New technologies in the electoral process

- challenges and opportunities of application in Bosnia and Herzegovina
“New technologies in the electoral process - challenges and opportunities of application in Bosnia and Herzegovina“

Sarajevo, august 2017.
NEW TECHNOLOGIES IN THE ELECTORAL PROCESS - CHALLENGES AND OPPORTUNITIES OF APPLICATION IN BOSNIA AND HERZEGOVINA

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<th>Full Form</th>
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<tbody>
<tr>
<td>EB</td>
<td>Election board</td>
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<tr>
<td>CEC</td>
<td>Central Election Commission</td>
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<td>MEC</td>
<td>Municipal Election Commission</td>
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<td>UEIS</td>
<td>Unique electoral information system</td>
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<td>IDDEEA</td>
<td>Agency for identification documents, registers and data exchange</td>
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<td>CVL</td>
<td>Central voter's list</td>
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<td>ICT</td>
<td>Information communications technologies</td>
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Dear readers,

It is our pleasure to present the publication "New technologies in the electoral process - challenges and opportunities for application in Bosnia and Herzegovina". The publication is divided into three parts. Papers dealing with topics relevant to the electoral process, including the use of modern information technology technologies, are presented in the first part. The second part presents the Report on the Work of the Inter-departmental for the analysis of the situation and proposal of modalities for introduction of new technologies to BiH election process with an analysis of the situation and proposal of modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina; Final report "On the improvements in the Election Process of BiH" by Tartvi Martens and Conclusions and Recommendations: "Strengthening the Capacities of the Central Election Commission of BiH - Technical Assistance and Expert Mission of the Council of Europe" by Peter Wolf. Recommendation CM/Rec (2017)5[1] of the Committee of Ministers of the Member States on Standards for e-voting and the Code of Good Governance in Electoral Matters of the European Commission for Democracy through Law (Venice Commission) are presented in the third part.

Modern IT solutions such as automatic voting and counting of the votes, electronic voter identification, Internet voting have long been used in the electoral process worldwide and all these solutions aim to increase the credibility and reliability of election results, i.e. to shorten the deadlines for announcement of the election results. The process of introducing IT solutions to the electoral process in Bosnia and Herzegovina started in 2010 with the construction of the Integrated Election Information System (JIIS). In October of 2015, at the initiative of the Office of the High Representative to BiH, with the financial support of the Embassy of the Kingdom of Norway to BiH and in cooperation with the Association of Election Officials in BiH, the BiH Central Election Commission had under the project “Evaluation of Possible Technical Improvements to Election Process in Bosnia and Herzegovina” and with the engagement of an expert from Estonia prepared an analysis of possible improvements in the electoral process through the use of advanced technologies whose presentation was held in February of 2016 in the building of the BiH Parliamentary Assembly in Sarajevo. The primary objective of the event was to present innovative solutions that could enhance the electoral process in BiH to the decision-makers, electoral administration, the media and the public. The presence of representatives of five companies (Smartmatic, Indra, Gemalto, Scytl, Smart System Solution) who presented their solutions on improving the process of voter identification, voting, counting and publication of results as well as simulated elections using electronic pens in voting and counting, presented useful and informative experience and insights into effective and practical solutions that are already being implemented or attempts are being made to introduce them into the electoral process in the world.

On 16 February 2016, at the request of the House of Representatives of the Parliamentary Assembly of BiH, the BiH Central Election Commission provided information on the possibilities of implementing a pilot project of various advanced technologies in the electoral process at the 2016 Local Elections, presenting possible technological solutions and the costs of conducting such a pilot project.

As a next step in the process of electoral process modernization, and on the initiative of the BiH Central Election Commission, the Council of Ministers of Bosnia and Herzegovina had On December 29, 2016 decided to establish an Inter-departmental for the analysis of the situation and proposal of modalities for introduction of new technologies to BiH election process. The working group consisted of representatives of the Central Election Commission of BiH; Agency for Identification Documents, Registers and Data Exchange (IDDEEA); Ministry of Foreign Affairs of BiH, BiH Ministry of Finance and Treasury and Ministry of Civil Affairs of BiH. The task of the working group was to prepare a report and to propose modalities for the introduction of new
technologies into the electoral process in BiH as well as to send this document through an authorized proposer into the parliamentary procedure. The Council of Europe has provided expert support to the working group.

On July 19, 2017, the Council of Ministers of Bosnia and Herzegovina adopted and submitted to the BiH Parliamentary Assembly the Report on the Work of the Inter-departmental for the analysis of the situation and proposal of modalities for introduction of new technologies to BiH election process, and a proposal was made to the BiH Parliamentary Assembly to establish a Working Group for development of a strategy for implementation of new technologies in the election process in Bosnia and Herzegovina and to draft an Action Plan for its implementation, as strategic documents of the Parliamentary Assembly of BiH, thus determining short-, medium- and long-term directions for the development and the use of information and communication technologies in the electoral process in Bosnia and Herzegovina.

The BiH Central Election Commission had parallel to the work of the Inter-departmental for the analysis of the situation and proposal of modalities for introduction of new technologies to BiH election process drafted a proposal of amendments to the BiH Election Law, which will be sent to the Inter-departmental working group for changes and addenda to the BiH Election Law so that in terms of the legislation proposals enabling introduction of new technologies into the electoral process would be offered.

What type of solution will Bosnia and Herzegovina choose and which direction it will take in modernization of electoral process will surely be the result of a broader consensus on this issue, but once initiated, the process of modernization and the introduction of new technologies is irreversible. It can be gradual, partial or comprehensive, but it is important to make a step in the right direction.

Claudia LUCIANI
Director of Democratic Governance
Council of Europe

Dr. Irena HADŽIABDIĆ
President CEC BiH
Dear readers,

it is my utmost honor and professional pleasure to address you as an editor of this publication titled: *New technologies in the electoral process - challenges and opportunities for application in Bosnia and Herzegovina*, published by the Central Election Commission of Bosnia and Herzegovina with selfless support and financial assistance by the Council of Europe. primary goal of this publication is contribution to public discussion on essential need for modernization and digitalization of electoral process in BiH. development of information and communications technology significantly affects all aspects of life and work and that technology has significant impact on elections.

Development of new information and communications technologies with expansion of Internet and occurrence of social networks significantly affected the way in which we communicate with each other and towards the state and institutions that present and advocate general interests. today, every citizen with basic ICT knowledge can share with wider public any information, picture, video, voice, movie, etc., and anything else he/she desires. That opened vast possibilities for innovations in electoral process with provision of the highest level of security and trust.

All in all, it is hard to imagine life today without Internet and large number of technical devices – hardware and software – that we use for all forms of communication; with application of modern technologies we exercise, in different manners, our political and other rights, including the right to elect our political representatives.

The content of the publication shall, I hope, provide something for everyone interested in the application of new information and communications technologies in electoral process in BiH, which will intrigue them to go deeper in the content and analysis of proposed modalities or that, at least, the presented ideas and suggestions would serve them to, as legislators and decision-makers, initiate processes within the decision-making bodies which should result with application of some of proposed models in the electoral process in BiH.

The publication is divided into three parts.

The first part presents the author works presented at the Round table on 15th March, 2017, in the Grand hall in Parliamentary Assembly of BiH. It is important to highlight that on that occasion, aside to the members of the Interdepartmental working group for analysis of situation and proposal of modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina, practitioners, members of municipal and city election commission in BiH also delivered their observations. Their author works, which are based on large practical experience in implementation of elections in BiH, showed the need for urgent
intervention in electoral process in BiH by introduction of modern information and communications technology, which should make the electoral process in BiH more affordable, facilitated, faster and more transparent.

The second part of the publication includes the reports by international experts Tarvi Martens (Estonia) and Peter Wolf (Austria), who were engaged with assistance of the Embassy of Norway in BiH and Council of Europe, as well as reports, minutes of meetings and document *Analysis of situation and proposal of modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina*, developed within the work of the Interdepartmental working group for analysis of situation and proposal of modalities for introduction of new technologies into the electoral process in BiH.

In the end, the third part of the publication is sort of compendium with important international documents that set the standards for electronic voting and general application of new technologies in elections. I hope that it will be a sufficient challenge for some deeper research and comparative analyses of application of information and communications technologies in election worldwide, which could be highly beneficial to everyone in Bosnia and Herzegovina.

I would like to thank and highlight selfless contribution and professional engagement of numerous associates who contributed, in their own way, to publication of this material as you can see it in your hands. By that, I mean primarily the authors, associates in the Secretariat of the Central Election Commission BiH, designer Semin Drinić, as well as proofreading team of the translation association *Taba* from Živinice. My special gratitude goes to: Jasminka Joldić, Bojana Primorac, Mubera Vulović, Jasmina Ramić-Odobašić, Tatjana Krivokapić, Naida Bešović, Adi Agić, Jakuf Subašić and Dejan Ćurić, employees of the Secretariat of the Central Election Commission BiH, for their highly dedicated, selfless and professional behavior in different stages of preparation of this publication. Also, I would like to express my gratitude to Mr. Francois Friederich, Chief of Department for electoral assistance of the Directorate General for democracy in CoE, as well as to Mrs. Cornelia Perle, program advisor in the Department for electoral assistance of the Directorate General for democracy in CoE. Therefore, on my own behalf and, I believe I am not wrong to day on your behalf as well, dear readers, I thank them.

Special gratitude goes to my colleague Irena Hadžiabdić, Chairwoman, and colleagues - members of the Central Election Commission BiH whose unambiguous support to application of new, modern information and communications technologies in electoral process in BiH, was never questioned.

