? Is a paper copy of the results per device and polling station printed and made available for observers and political party representatives? Are such copies also posted for public display?
- How are the polling station results transmitted to higher levels of the election administration? Are the procedures for such transmission followed? If not, why not?
- Are any immediate audits of the results conducted at the polling station?
- Do voters have a choice between voting electronically or on paper? Are they forced to use either option?
- What happens with the recorded votes after election day? Are the storage units of the NVT systems cleaned and, if so, by whom?

OSCE/ROBERT KRIMMER

Observers monitoring the compilation of voting results in Russian Federation, 2006.

7

Reporting: Making Assessments and Recommendations

It is vital that EOM reporting about all aspects of an election process be factual, accurate and balanced. Where NVT are utilized, assessments of these technologies should contribute to the overall assessment of an electoral process. This assessment should also form the basis for any recommendations that the EOM may make in this area in order to assist OSCE participating States in improving their electoral processes in line with their commitments.

Where an election includes the use of NVT, EOM reports generally will have a section dedicated to this aspect of the election. Although each member of the core team will have responsibilities for gathering information about the use of NVT, the NVT Analyst

will be primarily responsible for consolidating this information, analyzing it and drafting the relevant section.

The aim of this section is to explain and provide an assessment of the functions of the NVT system. Reporting should be as concise as possible and must be understandable for a non-technical audience, but in-depth enough to present a nuanced understanding. While it may be necessary to include some technical details about the system, these should generally be put in footnotes or annexes. The EOM's reporting on the use of NVT should identify positive elements of the process as well as any weaknesses of the system. The EOM should bear in mind that the use of NVT cannot be seen in isolation but as part of a broader electoral process. In making assessments, consideration should be given to how the implementation of NVT affects other aspects of the process.

Many of the assessments that must be made about the use of NVT cut across the roles of the various core team members. The Legal Analyst should work together with the NVT Analyst to assess whether the legal framework adequately regulates the use of the NVT and whether there have been any complaints and appeals that impact NVT. Together with the Political and Media Analysts, the NVT Analyst will assess the political and public discourse that encompasses the use of NVT. Together with the LTOs, the NVT Analyst will assess any regional disparities in the use of NVT, as well as any usability and testing issues. At the same time, the Political Analyst and LTOs, together with the NVT Analyst, will evaluate the opinions of political parties, contestants and other electoral stakeholders about the system, and the Election Analyst will assess the feedback of the election administration about NVT.

The basis for making assessments and recommendations about NVT are the OSCE commitments. Where appropriate, relevant international good practice should also be considered, especially when they relate to detailed aspects of the conduct of the NVT. Such assessments should also include applicable domestic legislation.

The commitments and standards can be summarized in the seven principles discussed in the Background section of this handbook. The EOM's assessments, conclusions and recommendations about the use of NVT in a given election should relate to these principles. All of these should be taken into consideration in the mission's assessment of the degree to which the use of NVT is consistent with OSCE commitments.

The EOM should make relevant recommendations on how the use of NVT can be improved, through modifications to the system, changes in its management or implementation, or amendments to legislation.

It is crucial that such recommendations are well thought through, well drafted and in line with the principles mentioned above. The electoral recommendations of the final report are the guiding benchmarks of any electoral process and the follow-up before the next elections.

While it is important for recommendations to be sound and implementable, it is also crucial that recommendations regarding NVT are understandable to non-specialists.

Recommendations should be backed by concrete findings of shortcomings and possibilities of improving current practice to bring it more in line with good practice. It is also important that recommendations do not contradict one another and are coherent.

Out of any set of all recommendations made, some will generally be priority recommendations to address essential changes of greater urgency or importance. A balanced evaluation needs to be made whether any recommendation regarding NVT qualifies as a priority recommendation.

When shortcomings are more serious and the verifiability of results is not possible, or when the continued use of NVT appears to undermine the public confidence in the electoral process, the EOM may decide to recommend that the use of NVT be reconsidered until such issues can be overcome.

OSCE/ROBERT KRIMMER

An election official trains election administrators on the use of a direct-recording electronic voting machine in United States, 2006.