In Sarajevo, August 2017

Prof. dr. Suad Arnautović
PART I
Introduction

The electoral process is a process of legitimizing the holders of political power. “It is a complex mechanism and consists of a series of procedures and actions that must lead to the establishment of a legitimate political structure in power” (Arnautović, 2009: 277). The main elements of the electoral process are: “operationalization of the electoral system in the narrow sense; defining the provisions on voting right; concluding the voter lists; determination of constituencies; method of running for an election; Establishment of EMBs; determination of polling stations; regulating the voting method; ways to run an election campaign; protection of electoral rights; counting ballots; determining the election results and the distribution of the mandate and the transfer of power” (Arnautović, 2009: 279).

It is important to note that the electoral process should be distinguished from the concept of electoral system, because the electoral system is a broader term. “The particularities of the electoral process within the political and electoral system is the structuring of the relationship of power. They may, on the one hand, be a reflection of the existing matrix of political power, but also the basis for designing the future relations of political power in a particular society, on the other.” (Arnautović, 2009: 280).

The main objective of this paper is to point to the possibility of digitalization of the electoral process in Bosnia and Herzegovina, in particular with regard to the creation of the accurate Central Voters’ Register, the regulation of electronic voting, electronic counting of the ballots and determining the election results at a polling station electronically.

*Prof. Dr. Suad Arnautović, commitioneer, Central Election Commission of BiH*
However, now it is most important to immediately take the measures that are realistic, which means that they correspond to the level of our general and especially electronic literacy, our economic possibilities and, in particular, that they do not hinder the possible political consensus of all key political actors on this issue.

There are three main elements that the state of BiH must immediately initiate and consistently implement in order to catch up with the countries that have a long democratic tradition as well as the so-called new democracies, which greatly enjoy the benefits of using modern IT equipment in the electoral process. These elements are: (1) preparation of accurate CVR i.e. accurate voter registration, and closely related also accurate voter identification at the polling station, (2) use of electronic voting machines at the polling station and (3) new ballot design that can be adapted to e-voting. These elements are the icons of practical "electronic" voting, which some countries have been practicing for many years.

In this connection, the question is: "What kind of technological innovations, or modern devices that can contribute to digitalization of the electoral process in BiH, can be delegated to the competent authorities in Bosnia and Herzegovina?"

**Voter registration and preparation of accurate Central Voters’ Register**

Voters' registration is one of the most complex and most controversial parts of the electoral process anywhere in the world, and in Bosnia and Herzegovina this part of the electoral process is particularly pronounced. This applies, in particular, to the problems encountered in the registration of voters in the post-Dayton period, such as the very complex and incomplete registration of diaspora, refugees and displaced persons, and the phenomenon where deceased persons are kept on the CVR illegally.

To overcome the problems encountered, new IT telecommunications solutions, especially modern biometric technology, can provide exceptional opportunities. The biometrics application in BiH is facilitated by its apolitical nature, which is why there is broad agreement in BiH regarding the application of
biometrics in the electoral process as well. This resulted in a piece of legislation that in 200 entrusted technical development of the CVR to the IDDEEA Agency, i.e. its entire preparation for the voters in the country is based on a civil registry (passive voter registration). So highly sophisticated, high-tech solutions enable the relevant authorities in BiH and interested parties to successfully resolve all issues and problems related to voter registration. A part that is not yet covered by the passive voter registration based on a civil registry, is using of the IDDEEA records on passports issued by the BiH diplomatic and consular network for preparation of excerpt from the CVR for OCV or voting at the DCRO BiH (for which there is no logical justification). It would be necessary, as soon as possible, to start applying i.e. equating it with the process of making CVR for voters voting at regular polling stations in BiH.

A wide range of biometric features that are applied worldwide in registration include fingerprints, palm prints, retina and iris scans, voice patterns and DNA profiles. In recent years, the use of biometric technology has spread in various areas such as access control to airports, government buildings, banks, financial and other institutions, border crossings, citizens' registration, issuance of passports and identity cards, driving licenses, but also more and more in the process of registration and identification (authentication) of voters in the elections. Electronical voter registration can also be done using laptop computers, handheld web cameras and fingerprint readers.

**Role of competent bodies in preparation of the CVR**

Article 3.5, paragraph (1) of the Election Law of BiH stipulates that the Central Voters' Register shall be kept ex officio. So, the state is the one that needs to make the CVR based on official records. The role of the voter is passive. That is why, at the beginning of our discussion, it is important to define which authorities are responsible to participate in preparation of the Central Voters Register. So who are the key actors and what is their role in this important state business?

These bodies are defined in Chapter 3 of the Election Law of BiH and, in short, key actors are: CEC BiH, Entity MoIs, Police and Public Register of the
Brcko District of BiH, Register Offices, Entity Ministries on Displaced Persons, BiH Ministry of Human Rights and BiH Ministry of Civil Affairs. These are the key i.e. the original bodies that submit their records of citizens of BiH with the right to vote to a body that technically keeps records of the Central Voters Register, namely to the Agency for Identification Documents, Registers and Data Exchange (IDDEEEA) established by the Law on the Agency in June 2008 (“Official Gazette of BiH”, no. 56/08).

In the practice so far, there have been various problems in linking CVR’s records with other records kept by competent state bodies ex officio. The most commonly mentioned problems relate to names of dead people being kept on the CVR.

To build a reliable, accurate CVR, it is very important to abide by international standards in this area. Just as a reminder, these generally accepted standards are:

i. voters’ registers must be permanent;
ii. voters’ registers must be regularly updated, at least once a year;
iii. voters’ registers must be published;
iv. there has to be an administrative proceeding that is subject of judicial control or a court proceeding that enables registration of voters who were not registered; registration must not be done at the polling station on the E-Day;
v. through a similar procedure voters must have the possibility to correct inaccurate data in the register;
vi. additional registers can be the way to enable the persons who have moved or acquired the legal right to vote after final conclusion of the CVR to cast the ballot.

We in BiH have provided a high percentage of the implementation of these standards. However, there is still room for improvement, especially with regard to the correct delivery of IDDEEA records. Therefore it is very necessary to urgently begin with functional electronic bonding of the RS and FBiH databases with the database of the IDDEEA Agency, i.e. of the BiH CEC, in order to enable the
electronic delivery of the data on death recorded by the register offices in real time to all key bodies that influence establishment of accurate CVR.

As it is well known, IDDEEA is responsible for issuing standards in the field of identification documents, administration and maintenance of servers, which include data from central records, hosting of applications through which the competent bodies conduct administrative procedures about issuing personal documents, maintaining a data transfer network between institutions from all levels of government and personalization (printing) of personal documents. On the other hand, personal documents in accordance with legal regulations are issued by the competent ministries of interior (MoIs), in Republika Srpska MoIs of RS, in the Federation of Bosnia and Herzegovina cantonal MoIs and in the Brcko District of BiH the Public Register of Brcko District. Requests for issuance of documents are submitted to the organizational units of the MoIs at the place of residence. These are the original bodies that are responsible for the accuracy of the data they keep in their records. And this process goes relatively well. However, it is necessary to further strengthen the staffing and technical capacities of the Agency for Identification Documents, Register and Data Exchange of BiH - IDDEEA as the central body in the technical development and maintenance of the accurate CVR. Particularly important is that the capacity building is done in the segment of information and technological security and that continuous professional training and certification of the staff for highly specialized IT areas is done.

In this segment, it is important to develop all e-Management resources. IDDEEA has provided technical infrastructure for electronic identification of citizens through biometric documents, but for the efficient provision of electronic services in the electoral process in the future it is necessary that all levels of government optimize their processes and adapt them to this system.

In addition, it is necessary to make interventions in the normative legal regulations as soon as possible, and above all to carry out an audit of Chapter 3 of the Election Law of BiH in order to clarify the obligations of all competent authorities in the preparation of an accurate CVR. It is also necessary to update the
Rulebook on the content and manner of keeping records adopted by the BiH Council of Ministers on the proposal of the Director of IDDEEA in order to make full use of the resources and the mutual link of the records used in the production of an accurate CVR. In particular, linking the CVR records, which are now linked to the records on single citizens’ identification number, to the register of permanent and temporary residence of BiH citizens and to the register on personal documents with the register on passports, official passports, diplomatic passports and travel notes.

Furthermore, certain interventions are also necessary in the description and contents of the single methodology and programs used for preparation of CVR, as well as update of the Agreement between IDDEEA and the BiH CEC.

**Verification and identification i.e. authentication of voters at the polling station**

The next part of the electoral process in BH that requires urgent and comprehensive solutions with application of state-of-the-art technology is definitely **verification and identification, i.e. voter authentication** at the polling station. In this segment of BiH lags behind a large number of countries in the Europe and the world, and it is especially lagging behind our first neighbors and other countries of the region. The question is therefore, “What technological innovations are needed in the polling station?”

The registration and identification of voters established on biometric data on voters is also an essential element for introducing “electronic” voting in BiH. The key agency for this job, as I have already pointed out, is IDDEEA, which has long since established a technical infrastructure that can be applied for electronic citizens’ identification and is qualified in terms of technology and staff fulfill all the necessary steps for registered voters to identify at the polling station.

The current procedure for the identification and authentication of voters at a polling station is governed by Article 5.12 of the Election Law of BiH and is based on **the manual identification of voters** by the president or a member of the PSC.
This procedure is done by inspecting one of the voters' valid personal documents with the photograph, such as ID card, passport or driver's license, after which the voter is required to confirm his identity with his/her signature. The signature has a dual function: first, to confirm that the voter personally came to the polling station, took the ballot paper and exercised his/her right to vote (became a “voter”) and, if necessary, to be used later for graphological analysis by comparing it to the voter’s signature on the personal ID document. The present practice has shown that this procedure is subject to abuse and manipulation (falsification of signature, voting and signing “on behalf of” a deceased person or person who did not vote), especially when besides the “voter” the president or the member of the PSC have intention of conducting such criminal activity.

Some countries have been trying to improve this process by including voters' photographs on the excerpts from the CVR or by using electoral ink, as well as by comparing the voter's signature on the excerpt from CVR to the signature of voters on the personal document the voter presented to the PSC. However, it is undeniable that the most efficient solutions for voter authentication come with the use of biometric electronic identification and voter authentication system, using some of the modern devices of electronic biometric scanners. For this purpose it is possible to prepare portable laptop computers for each polling station where all available biographical and biometric data on voters that the agency responsible for civil register has (IDDEEA) can be exported to voters with the IDEEA can be exported.

It would be ideal for all voter registration centers and PSCs that conduct voter identification at the polling station to be directly i.e. online linked to a centralized voter register owned by IDEEA. Such a link provides the most up-to-date information on each voter available to local authorities and bodies; a double

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1 When entering the polling station for voting, each voter must present one of the valid personal documents. A member of the PSC in charge of identification is required to determine whether the voter's appearance corresponds to the voter's photograph on the identification document and to compare the single citizen’s identification number in the identification document with the single citizen’s identification number contained in the excerpt from the final Central Voters Register next to the voter's name. Once the voter proves his/her identity and his name is found in the excerpt from the Central Voters Register, the voter has to sign next to his/her name of the excerpt from the CVR and the signature has to be identical to the signature on the ID document. Member of the PSC is responsible to warn the voter about this and is responsible for that.

2 Electoral ink, indelible ink, electoral stain or phosphoric ink is a semi-permanent ink or dye that is applied to the forefinger (usually) of voters during elections in order to prevent electoral fraud such as double voting.
check that can be done directly at the polling station eliminating the crowds, nervousness and protests of the voters in case voter’s name cannot be found on the excerpt from CVRs or in case data on voter are inaccurate, wrong and incomplete; voters can also be informed immediately of any change in their polling station and, in certain cases for which the employees of the center for voter’s register or the president of PSC can be authorized, it is possible to prescribe for which level and for which type of data correction can be made on the spot instead of entering corrections into an integrated. Also, online connectivity allows for the transfer of any updated data without their physical transmission to the central voter’s register. However, it should be noted that according to positive legislation in BiH such possibility is not allowed (still). However, it is possible that, on Election Day, the authorized persons from the IDDEEA Agency, i.e. from the competent authorities, are present at every polling station with a laptop that would be connected to the central server, enabling direct entry into the system to update data in line with a strict approval.

An online system for biometric-based voter verification has an added advantage. In such cases, it is possible, if this is prescribed by law, to have a voter vote at any polling station in the country where he/she is on Election Day. In such cases, voters' names are available and verifiable at all polling locations, and the data on his / her right to vote are recorded in real time, eliminating the possibility of double voting.

The idea and framework project on the online connection of the polling stations and the Center for Counting, especially for the stage of delivery of polling results from the polling station, was presented and promoted in 2008 under the project entitled: “5000 laptops at 500 polling stations” but unfortunately to date there have not been any concrete reactions for such an improvement and digitization of the electoral process.

For the process of authentication at the polling station, one of the options is to purchase and install at each polling station a fingerprinting devices, i.e. using fingerprint readers. Certainly, it is presumed that the competent authorities have a
database of BiH citizens with voting rights with fingerprints, which is the basis for using these devices at the polling station.

Fingerprint readers can be based on scanning a fingerprint for each voter, which is the fastest and easiest procedure. However, just recording a fingerprint increases the likelihood of scams because the same person can register multiple times using different fingers. Capturing more than one fingerprint for each voter reduces the likelihood of scams and increases the amount and quality of available fingerprint data or voter information. In this way it is possible to significantly reduce the risk of fraud. More recently, fingerprints of all fingers are often in use. The bodies that store fingerprints scan all fingers of each person who registers (four fingers on the left, four fingers on the right side and both thumbs).

The next possible innovation in the electoral process in BiH is the multiple use of digital photo of voters by printing it on the excerpt from the Central Voters Register, as well as its use as an electronic presentation on the screen when identifying and authenticating voters at the polling station. All BiH citizens registered in the Central Voters Register have a stored digital color photo in the databases of the competent authorities that the IDDEEA Agency disposes of. This photo can easily be inserted into the Central Voters Registered and CVR excerpts, and processed biometrically via the Face Detection application and displayed on the screen at the PS. This screen can be a laptop or a regular PC or a flat screen TV, and additional projection via video (video projector) can be made to the screen placed at a polling station so that all present election observers and members of the polling station committee can see the voter's face for identification and authentication. This check, with the recognition of fingerprints, may further increase the accuracy of the voter authentication system at the polling station, so this system should be used together with fingerprint recognition devices.

Verification of voter signatures can also be significantly improved by using new technologies. Although the signature of a voter given on the excerpt from the Central Voters' Register at a polling station may, intentionally or unintentionally, differ significantly from the signature on the personal document with the
photograph, which makes the reliability of the electronic signature verification difficult, yet the image of the voter's signature on the personal document may still be extremely useful for visual comparison with a signature on the excerpt from the Central Voters Register, especially if graphological expertise is used.

And finally, we have to mention iris recognition devices for voter identification and authentication that are relatively new and so far, comparatively, rarely used in the electoral process. Identifying the voter through iris recognition has several advantages over fingerprints, because the eye is physically more protected from fingerprints. Also, iris scans can be made from the distance i.e. without voters getting in contact with any equipment and without the possibility of the sample being spoiled or physically damaged. However, the biggest barrier to using iris scanning technology and the use of this data for election purposes is that the cost of procurement, maintenance and renewal of this technology is still relatively high.

**Electronic voting machine**

According to the positive legislation in BiH, and after the voter's authentication, the procedure at the polling station continues by voter signing the excerpt from the Central Voters Register, whereafter the member of the PSC issues a ballot paper and directs the voter to a vacant voting booth to vote.  

It is this process that requires the electoral process to be reformed, namely the introduction of electronic voting machines at polling stations in BiH, or scanners, as verified modern devices for electronic voting at a polling station.

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3 Iris is a coloured disc-shaped part of the eye, located between the cornea and the pupil. Iris consists of connective tissue and tiny muscle fibres. The round black stain in the iris is called a pupil. No man in the world has the same texture, shape and colour of iris similar to the fingerprint.

4 After filling the ballots, the voter folds them to protect the secrecy of the vote and inserts them into the ballot box one by one. Member of the PSC in charge of controlling the ballot box shall ensure that all ballot papers are put into the ballot box. If a voter attempts to put in a ballot box a ballot paper that differs in colour or otherwise (e.g., has by-mail note on the other side) from the original ballot papers issued at polling station, will notify the president of PSC thereof who will take that ballot from the voter. The president of PSC will record this case in the Minutes on work of PSC (ZARBO), including the data from the voter’s identification document.
One of the possible options is the use of an electronic voting machine (e.g. PCOS - Precinct Count Optical Scan). This device was used, among other things, in parliamentary elections in the Philippines, South Korea or Kyrgyzstan. It represents essential tool for a drastic acceleration of the electoral process. Based on the optical scanner, it allows for automatic countrywide data capture after the closing of the polling station, providing information on: the total number of votes for each party; the total number of votes per candidate; the total number of blank ballots; the total number of registered voters; the total number of those who voted; the total number of invalid ballot papers; identification of the polling station and the municipality; the time of closing the polling station; and give the opportunity to obtain a variety of validation reports; internal codes of electronic voting machines, etc.

New design of ballot

The use of electronic voting machines, however, requires a new ballot paper design to be electronically processed. This requires a reduction in the format of the current appearance of the ballot paper so that the sheet can be drawn through the scanner. Therefore, in order to significantly speed up the process of counting and unifying the results, the ballot paper must be of such a format that the electronic voting machine can accept and process it.

As known, a system of closed unblocked lists is in force in Bosnia and Herzegovina. Eventual introduction of a new technology e.g. use of PCOS machine or a touchscreen or other machine would require a software to recognize a political party to which the voter gave the vote and within that candidate list a candidate to whom the voter would give the vote (if one preference system is in place). The solution can be, for example, that each party has its own number and that each candidate of that party has his/her own number. The voter would have the option, besides the choice of the party, to nominate a single candidate preferred on the list of that selected party. Any of presented solution, based on a very precise mathematical algorithm, would require interventions in the BiH Election Law.
“Electronic voting” vs. electronic voting

This is an opportunity to draw attention to a conceptual confusion that has been present lately in our public space. Namely, recently some of senior officials have been disseminating the new that “electronic voting” will be introduced at the next elections in BiH, which is actually identified as internet voting. Although Internet voting will become inevitable in the future and such a way of voting has the chances of being generally accepted one day, there are still many dilemmas before its final implementation. The positive side of internet application in the electoral process is the speed of processing the voting results, its accuracy and, in particular, the possibility of mass participation in elections, and that voters do not have to come to the polling station but can do it from their homes.

To avoid such information causing confusion with citizens and the public, it is necessary to emphasize the need to introduce IT technology into the electoral process in BiH in the context of our realistic possibilities. That is why, first and foremost, it is necessary to explain the difference between "electronic voting" and "voting over the internet" which is currently "impossible" for BiH, especially for the forthcoming 2018 elections, and "electronic voting data processing" which has possibility of being introduced in 2018, if this is a political will.