8

Follow-Up

Successful follow-up to recommendations depends largely on the political will to improve the electoral process ahead of the next elections. The OSCE participating States have repeatedly committed themselves to follow up on recommendations and emphasized ODIHR's role in assisting them.[28] Participating States have been increasingly reporting to OSCE bodies regarding their experiences following up on ODIHR electoral recommendations. International election observation organization signatories of the 2005 Declaration of Principles for International Election Observation have

28 OSCE Summit Declaration, para. 26, "Elections", Istanbul 19 November 1999; OSCE Ministerial Council, Decision No. 5/03, "Elections", Maastricht, 1-2 December 2003; OSCE Ministerial Council, Decision No. 19/06, "Strengthening the Effectiveness of the OSCE", Brussels, 4-5 December 2006; see all at <http://www.osce.org/mc/66113>.

also increasingly emphasized the importance of follow-up on recommendations, both by governments themselves and also by the international community, which can potentially build momentum in this process, ideally by co-ordinating follow-up activities.[29]

In line with the ODIHR Election Observation Handbook, election observation is not an end in itself but is intended to assist OSCE participating States with the implementation of their election-related commitments. The utility of an election observation activity can only be maximized if the recommendations it provides are given full and serious consideration and are implemented effectively. An effective follow-up process can improve the impact and usefulness of election observation activities. It is part and parcel of the electoral cycle and should start as soon as the final report with its recommendations has been published.

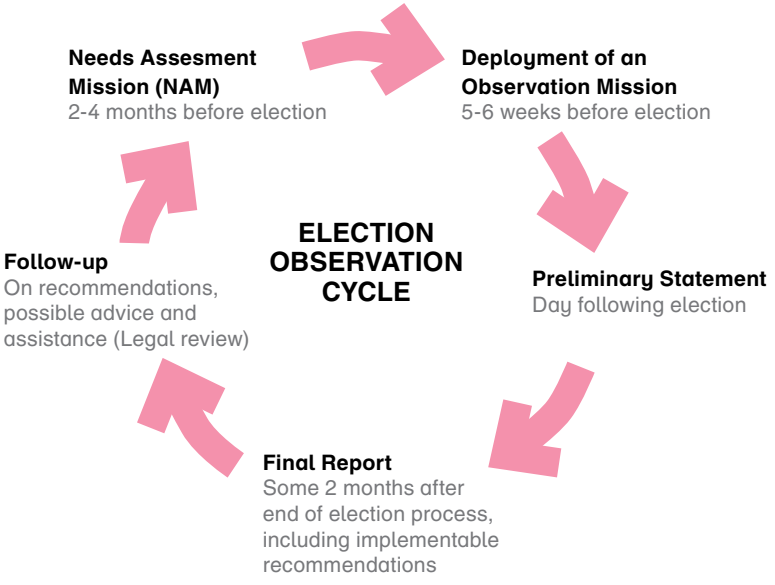

Figure 1: Election Observation Cycle

Following the publication of the final report with its recommendations, ODIHR generally undertakes a follow-up visit to present the final report and its recommendations to the electoral stakeholders. These visits represent the first step in the follow-up process and serve as a reminder to OSCE participating States between elections of their obligation to improve their electoral processes in line with OSCE commitments. In addition, these visits provide a better understanding about the willingness and ability of states to address particular recommendations in the future. These visits to present final reports also serve as a reminder of ODIHR's expertise and ability to assist by commenting on

29 "Declaration of Principles for International Election Observers and Code of Conduct for International Election Observers", United Nations, et. al., New York, 27 October 2005, <http://www.osce.org/odihr/elections/16935>.

draft laws that include NVT elements, or in providing expertise on particular technical aspects of NVT in the electoral process.

Following the presentation of the EOM final report, follow-up visits provide the opportunity to look at the various aspects of ODIHR's assistance in greater detail and in more depth. Such follow-up visits focus on technical support to the participating State with a more in-depth technical assessment, including recommendations on particular areas of concern. Examples include the provision of technical advice to improve transparency, security and verifiability of NVT used in an electoral process. Follow-up visits are tailored around ODIHR's assessment and are the most efficient way to address past recommendations.

Assistance in follow-up to recommendations in relation to NVT can take the form of advice to a participating State on how better to approach the issue of NVT. Such advice could assess the context prior to or immediately after a policy decision has been made on the use of NVT systems, and could help to assess the general feasibility of such an endeavor. Such an assessment should always include a full evaluation of both electronic and non-electronic voting options. Legal opinions form a second area where assistance can be rendered, often through providing comments on draft electoral legislation in respect to NVT. Third, expert visits may be conducted to assess a pilot installation of NVT or Internet voting. As always, ODIHR stands ready to assist participating States in these endeavors, upon their request.