For each new policy solution, this is what science politics teaches us, it is necessary to meet the three conditions: (1) that the new solution is technically and technologically feasible; (2) that there are funds secured for the new solution in the budget; and (3) that there is political consent between the decision makers to implement the proposed solution. The next period will show whether these three conditions are met in view of the extremely important electoral reform, i.e. the introduction of electronic processing of voting results on the most modern basis.

In this context, the question is whether internet voting is technically feasible in BiH at this time even if funds are allocated for this purpose and political consensus for introducing modern IT technology into the electoral process achieved?
The decisive moment in making the decision to introduce the Internet into the electoral process in BiH is related to the general electronic literacy of the voters, which includes, among other things, the mass use of the electronic signature. The question is whether, according to the current level of this literacy, this system could be applied in the 2018 elections in BiH?

While it is certain that this system will considerably facilitate and speed up the processing of voting results, it should be borne in mind that, in addition to the current electronic registration of the citizens, the process of issuing biometric personal documents for all voters in BiH and diaspora should be fully implement or assign each voter the appropriate biometric voting card.

I think that the use of internet voting in BiH has not yet reached all the necessary conditions, but that is now the right time for electronic voting and processing of results at each polling station using electronic voting machines, i.e. optical scanners.

**Conclusion**

What would be generally achieved with digitalization of electoral process in BiH? First and foremost, the highest possible speed in obtaining, processing and announcing election results, approximately two to three hours after closing of the polling stations. Secondly, the highest possible accuracy of the results and the third, maximum transparency of the electoral process, eliminating the possibility of violations of the electoral process such as registration and "voting" of the dead, multiple voting, carousel voting, etc.

Modern IT and telecommunication technology facilitates all social processes, including the electoral process. At the time of general computerization, it is impossible to imagine life without the application of technical-technological solutions that make our daily, both official and family jobs easier for us. Emphasized digitization of part of the electoral process in BiH, as well as internet voting presented in this paper, is our future. Although there may be fear and
reservations because possible manipulations in the elections or the cost-efficiency, which can slow down or put a stop to introduction of modern telecommunication devices in the electoral process in BiH and its digitization at one time, digitization of elections is our destiny, but also the need.

Due to the current political circumstances, it may be unfortunate at this time to forecast when the time will come for a more comprehensive application of modern telecommunications and other technical and technological solutions to the electoral process and internet voting in Bosnia and Herzegovina. However, one should emphasize the proactive actions of the Central Election Commission of Bosnia and Herzegovina to discuss this topic in the public space on an expert basis and to take concrete steps within the executive and legislative authorities in BiH.

What is undeniable is that Bosnia and Herzegovina has enough capacity, both intellectual, expert and material, to make the digitization of the entire electoral process realistically possible. New technologies in the election also offer us an accelerated electoral reform. The only question is whether we want that?!

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Council of Europe Recommendation on Standards for E-Voting*

Abstract

This report provides a brief overview of the Council of Europe’s initiatives related to electronic voting (e-voting) with a specific focus on Recommendations Rec(2004)11 and the draft Rec(2017)XX, the only international standard for electronic voting. The Standards aim at harmonizing the implementation of the principles of democratic elections and referendums when using e-voting, thus building trust and confidence in domestic e-voting schemes.

In case e-voting will be introduced in Bosnia and Herzegovina, the usage of this technology should be guided by adopted version of the Recommendation.

Scope of the Council of Europe Recommendations on Standards for E-Voting

There are many technologies that can be applied in electoral processes: voter registration systems with or without biometric features, voter verification systems in polling stations, that may or may not utilize biometric identification technology, voter information systems, electronic result tabulation, tally and transmission systems and result publication systems are only a few of them.

The Council of Europe (CoE) Recommendations Rec(2004)11 and Rec(2017)XX only deal with arguably most critical election technology: e-voting or in other words, the use of electronic means to cast and count the vote. This category includes systems such as Direct Recording Electronic (DRE) voting machines, ballot scanners, digital pens and internet voting systems.

About the Council of Europe Recommendation(s) on E-Voting

Council of Europe Recommendation on Standards for E-Voting is the only existing international standard on e-voting and as such has been applied by CoE member states and beyond.

The Recommendation is adopted by the the Committee of Ministers of CoE member states and developed ensure that electronic voting complies with principles of democratic elections and referendums.

As of March 2017 there are two versions of the CoE recommendation:

- The initial Recommendation Rec(2004)11 on Legal, Operational and Technical Standards for E-Voting which was adopted in 2004

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The draft Recommendation Rec(2017)XX on Standards for E-Voting. This draft not yet adopted by Committee of Ministers, but adoption is expected for 2017


Around the 2014 meeting it became clear that after ten years there was a need for updating Rec(2004)11. The mandate for this update was given to the Ad Hoc Committee of Experts on Legal, Operational And Technical Standards for E-Voting (CAHVE). CAHVE was set up by the Committee of Ministers on 1 April 2015 and consisted of government appointed representatives from several CoE member states and organizations with direct experience or specialized knowledge on e-voting.

CAHVE's mandate was to prepare a new Recommendation updating Rec(2004)11 and its explanatory memorandum in the light of recent technical and legal developments related to e-enabled elections in the Council of Europe member States. The updated version was drafted as an enhancement of Rec(2004)11 and not as a completely different and entirely new standard. The update therefore mainly consisted of enhancing and further developing the existing Recommendation Rec(2004)11. Work focused on redressing the identified flaws of the Recommendation, taking advantage of recent experiences with e-voting in the region and in addressing the implications of emerging technical concepts and solutions.

At the end of 2016 CAHVE completed the update and delivered the draft Rec(2017)XX on Standards for E-Voting. The draft will be submitted for adoption by the CoE Committee of Ministers in 2017.

**Content of Recommendation Rec(2017)XX**

Recommendation Rec(2017)XX is based on obligations and commitments as undertaken within existing international instruments and documents, such as:

- the Universal Declaration on Human Rights;
• the International Covenant on Civil and Political Rights;
• the United Nations Convention on the Elimination of All Forms of Racial Discrimination;
• the United Nations Convention on the Elimination of All Forms of Discrimination against Women;
• the United Nations Convention on the Rights of Persons with Disabilities
• the United Nations Convention against Corruption
• the Convention for the Protection of Human Rights and Fundamental Freedoms (ETS No. 5), in particular its Protocol No. 1 (ETS No. 9);
• the European Charter of Local Self-Government (ETS No. 122);
• the Convention on Cybercrime (ETS No. 185);
• the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data (ETS No. 108);
• the Additional Protocol to the Convention for the Protection of Individuals with Regard to Automated Processing of Personal Data regarding supervisory authorities and transborder data flows (ETS No.181)
• Recommendation No. R (99) 5 of the Committee of Ministers to member States on the protection of privacy on the Internet;
• Recommendation Rec(2004)15 of the Committee of Ministers to member States on electronic governance
• Recommendation CM/Rec(2009)1 of the Committee of Ministers to member States on electronic democracy
• the document of the Copenhagen Meeting of the Conference on the Human Dimension of the OSCE;
• the Charter of Fundamental Rights of the European Union;
• the Code of Good Practice in Electoral Matters, adopted by the Council for democratic elections of the Council of Europe and the European Commission for Democracy through Law and supported by the Parliamentary Assembly, the Congress of Local and Regional Authorities and the Committee of Ministers of the Council of Europe;

It recommends that the governments of member States when introducing, revising or updating as the case may be, domestic legislation and practice in the field of e-voting:

i. respect all the principles and standards of democratic elections and referendums;
ii. assess and counter risks by appropriate measures, in particular as regards those risks which are specific to the e-voting channel,
iii. be guided in their legislation, policies and practice by the standards included in Appendix I to the Recommendation. The interconnection between the abovementioned standards and those included in the accompanying Guidelines on the implementation of the recommendation should be taken into account;

iv. keep under review their policy on, and experience of, e-voting, and in particular how and to what extent the provisions of this Recommendation are being implemented in order to provide the Council of Europe with a basis for holding review meetings on the implementation of this Recommendation at least every two years following its adoption;

v. share their experience in this field;

vi. ensure that the Recommendation, its accompanying Explanatory Memorandum and Guidelines are translated and disseminated as widely as possible and more specifically among electoral management bodies, election officials, citizens, political parties, domestic and international observers, NGOs, media, academics, providers of e-voting solutions and e-voting specific controlling bodies;

vii. to agree to regularly update the provisions of the Guidelines accompanying the Recommendation

The above-mentioned Annex I then contains a set of 49 standards in 8 sections:

- Section I: Universal Suffrage (4 standards)
- Section II: Equal Suffrage (5 standards)
- Section III: Free Suffrage (9 standards)
- Section IV: Secret Suffrage (8 standards)
- Section V: Regulatory and Organisational (4 standards)
- Section VI: Transparency and Observation (5 standards)
- Section VII: Accountability (4 standards)
- Section VII: System’s Reliability and Security (10 standards)

**Examples of the standards in Rec(2017)XX**

While all standards in Rec(2017) are of equal importance, the following are a few example standards that can give some insight in the contents of the recommendation:

**In the Universal Suffrage section:**

Standard 1: The voter interface of an e-voting system shall be easy to understand and use by all voters.
Standard 2: The e-voting system shall be designed, as far as it is practicable, to enable persons with disabilities and special needs to vote independently.

In the Equal Suffrage section:

Standard 9: All official voting information shall be presented in an equal way, within and across voting channels.

In the Free Suffrage section:

Standard 10: The voter's intention shall not be impacted by the voting system, or any undue influence.

In the Secret Suffrage section:

Standard 19: E-voting shall be organized in such a way as to ensure at any stage of the voting procedure that the secrecy of the vote is respected.

Standard 23: An e-voting system shall not provide the voter with a proof of the content of the vote cast for use by third parties.

Standard 24: The e-voting system shall not allow the disclosure to anyone of the number of votes cast for any voting option until after the closure of the electronic ballot box. This information shall not be disclosed to the public until after the end of the voting period.

Standard 26: The e-voting process, in particular the counting stage, shall be organised in such a way that it is not possible to reconstruct a link between the unsealed vote and the voter. Votes are and remain anonymous.

In the Transparency and Observation section:

Standard 30: The components of the e-voting system shall be disclosed for verification and certification purposes.

In the Accountability Section:

Standard 36: Member States shall develop technical, evaluation and certification requirements and shall ascertain that they fully reflect the relevant legal and democratic principles. Member States shall keep the requirements up-to-date.

Standard 37: Before an e-voting system is introduced and at appropriate intervals thereafter, and in particular after any significant changes are made to the system, an independent and competent body shall evaluate the compliance of the e-voting system and of any ICT (Information and Communication Technology) component with the technical requirements. This may take the form of formal certification or other appropriate control.
In the System Reliability and Security Section:

Standard 40: The electoral management body shall be responsible for the respect and enforcement of all requirements even in the presence of failures and attacks. The electoral management body shall be responsible for the availability, reliability, usability and security of the e-voting system.

Finally, Standard 27 in the Regulatory and Organizational Section: Member States that introduce e-voting shall do so in a gradual and progressive manner, is of key relevance also for all major implementations of new election technologies. This standard entails:

- preparations start well ahead of elections
- feasibility is established and the reasons for adoption of new technologies is clarified
- a proper risk analysis and cost-benefit analysis is conducted
- pilot projects are implemented and evaluated, and
- voting technology is thoroughly tested before use

Complementary Guidelines

Detailed guidelines for the implementation of the objectives expressed in the standards of Rec(2017)XX can be found in the new "Guidelines on the implementation of the provisions of Recommendation Rec(2017)XX on standards for e-voting" and the Explanatory Memorandum that accompanies the Recommendation. The new Guidelines include an updated version of the provisions of this level from the old Recommendation Rec(2004)11 and from the two Guidelines associated to it, namely the "Guidelines for developing processes that confirm compliance with prescribed requirements and standards in the region (Certification of e-voting systems)" and the "Guidelines on transparency of e-enabled elections".

Recommendations

The Central Election Commission of Bosnia and Herzegovina and other competent bodies in the county should follow and, as far as possible, participate in Council of Europe initiatives in the field of electronic voting and specifically track the progress towards adoption of Rec(2017)XX

At the latest when it becomes clear that electronic voting systems will be introduced in Bosnia and Herzegovina the CoE Recommendation should be translated to local languages
The Council of Europe Recommendation on E-Voting should guide any introduction and use of electronic voting in BiH.

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Electronic voting (also known as e-voting) is voting by electronic means to perform the voting process itself as well as vote counting. Depending on the individual realization, e-voting may include a range of Internet services, from the basic service that entails data transfer, to the complete online voting function through home WiFi devices at home. Accordingly, the degree of automation may vary from simple jobs to a complete solution, including registration and voter authentication, voter input, local or central pooling, voting data encryption and transfer to server, consolidation and tabulation, and electoral administration. A consistent and complete e-voting system implies most of these jobs, which must follow the established legislation, and must be able to successfully cope with the high demands on security, precision, integrity, speed, privacy, auditability, accessibility, economics, scalability and ecological sustainability.

For the purpose of explaining the concept of electronic voting, the following definitions are most often used: "Collecting, validating and counting votes in the electoral process using information and communication technologies" and "Electoral voting system that allows the voter to vote electronically safely and in secrecy".

Through the history of electronic voting, the following types of electronic voting are distinguished:

**Punch card system** – Abandoned system. This system has been used since 1960 in the United States, which was at the time the culmination of technology, and it is interesting to note that this system was even in use until November 2012 at the elections in Florida and was not used ever since.

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Optical scan voting system enabling scanning of paper ballots and computerized summation of checkboxes marked on ballot paper i.e. tabulation of results.
Specialized voting in kiosks (including independent DRE system, direct-recording electronic). It is e-voting that is under physical supervision of the polling station committee (entails e-voting on the machines that are installed at the polling stations).
The voting machine DRE records the votes through the screen on which the ballot is placed, and the voters access the voting by means of mechanical or electronic-optical components (usually by means of keys or touch screens) that process the data using software intended for this purpose, saves the data from the filled ballot and stores them in internal memory. After completion of the voting, a table view of the voting data stored in the internal memory is obtained. These data can also be printed. The system may provide for the transfer of individual ballots or votes to the central location to perform data consolidation and obtain results from individual constituencies and a final report from the central location.

The pioneer in the very beginning of electronic voting is Brazil, which in 1996 introduced a specific electronic voting system, so-called semi-electronic voting. After a survey was conducted in more than 50 municipalities, the Brazilian Central Election Commission has launched its "voting machine". Since 2000, all Brazilian voters are able to use electronic voting boxes at the elections. In 2010, in the presidential election, which had more than 135 million voters, the result was presented 75 minutes after the end of the vote.

The electronic voting box consists of two micro terminals (one is in the voting booth and the other one with the member of PSC) that are connected with 5 meter cable. These micro terminals have only numeric keypads, which do not accept any commands if more than one key is entered simultaneously. In the event of a power failure, the internal battery provides power or can be connected to the car battery in the event of shortage of power for its proper functioning. Today the Brazilian "electronic voting boxes" serve as a model for other countries. In 2008, Brazil had about 450,000 of these electronic voting boxes.

_Brazilian "electronic voting box"_
The United States had in 2002 provided access to voting system at the polling station to people with disabilities, which most of the US states accepted and enabled use of DRE machines, and some of them completely transferred to this system. In 2004, 28.9% of registered voters in the USA used direct data storage in the central system during e-voting.

The Electronic Voting Machine (EVM) used in India was tested in 2004 with a parliamentary election with 380 million voters who voted and used more than a million voting machines. The system is a set of two devices that work on 7.5V batteries. One device is called a voting unit and used by the voter, and another device is called the control unit and is managed by the Election Officer. Both units are connected by a 5 meter cable. The voting unit has a "Blue Key" for each candidate, one device can support 16 candidates, but up to 4 units can be connected to have 64 candidates. The control units have three buttons on the surface, namely one single confirmation key, the other key gives an insight into the total number of votes up to that point, and the third key closes the election process.
The result display bar is hidden and closed and cannot be used until the third button is pressed to complete the process.

**DRE voting system through public networks**

The DRE voting system through public networks is an electoral system that uses an electronic ballot and transmits ballot data from a polling station to another location through a public network. Voting information can be transmitted as individual ballots such as rejected ballots, occasionally as a ballot series during an election day or all at the end of a vote. This includes Internet voting as well as telephone voting.

The DRE voting system through public networks can use the method of sending data to a polling station or method of sending data to a central location. The method of sending data to a central location displays tabular results from ballot papers from multiple constituencies. Internet voting can be used from remote locations (voting from any computer connected to the Internet) or to use traditional polling stations with kiosks that consist of Internet connected voting systems.

Based on numerous studies of electoral processes in the world, it has been found that one of the most unreliable types of voting is voting with electronic devices in kiosks using DRE devices or tablets that are susceptible to hacking attacks ([Appendix - Mr. Bruce Schneier's review of specialized voting device, IBM security expert - WinVote touchscreen IPad voting machine in California](#)).

**Hybrid voting systems**

**Hybrid systems** that include electronic marking of the ballots (usually touch screen screens similar to DRE devices) or other auxiliary technologies for marking of the ballots (e.g. digital pencil - ePen), as well as used of a special device for electronic tabular view.
**Internet voting** so-called i-voting from PCs, laptops, smart phones, tablets, etc. Through private computer networks or Internet. With regard to voting over smart phones and tablets, the voting system technology using these media has not yet been perfected solely because of the high security requirements of the electoral process, which cannot be 100% guaranteed.

Internet voting systems have gained popularity and are used in all elections and referendums in Estonia and Switzerland, as well as in municipal elections in Canada and primarily in elections in the United States and France (systems that use e-voting at the polling station and i-voting). One of the safest and most reliable aspects of electronic voting is Internet voting via a protected PC or laptop, as no unusual activity or obstructions, no irregularities or malversations have been detected so far.
Internet voting

E.g. in Switzerland, voters receive their passwords for access to ballot papers by mail service. Most Estonian voters can vote at local and parliamentary elections via the Internet in one of the most modern ways in the world. This is enabled because most Estonians have ID cards with built-in computer readable microchips and this is how they access online voting. All they need is a computer, an electronic card reader, their ID card and PIN, so they can vote from any part of the world.

In principle, two main types of e-voting are commonly used: electronic voting on machines at the polling stations - either DRE, optical or hybrid systems and e-voting via the Internet (called i-voting) where an elector votes from the home or from any other location without going to the polling station.