Possible questions:
➲ Are there any changes planned or ongoing that involve NVT, and if yes, what are they and are they in line with past recommendations and international good practice?
➲ Is there any scope for ODIHR to assist in the follow-up to recommendations on NVT?
➲ What form of assistance would be most suitable to support the participating State and its institutions to meet past recommendations and to bring their electoral process closer in line with OSCE commitments with respect to NVT?

Annexes

Annex A: Useful Terminology

Whenever dealing with the use of ICT in the electoral process, it is important to have a clear understanding of the terminology and procedures associated with NVT, particularly as it is a technical and complex process. In the following definitions, commonly used terms associated with NVT are explained. Core team members should adopt consistent terminology in their reporting to avoid any confusion over what has been observed.

- An **audit** is an evaluation of a system as to whether or not it fulfils pre-defined criteria. The result of such evaluation can be an audit report or a certificate.
- **Cryptography** is a technique to keep communication (data) secure from any third party.
- **Data destruction** is a method to make data unusable, once they are no longer needed, in a way that cannot be recovered. This can be done in various ways, most commonly through magnetic, physical or thermal destruction of the storage medium.
- A **digital signature** is a mathematical function that allows anyone to verify the authenticity and integrity of a given message, file or software. It proves that it was signed by a known signatory (authenticity) and has not been altered since the point of signature (integrity).
- **Distributed Denial-of-Service (dDoS) attack** is an attack on a computer system or network in which a simple automated request is repeated at a very high frequency, with the aim of overloading the system's connection lines or computing capacities.
- **End-to-end verifiability** is a functionality of NVT systems that allows the validation of results on a universal and/or individual basis. Systems with universal verifiability provide means for an independent third party to establish that the result of an election was reported honestly and without manipulation, through either manual or mathematical checks. On an individual level, voters are provided with the ability to verify that their votes were cast as intended, stored as cast, and (ideally) counted as recorded.
- **Hacking** is an activity intended to find out and make use of weaknesses in computer hardware, software or computer networks that could allow unauthorized use of the system.

- **A key signing event** is a meeting (mainly in Internet voting) in which essential members of the election management body create a secret electronic "key", which is used to protect the integrity of the electronic voting. This key often is divided into several parts, stored on separate smart cards, which are then kept by individual members of the election management body until after the closing of the election. Then these members reconvene to put their parts of the key together, open the electronic ballot box, and start the decryption of the electronic votes, similar to the closing and counting process for paper ballots.
- **Separation of duty** means that at least two people are required to operate on a system at the same time, thereby providing checks and balances of each other's conduct in an effort to curtail malfeasance.
- **Source code** is human-readable text written in a specific computer language that can be readily translated into a set of computer instructions, i.e., an executable program.
- **Usability** is defined as an analysis of the ease of use and learnability of a technology.
- **Voter credentials** can be voter identity cards; unique, one-time passwords; smart cards; or other means to unequivocally identify the user as an eligible voter.
- **Voter-verified, paper audit trails** (VVPAT) are paper records retained by electronic voting systems that allow a voter to verify the vote recorded, ideally before the vote is actually cast; systems with VVPAT offer the ability to manually recount.