Possibilities of introducing electronic voting in Bosnia and Herzegovina

All necessary formal and legal preconditions for the use of electronic voting in any form have been met in Bosnia and Herzegovina. The implementation of the electronic signature at the state level has started by adoption of all necessary laws and by-laws. The citizens can use their own secured qualified electronic signature, not only relying on the IDDEEA's identity cards, but also on other forms of authorization and authentication, such as bank certificates. For example, the fact is that 99% of people have a bank card and can use their own certificate, as is the case in neighboring Slovenia and Croatia. These are certificates that citizens are already using for banking services (along with the paid certificate, citizens who want to vote via the Internet should have a card reader or access with their own qualified certificate). Alongside the public administration and the IDDEEA, BiH can rely on the business sector, i.e. on certification houses that issue secure electronic signatures.
Regarding the domestic software industry, which is an integral part of the overall ICT sector, and which has shown great potential for growth over the last 15 years and has grown to become respectable potential of Bosnia and Herzegovina from the industry. The data we received from the BiH BIT Alliance is that more than 420 small, medium and large IT companies are operating in Bosnia and Herzegovina today, which have recorded growth of revenues from 201% to 1419% over the past 5 years, and growth in the number of employees up to 583%. The BiH software industry has already proven that it can hire young qualified people and that is capable of delivering high quality software solutions to the most demanding world markets such as the US and the EU, as well as to participate in the development of the most demanding software solutions for the needs of Bosnia and Herzegovina.

So BiH is ready to improve on technology, knowledge, people, and ideas, with the help of public administration, the business sector, academia, and all relevant stakeholders in this process.

**Advantages of e-voting are:**

- Access to everyone and everywhere, if the option of i-voting is used,
- The speed of obtaining election results,
- The great advantage of electronic voting systems in relation to other voting techniques is that the electronic voting system can be included in any of the seven stages of the electoral process, in the preparation, distribution, voting, collection and counting of ballots, and thus can bring advantages to any of these steps,
- Minimizing the number of invalid ballots,
- By using advanced technical solutions that support the improvement of the electoral process, e.g. cloud services, which is a very near future, the response and speed of the system increases, increasing the availability of election results, and there are no so-called „server crashes“ because now a large number of data is located on a secure and protected „cloud server“.
  
  For example, there is a service portal in the United States that allows US citizens living abroad to access their ballot papers from the cloud computing environment - clouds, 45 days before the election, on the Microsoft Azzure platform, where no security breach was detected. This platform was used in the last US presidential elections in 2017.
- Electronic voting allows every individual to have the same rights and opportunities regardless of individual differences, especially the so-called e-inclusion of persons with disabilities. For example, DRE devices can be customized and used in combination with the audio interface with the use of headphones to ensure secrecy of the vote, assisting blind and vision impaired persons or, for example, using a visual interface for people who do not speak BH languages so that they can independently vote in secret and without help. For the introduction of such technology the extra costs are
low, and the opportunities are great and very important for the inclusion of all marginalized people.

**Disadvantages of electronic voting** are:

- Resistance of voters due to new technologies,
- People do not give up on the traditional way of voting
- Based on the study conducted on "Remote Electronic Voting in Estonia's 2007 Parliamentary Elections", it has been shown that instead of eliminating inequalities, i-voting has somewhat increased the digital gap between higher and lower socio-economic classes. At the Estonian elections in 2007, there was a greater response of voters with higher social status, income and higher level of education than those with lower incomes and who had primary and secondary education.
- Political parties that have more support from people who are more familiar with Internet voting can for that reason be more successful in the elections, due to i-voting, which tends to increase voter turnout of the high and middle class citizens
- Relative security against hacker attacks, for example, voting with some DRE devices is very unsafe and vulnerable to hacker attacks, while Internet voting is one of the safest options as well as some types of high-quality hybrid systems.

**Conclusions and recommendations/Short-term, mid-term and long-term goals**

It is very important to keep in mind the short, medium and long-term goals of introducing electronic voting due to the number of required assumptions that have to be met. Accordingly, it is necessary to define the recommendations related to the execution of the goals when introducing electronic voting.

**Short-term goals**

- Incorporate new electronic technologies gradually and non-aggressive in line with the specificity of Bosnia and Herzegovina, previously testing them in the individual stages of the electoral process, starting from the simplest initial stages.
- Inclusion of new electronic technologies should be in line with the positive practices of countries in the region and in the world, using method of elimination of most critical solutions.
- Provide for any type of electronic voting that everyone has the same rights and opportunities regardless of individual differences, in particular allow disabled people secret and independent voting. This concept does not require a large investment and can be carried out in the short term.
- To continuously promote the introduction of new technologies into the electoral process through various types of media, including social networks,
and to train polling station committees for work with new technological solutions.

**Mid-term goals**

- To incorporate **new electronic technologies in the main phases** of the electoral process, such as identification and authentication, voting, tabulation, and testing them in all stages of the electoral process.
- To **continuously promote** the possibilities of electronic voting and in general use of the Internet, to organize training on the use of the Internet in rural environments and for older people, which would significantly reduce the digital gap and allow equal voting opportunities for people of different social, economic and educational status.
- When switching to advanced technologies, it is most important to take into account the **concept of electronic voting security**, which must include organizational security measures with precisely defined security organization procedures that must guarantee anonymity of voting and that reporting is done in accordance with the electoral rules.
- To enable the choice - **multiple types of electronic voting** to be chosen by voters, including getting to the polling station with the use of new technologies, as well as allowing those who want to vote via the internet in the country, in absentia and diaspora.
- Adopt **new ICT organizational procedures** when introducing new technologies, which must be documented, verified and their application must be improved in accordance with the practice (ICT procedures must be separately made for polling stations, and for central location, as well as for their relation).
- Electronic voting and development activities at all times should be focused on two main objectives: **ensuring security, increasing usability and accessibility**.
- Give advantage to the **domestic software industry** in developing electronic voting solutions.
- New technologies must be **verifiable** - for all three aspects of verifiability: individual verifiability, universal verifiability, and verifiability of voting rights. Individual verifiability enables the voter to verify his vote included in the outcome of the election, universal verifiability enables the voter or observer to check whether the election result corresponds to the ballot paper and the verifiability of the voting right permits the voter and observer to check that ballots marked by eligible voter from a single voter register were included in the outcome of the election.
- In accordance with all changes in voting technology, it is necessary to make **changes to the Election Law and all other legislation related to the electoral process in BiH**.
Long-term goals

- In line with the practice and technological progress, it is necessary to ensure **further development of the electronic voting system through research and development**: to conduct additional research on electronic voting, to test the system on attacks and to improve it in preventing attacks, to additionally work on defense enhancement mechanisms and cryptographic research, to develop new enhanced electronic voting protocols, increase security on the client's part, to increase usability and availability, implement pilot projects in implementing new authentication methods, and in particular exploration of expanding the use of new electronic voting platforms on the client's part (Smartphones, Tablet PCs, etc.).

- **To present** the results obtained through research and development.

- In line with the results and goals, work on **improving the current electronic voting system**.

- Establish **legal regulation** for the continuous improvement of the electoral process, which will create the obligation of constant technological progress, in line with world standards.

Annex

The main causes of "electoral process with mistakes and frauds" are lack of testing, inadequate audit procedures, and insufficient attention paid to the system or design of the electronic voting process. Insufficiently secured hardware can be subject to physical attack. Some electronic voting critics claim that an old hardware can be inserted into the machine, or between the user and the central mechanism of the machine, using the human factor as means of attack on the machine. However, by establishing review and testing procedures, viral codes or fake hardware can be detected. Usually hardware is secured by sealing off the device as well as by blocking access using simple security mechanisms.

One of the methods for testing the machine on any mistake is parallel testing, which is carried out on the E-day with a randomly selected machine. For example, the United States has used these security measures at the 2000 presidential elections and had found that only 2 ballot papers per every constituency had a mistake.

One of the leading US experts in IT security, IBM's Bruce Schneier with his team of experts investigated the security of the DRE voting devices that are in use in almost every US country and came to the conclusion that these devices are absolutely unsafe and susceptible to hack attacks. He gave a humorous and sarcastic account of the situation as well as an advice on "how to hack a voting device" - below.
Disadvantages of DRE voting device - How to hack WinVote touchscreen voting machine, Bruce Schneier, IBM security expert

1. Weak passwords, hard-coded and cannot be changed
2. The Wi-Fi network used by the DRE machine is encrypted using a wired privacy protection system, the encryption algorithm is so weak that it takes only 10 minutes for the hacker to break the network encryption key.
3. The weaknesses of the WEAP (Wired Equivalent Privacy) algorithms for secure communication over the IEEE 802.11 wireless networks are so well known that IEEE, the world's largest association of technology experts, banned it in 2004.
4. This system named WINVote has a version of Windows XP that has no available update since 2004, making it vulnerable to dozens of known attacks that can lead to complete machine damage. To make things worse, the machine does not use a firewall (a network device whose purpose is to filter the network traffic to create a security zone) and risks the access to several important Internet ports.
5. The Virginia Information Technology Agency (VITA) investigated the machine, and found that this machine could be easily hacked from a smartphone.

So how would someone use these vulnerabilities to change the election results?
1. Take your laptop and sit outside at a parking lot near a polling station.
2. Use a free "sniffer" for traffic capture, and use it to get the password for the WEP algorithm.
3. Connect to the voting machine via the nearest Wi-Fi device.
4. If the machine asks for a password, the administrator password is "admin".
6. Use a free tool to extract a network key.
7. Add, delete, or modify any of the ballots in the database in the Microsoft Access database – votes in the database.
8. Upload a modified copy of Microsoft Access database back to the voting machine.
9. Wait for the election results to be published.

Note that none of the above steps, with the possible exception of getting the WEP password, require special IT knowledge. In fact, they are pretty simple for an average office worker to do them on a daily basis.

Crash of the electronic voting machines in California, 2007

Thousands of electronic voting machines were withdrawn from use in California after the state secretary decided to retire them. It was decided to withdraw 33,000 electronic voting machines in 20 countries before the 2008 presidential election, due to the high susceptibility to hackers’ attacks. Certain touch-screen electronic voting systems will not be used in election units due to security breaches that may endanger vote counting. California returned to paper ballots.

It was decided that hybrid systems (electronic pencils and electronical counting of the votes with the optical scanner) were introduced at these locations, and it was concluded that e-voting has to be improved after the elections.

One billion dollars of assistance was provided to US states before the 2008 elections for the process of transitioning the voting system in the US into a more modern one with all standards.
Analysis of the situation and proposing modalities for introduction of new technologies in election process in Bosnia and Herzegovina*

About Agency

The Agency is an organization within the BiH Ministry of Civil Affairs and is the legal successor of the Directorate for Implementation of the CIPS Project (2002). The Agency was established on July 22, 2008 with the seat of the Agency in Banja Luka, with 4 regional centers (Sarajevo - Disaster Recovery Location, Mostar, Bijeljina, Bihać). Within the Agency there is also the Center for Storage, Personalization and Transport of Personal Documents in Banja Luka.

The Agency maintains a large number of records for which there is consent from the primary bodies.

IDDEEA keeps the records of:

- Single Identification Numbers
- Temporary and permanent place of residence of BiH Citizens
- ID cards of BiH citizens and ID cards for foreigners
- Civilian, official and diplomatic passports and travel notes
- Driving licenses
- Registration of motor vehicles and registration documents
- Pecuniary fines and offence records
- **Central Voters’ Register**
- Issued border passes with personal information of Croatian citizens
- Personalized technographic cards

The process of issuing personal documents is showed in picture below.

*Mersiha Lonić-Pašalić and Aleksandar Kapikul, IDDEEA Agency*
The IDDEEA Agency is solely responsible for the technical management of the Central Voters’ Register. The Agency with its resources is responsible for the proper functioning of servers, applications, and data transfer networks. The Agency does not own the data stored in the records, but is the primary body. Apart from keeping the records, the Agency has the following competencies:

- It proposes and implements strategies in the field of identification documents
- Maintains servers for keeping information entered by competent bodies
- Maintains applications through which the competent authorities conduct administrative procedures related to issuing personal documents
- Administer the data transfer network between institutions at all levels of government
- Maintains records and personalization (printing) of identification documents, registration plates and vehicle registration documents
- Digital signature in the area of identification documents

The information system of Agencies can be logically and functionally separated into two separate entities. The first is made up of applications and records defined by the "Law on Agency for Identification Documents, Registers and Data Exchange of BiH". The second is an information system that is exclusively used by the staff of the Agency and is defined by the "INSTRUCTION on the content, managing and using of information system of the Agency for identification documents, registers and Data Exchange of BiH“.

**IDDEEA – Network**

The system is realized with radio-relay equipment throughout BiH and consists of: a portable part (realized with PtP links of greater capacity, minimum 155 Mbps) and access equipment (base stations and end-user equipment). Equipment operates on licensed frequency band on over 120 antennae throughout BiH. More than 20 institutions are connected to the network with over 800 end-user locations.

The users of SDH network that is maintained by the Agency are:
- Ministry of security,
- State Investigation and Protection Agency
- Border police,
- Office for Foreigners’ Affairs,
- Directorate for coordination of law enforcement bodies,
- High Judicial and Prosecutorial Council (including all locations of the courts and prosecutors’ offices at all levels of government in BiH),
- BiH Federation Ministry of Interior,
- RS Ministry of Interior,
- Police of Brčko District,
• Cantonal Ministries of Interior (in total 10 of them)
• Ministry of defense,
• Intelligence-security agency,
• All municipalities and cities in BiH (for verifications during issuing of biometric ID documents for the BiH citizens),
• **Central Election Commission and all locations of the municipal election commissions in BiH**

**Bodies, institutions in the identity chain:**
- 143 register offices – IDDEEA networked register offices in May and June of 2009;
- Competent MoIs: Ministry of Interior RS and 10 cantonal ministries of interior;
- Public register of Brčko District;
- BiH Ministry of civil affairs, BiH Ministry of Foreign Affairs, FBiH Ministry of Interior and RS Ministry of local self-government.

Citizens can apply for personal ID documents at:
- 132 locations for issuance of BiH ID documents (MoIs and Public Register of Brčko District)
- 46 locations of the MFA BIH – Network of embassies.

**IDDEEA and CEC**

The CIPS Implementation Directorate supports the electoral process in BiH since 2006, and the CEC and the MECs have been linked to a single system via the communication network. The original methodology and program for processing and keeping records of the Central Voters Register was signed in February 2009 (v2). The unique methodology among others contains:

- Defines and contains competences and obligations of the Agency and the CEC
- The manner of developing CVR
• Passive voter registration – 144 locations in BiH have been networked through this project (CEC + 143 MECs)

The CIPS has since 2006 and the IDDEEA Agency since its establishment in 2009 technically supporting the electoral process in Bosnia and Herzegovina, and the Central and Municipal Election Commissions are linked through the network administered by IDDEEA to a unique system, which greatly facilitates the implementation of the elections. By 2006, we had active voter registration. Since 2009, IDDEEA and CEC’s cooperation was improved by signing the document "Uniform Methodology and Program for Processing and Keeping the Record of the Central Voters' Register", which clearly specifies the competences, obligations and deadlines for these Institutions related to the passive registration of voters for the elections. Agency for Identification Documents, Registers and Data Exchange (IDDEEA) is not responsible for entering data in the records based on which the actual cross section of the Central Voters' Register is done. IDDEEA is only responsible for the technical management of the Central Voters' Register, i.e. it is not responsible for data processing, but only for the proper functioning of the server, applications, and data transfer network. MoIs i.e. Register Offices are competent for the data, their processing and accuracy are, because the Central Voters' Register is created on the basis of the data from the register of Citizens' Single Identification Number, temporary and permanent place of residence, and ID cards, which are only and exclusively submitted by competent MoIs.

Unique methodology

Competent bodies

• The Central Election Commission of BiH maintains the Central Voters' Register for the territory of Bosnia and Herzegovina on the basis of the Agency's records, which electronically keeps records of data of citizens of Bosnia and Herzegovina on behalf of other competent authorities, in accordance with the Law on Agency, unless otherwise defined by the Election Law of Bosnia and Herzegovina.

• IDDEEA -Agency maintains and is responsible for the overall technical processing of all data important for the Central Voters' Register. Technical processing implies all activities carried out in accordance with the Law on the Agency.

• The accuracy and updatedness of the data required for the creation of the Central Voters' Register is the responsibility of the body responsible for keeping official records of such data. The Agency is responsible for technical maintenance and electronic recording of data exclusively in
accordance with Article 8, Paragraphs (4) and (5) of the Law on Agency for identification documents, registers and data exchange.

_How is the CVR developed?_

Election Commissions, together with the Centers for Voters’ Register for a competent constituency are responsible for:

- CVR management and updating activities at the level of the basic constituency for which they are responsible
- Designating polling stations
- Monitoring the accuracy and updatedness of CVR data,
- Publishing excerpt from the Central Voters' Register
- Defines and establishes polling stations in the territory of the relevant basic constituency
- Designates addresses (streets and settlements) to polling stations
- In a limited number of cases, it directly determines polling stations for individual voters,
- updates the previous data, in accordance with the change of voters' number and established procedures,
- on the basis of individual requests provides insight into the data contained in the excerpt from the Central Voters' Register to citizens in the territory of the relevant basic constituency
- Receives citizen requests and handles complaints concerning the data under which voters are entered in the Central Voters' Register.

The Agency gives the election commissions permanent access through the communication network to the data and records approved by the Central Election Commission of BiH using the processing program. Agency updates the data on polling stations based on decisions on designation of polling stations and data entered through electronical records by election commissions, on polling station for each eligible voter, and submits the register of certain polling stations with associated streets and codebook to the BiH CEC after any changes in the electronic form.

_Recommendations_

- Improve communication and cooperation between IDDEEA and the CEC in day-to-day work at the technical level
- It is necessary to improve communication between the competent authorities for the provision of information to the CVR
- Change the modus operandi so that it is possible to verify that the CVR data are updated in accordance with the regulations
To establish a working group consisting of IDDEEA and CEC representatives aimed at delivering:

- Analysis of the current state of the technical conditions for the conduct of the elections
- Proposal of amendments to the Unified Methodology in accordance with the Rulebook on Content and Method of Keeping the Record
- Project assignment for the new application "Passive voter registration" in accordance with the applicable regulations since it has been in operation for over 10 years and has shortcomings
- Proposal to amend the Election Law, if necessary
- Proposal to strengthen the ICT capacities of the CEC and IDDEEA in order to ensure high quality implementation of the electoral process

Communication between the MECs and the polling station has a lot of room for improvement with respect to the modern communication tools that are generally available to the public. The MECs are responsible for the preparation of the polling station committees, but are not responsible for the results of their work and solving of consequences of poor quality work is though transferred to the central level. To transfer responsibility for re-counting ballots and shredding to the MECs. This shortens the chain of responsibility by putting the activities of the polling station committees fully under the jurisdiction of the MECs. Polling station committees are the weakest link in the electoral process and every time there are numerous irregularities, so if the MECs would be responsible for the regularity at the polling stations, then there would be only some minor omissions in electoral process itself.

The big problem in the electoral process are the names of the deceased persons that can be found on the voters' register, and therefore levels of responsibility should be explained. In the case of death, the local registry offices deliver this information to the competent Ministry of Interior, and the competent MOI conducts the procedure and changes the records (here status changes are made). IDDEEA warned competent MoIs, municipalities, but also the CEC on the obligation to keep data compliant with the regulations and the risks that arise in case the personal data are not processed adequately. The FBiH MoI, the Ministry of Administration and Local Self-Government of the Republika Srpska and Brcko District should complete the establishment of the electronic register, which would significantly reduce the risks for these cases.