Annex B: Master Checklist

- ❒ In what environment were the NVT introduced? Was there a public debate about the necessity and modalities of the NVT? Was there overall political agreement or were there divisions about the issue? Was their overall public confidence in the election process and the election administration prior to the introduction of electronic voting?
- ❒ Have the NVT been introduced gradually, with time for potential problems to be detected and corrected, and time for voters to become familiar with the system?
- ❒ How does the election process with the use of an NVT system compare to a paper-based process in terms of fulfilling fundamental principles for a genuine, democratic election? What is the added value of using NVT in the country? Do contingency plans exist, in case the technology fails?
- ❒ If used together with a paper ballot system, how does the use of NVT affect the conduct of the rest of the election process?
- ❒ Has the NVT system been certified in a transparent process by a qualified independent body, under both national legislation and international good practice?
- ❒ Has the NVT system and its components been comprehensively tested prior to introduction and periodically thereafter?
- ❒ To what extent are voters, election administrators and observers capable of understanding and using the system? What skills are needed to make them educated users? What kind of training or voter education could build these skills?
- ❒ Are any individuals or groups, including political parties and domestic observers, permitted by law to conduct their own tests, assessments or reviews of documentation?
- ❒ Do international observers have full access to the process and to documentation, including certification, testing, verification and audit reports?
- ❒ To what extent is there public confidence that the use of NVT in the election in question is conducted in accordance with democratic principles?
- ❒ Is secrecy of the ballot guaranteed?
- ❒ Are security requirements and procedures in place at each level of the system? Do these, in practice, ensure protection against external intervention, internal manipulation and technological failure?
- ❒ Is a voter-verifiable paper record produced in order to ensure that the voter's choice has been recorded accurately and to create the possibility for observers without technical expertise to observe a re-count? If not, what measures ensure universal, end-to-end verifiability of the results?

- Does the legal framework take full account of the implications of new technologies, including adequate provision for access of observers, system audits and other transparency measures, as well as the possibility for recounts, mandatory audits of results and legal challenges to election results?
- Could any changes be made to law or practice with regard to NVT that would improve the conduct of the election and fulfillment of OSCE commitments? If so, what are they?
- Is there a clear division of responsibilities between vendors, regulatory agencies and election officials to fully ensure accountability and an effective response in the case of problems?

Annex C: Code of Conduct for OSCE/ODIHR Election Observers

- Observers will maintain strict impartiality in the conduct of their duties and will at no time publicly express or exhibit any bias or preference in relation to national authorities, parties or candidates, or with reference to any issues in contention in the election process.
- Observers will undertake their duties in an unobtrusive manner and will not interfere in the electoral process. Observers may raise questions with election officials and bring irregularities to their attention, but they must not give instructions or countermand their decisions.
- Observers will remain on duty throughout election day, including observation of the vote count and, if instructed, the next stage of tabulation.
- Observers will base all conclusions on their personal observations or on clear and convincing facts or evidence.
- Observers will not make any comments to the media on the electoral process or on the substance of their observations, and any unauthorized comment to the media will be limited to general information about the observation mission and the role of the observers.
- Observers will not take any unnecessary or undue risks. Each observer's personal safety overrides all other considerations.
- Observers will carry any prescribed identification issued by the host government or election commission and will identify themselves to any authority upon request.
- Observers will comply with all national laws and regulations.
- Observers will exhibit the highest levels of personal discretion and professional behaviour at all times.
- Observers will attend all required mission briefings and debriefings and adhere to the deployment plan and all other instructions provided by the ODIHR EOM.

Annex D: Selected OSCE Commitments, Good Practice Documents, and Relevant Court Cases

OSCE Commitments on Elections

1990 OSCE Copenhagen Document (election-specific commitments)

(6) The participating States declare that the will of the people, freely and fairly expressed through periodic and genuine elections, is the basis of the authority and legitimacy of all government. The participating States will accordingly respect the right of their citizens to take part in the governing of their country, either directly or through representatives freely chosen by them through fair electoral processes. They recognize their responsibility to defend and protect in accordance with their laws, their international human rights obligations and international commitments, the democratic order freely established through the will of the people against the activities of persons, groups or organizations that engage in or refuse to renounce terrorism or violence aimed at the overthrow of that order or of that of another participating State.

(7) To ensure that the will of the people serves as the basis of the authority of government, that participating States will

(7.1) hold free elections at reasonable intervals, as established by law;

(7.2) permit all seats in at least one chamber of the national legislature to be freely contested in a popular vote;

(7.3) guarantee universal and equal suffrage to adult citizens;

(7.4) ensure that votes are cast by secret ballot or by equivalent free voting procedure, and that they are counted and reported honestly with the official results made public;

(7.5) respect the right of citizens to seek political or public office, individually or as representatives of political parties or organizations, without discrimination;

(7.6) respect the right of individuals and groups to establish, in full freedom, their own political parties or other political organizations and provide such political parties and organizations with the necessary legal guarantees to enable them to compete with each other on a basis of equal treatment before the law and by the authorities;

(7.7) ensure that law and public policy work to permit political campaigning to be conducted in a fair and free atmosphere in which neither administrative action, violence nor intimidation bars the parties and the candidates from freely presenting their views and qualifications, or prevents the voters from learning and discussing them or from casting their vote free of fear of retribution;

(7.8) provide that no legal or administrative obstacle stands in the way of unimpeded access to the media on a non-discriminatory basis for all political groupings and individuals wishing to participate in the electoral process;

(7.9) ensure that candidates who obtain the necessary number of votes required by law are duly installed in office and are permitted to remain in office until their term expires or is otherwise brought to an end in a manner that is regulated by law in conformity with democratic parliamentary and constitutional procedures.

(8) The participating States consider that the presence of observers, both foreign and domestic, can enhance the electoral process for States in which elections are taking place. They therefore invite observers from any other CSCE participating States and any appropriate private institutions and organizations who may wish to do so to observe the course of their national election proceedings, to the extent permitted by law. They will also endeavor to facilitate similar access for election proceedings held below the national level. Such observers will undertake not to interfere in the electoral proceedings.

1991 OSCE Moscow Document

(24) The participating States reconfirm the right to the protection of private and family life, domicile, correspondence and electronic communications. In order to avoid any improper or arbitrary intrusion by the State in the realm of the individual, which would be harmful to any democratic society, the exercise of this right will be subject only to such restrictions as are prescribed by law and are consistent with internationally recognized human rights standards. In particular, the participating States will ensure that searches and seizures of persons and private premises and property will take place only in accordance with standards that are judicially enforceable.

Good Practice Documents

Aldana, Gustavo, *Observing the Use of Electoral Technologies: A Manual for OAS Electoral Observation Missions*, (Washington DC: General Secretariat of the Organization of American States, 2010), <http://www.oas.org/es/sap/docs/Technology%20English-FINAL-4-27-10.pdf>.

Caarls, Susanne, *E-voting handbook, Key steps in the implementation of e-enabled elections* (Strasbourg: Council of Europe , 2011), < http://www.coe.int/t/dgap/democracy/activities/GGIS/E-voting/E-voting%202010/Biennial_Nov_meeting/ID10322%20GBR%206948%20Evoting%20handbook%20A5%20HD.pdf >.

Council of Europe, Rec(2004)11 "Recommendation Rec(2004)11 of the Committee of Ministers to member states on legal, operational and technical standards for e-voting", Brussels, 30 September 2004, <https://wcd.coe.int/ViewDoc.jsp?id=778189>.

Goldsmith, Ben, Electronic Voting & Counting Technologies: A Guide to Conducting Feasibility Studies (Washington DC: International Foundation for Electoral Systems, May 2011), <http://www.ifes.org/~/media/Files/Publications/Books/2011/Electronic_Voting_and_Counting_Tech_Goldsmith.pdf>.

"Guidelines on Certification of E-voting Systems", Council of Europe, November 2011, < http://www.coe.int/t/dgap/democracy/activities/GGIS/E-voting/E-voting%202010/Biennial_Nov_meeting/Guidelines_certification_EN.pdf>.

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Handbook on Observing Electronic Voting, 2nd Edition, (Atlanta: The Carter Center, January 2012), <http://www.cartercenter.org/resources/pdfs/peace/democracy/des/Carter-Center-E_voting-Handbook.pdf>.

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Goldsmith, Ben and Holly Ruthrauff. Implementing and Overseeing Electronic Voting and Counting Technologies. Washington, DC: IFES and National Democratic Institute. 2013.

Court Cases

Austria: Constitutional Court, Judgment of 13 December 2011 regarding the 2009 Federal Students' Elections (V86-96/11), <http://www.vfgh.gv.at/cms/vfgh-site/attachments/7/6/7/CH0006/CMS1327398738575/e-voting_v85-11.pdf>.

Estonia: Constitutional Review Chamber, Judgment of 1 September 2005, regarding Petition of the President of the Republic (3-4-1-13-05), <http://www.nc.ee/?id=381>.

Finland: Supreme Administrative Court, Judgment of 4 September 2009, regarding Finnish Municipal Elections 2008 (687/1/09), <http://www.kho.fi/paatokset/46372.htm>.

Germany: Federal Constitutional Court, Judgment of 3 March 2009 regarding the 2005 Federal Bundestag elections (2 BvC 3/07, 2 BvC 4/07), <http://www.bundesverfassungsgericht.de/en/press/bvg09-019en.html>.