Note: The following documents were used in analyzing improvements relating to CVR, IDDEEA's role in the electoral process and passive voter registration:
- *Unique methodology and program of processing and keeping the Central Voters' Register*
- *Rulebook on IDDEEA Agency*
- *Law on IDDEEA Agency*
- *CEC's Rulebook*

### Recommendations concerning e-voting

Although some types of electronic voting machines are used in some countries of the world (USA, Canada, India), there are still none in BiH as well as in many other countries (and in the region as well). Voting is still more or less the same as it was a few decades ago before the emergence of modern computer and communication systems. There are paper ballots, different ballot, etc.

One of the basic motives for using electronic voting systems is the speed of vote counting. Expensive, uncertain and time consuming vote counting in some of the world's most populated countries has led to the need to use electronic machines or online software voting systems.

- During the development of these electronic and online systems, frequent objections to such voting systems are often mentioned. There is a significant and very present complaint that such machines may be subject to manipulation. The complaints relate to the uncertainty and untrustworthiness of such voting systems (such a voting system was dropped in France because the French government abandoned plans to allow its citizens to vote in parliamentary elections in June because of the fear of cyber-attacks).

- If e-voting is something to be introduced, it definitely has to meet certain conditions.
  - **E-voting should ensure that:**
    - Everyone can vote and it can be done only once
    - Person who are not on the voters' list cannot vote
    - Voting should be completely anonymous
    - Every vote is properly recorded
    - The vote must not be lost or changed
    - The voting process is auditable and reliable.

- **Electronic (online) systems should ensure the following:**
• Provide the opportunity for anyone who wants to vote can do that from the current location (outside the place of residence, including from abroad).
• Send an e-mail invitation for voting.
• More thinking during the voting process, viewing biographies and candidates' programs that are linked to ballot papers.
• Reducing the cost of voting and of the entire electoral process.
• Speeding up counting process and results reporting.
• Greater precision and accuracy, i.e. reducing the possibility of error at counting, collecting, manually entering data, collecting ballots etc.
• Facilitate the preparation of voting and ballots and other electoral materials.

NOTE Electronic voting can be considered as mid-term or long-term measure to improve electoral process.

- One of the problems that arises is that not everybody has access to the Internet, so there should be so-called hybrid voting model, where some people vote online, and others in a classical manner. This additionally complicates the implementation and the protection measures, and the possibility of overcoming the problem is that "classic" voting sites are equipped with online voting computers instead of the classic ballot boxes. "Online“ voting would be feasible with biometric documents and smart card readers. The problem is that not all people with the right to vote in BiH have this document. The overview of number of people who have biometric ID document (March 2017) is presented in the table below.

<table>
<thead>
<tr>
<th>Total number of valid ID cards: 3.150.909</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of biometric ID cards: 2.056.449</td>
</tr>
<tr>
<td>Total number of valid old ID cards: 1.094.460</td>
</tr>
<tr>
<td>Total number of permanent ID cards: 724.042 (permanent old ID cards 360.055)</td>
</tr>
<tr>
<td>Total number of biometric permanent ID cards: 363.987</td>
</tr>
</tbody>
</table>

Number of ID cards on old form with expiry by years („OLD Ids“)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of ID cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>121.517</td>
</tr>
<tr>
<td>2019</td>
<td>109.842</td>
</tr>
<tr>
<td>2020</td>
<td>121.681</td>
</tr>
<tr>
<td>2021</td>
<td>124.880</td>
</tr>
<tr>
<td>2022</td>
<td>128.583</td>
</tr>
<tr>
<td>2023</td>
<td>14.803</td>
</tr>
</tbody>
</table>
It is important to note that the number of persons who have a valid biometric PI, but old ID card is **473,564**, so the number of persons with at least one biometric document is much higher. By March 1, 2023, all citizens will have a biometric ID card, except those with "old" permanent ID card (currently about 360,000 persons).

Electronic voting has already become a reality in some countries. Systems used are special voting machines or on-line systems (this had major implications for politicians, political parties, propagation and political campaigns). It is certain that the introduction of electronic voting will result in higher turnout of young people.  
- There are over 5000 polling stations in BiH and it is estimated that it would take around 20-25 million KM to complete the installation of this system at polling stations. If we take into account the fact that there would be some savings in one election cycle, it is clear that such an investment would be **cost-efficient in a long run** (experimentally introduce it to smaller territorial units such as local communities and test it). The results could be released immediately after the closing of the polls. This all entails changing the Election Law if we want to prevent various thefts and manipulation with votes and a large number of invalid ballots that would not be possible through electronic voting.  
- Electronic voting would reduce election costs, election results would be known a few minutes after closing of the polling stations, preventing a large number of invalid ballots that could greatly affect the outcome of the election itself (Especially if we know that the polling station committees are the weakest link of the electoral process and every time there are numerous irregularities).

**Note: Data from the IDDEEA's records and websites (Free Europe, N1, Telegraf) used in preparation of the analysis**

**Conclusions from the conference „free and fair elections for all citizens“**

On March 27, 2017 a conference „Free and fair elections for all citizens“ was organized by the Coalition „Pod lupom“.

Based on the presentations and discussion it is clear that there are a lot of problems with the work of the polling station committees (PSC) in the electoral process, which makes this segment the weakest link. The main problems are political pressures, poor PSC training, omissions in packing and delivering election materials, poor preparation of PSCs for elections, PSCs often advocate party interests, voting without personal documents, re-counting at polling stations (PS) etc.
Recommendations concluded at the conference:

- Announcing elections 120 days prior to the E-Day instead of 180 days;
- Introduce mandatory cancellation of election results at PS where there is an excess / lack of ballots;
- Amendments to the Election Law or the adoption of a new Election law related to PSCs work that would eliminate problems in the PSCs;
- Enable non-party observers to file objections;
- Provide better training for PSCs;
- That the Presidents of the PSCs are not party persons;
- Introduction of translucent ballot boxes.

Conclusions from the Presentation „Method of maintaining CVR and using the electronic voter identification device in Montenegro“

Secretary of the State Election Commission of Montenegro and his associates, made a presentation „Method of maintaining CVR and using the electronic voter identification device in Montenegro“. The electronic voter identification device was presented in the presentation. The device consists of a terminal printer, OCR document reader and monitor, which are integrated into one device. The process of voter identification at the polling station is carried out by passing an identification document through the device's reader. If a voter is registered at that polling station, on the left side of the screen, the voter's photo will be displayed, on the right name and surname, the Single identification number of the voter and his/her address. Simultaneously with electronic identification, the device will print and paper slip-certificate containing the name and surname, ID number and serial number of voter which is identical to the one in the printed voters' register. The application has been made so only one positive identification of the voter can be done, and only one certificate printed. The advantage of the device is that at any moment it can show the turnout at this polling station, a more detailed identification of voters and would speed up the electoral process in terms of obtaining the official results. However, because of the many drawbacks that this device contains, we consider this solution in the electoral process not acceptable.

Drawbacks of the electronic identification device are:
- Impeded reading of certain documents;
- Electricity is needed for the functioning of the device, because the device does not have backup power supply so in case of power blackouts the device could not be used;
- The price of the device is not low (having in mind that there are more than 5000 PS in BiH);
- The device should be accompanied by the fingerprint reader (a voter could vote with someone else’s ID card if PSC is to allow that);
- Data from this device cannot be transferred and it cannot be connected to the Center for counting (no internet connection).
Role of diplomatic-consular representation offices of BaH in electoral process – experiences and lessons learned*

The Ministry of Foreign Affairs of BiH, whose part are diplomatic-consular representation offices (hereinafter DCRO) conducts tasks concerning residence and protection of rights and interests of BiH citizens who permanently or temporarily reside abroad and domestic legal entities abroad, as well as encouraging, developing and coordinating cooperation with the BiH diaspora.

Article 1.5 of the Election Law of Bosnia and Herzegovina states that citizens of Bosnia and Herzegovina who are temporarily residing abroad have the right to vote personally at an appropriate polling station in Bosnia and Herzegovina, or at DCRO or by mail.

The Central Election Commission of Bosnia and Herzegovina has through its bylaws regulated designation of polling stations in the DCROs under the condition that at least fifty (50) voters have registered to vote at that DCRO. Exceptionally, based on the assessment, the Central Election Commission of BiH can make a decision on voting in the DCRO even if number of register voters is smaller taking into account the financial aspect as well as the technical possibilities for making such a decision.

Determining the polling stations in DCROs is made after registration of refugees and persons temporarily residing abroad in the central voter’s register. The registration in the central voter’s register is done through an active registration system by submitting the application form PRP-1 to the Central Election Commission of BiH, which is delivered either by post, by fax, by electronic mail or personally through the registry office of the Central Election Commission of BiH. Registration in the central voter’s register of people who have the right to vote is made throughout the year.

*Stela Misilo-Šunjić, Ministry-adviser, Ministry of foreign affairs of BiH
The voters who were registered in the central voter’s register for voting outside BiH at the previous elections receive from the Central Election Commission of BiH PRP-2 forms to confirm personal data. The documents required for registration / verification are ID cards or passports, which are delivered with PRP-1 or PRP-2 forms.

After making a decision on the polling stations, the polling station committees are formed in the DCROs consisting of three diplomats, employees of the Ministry of Foreign Affairs of BiH in that DCRO, and three members elected among the persons registered for voting at that polling station and three substitute members. Training of the PSC is done by the BiH Central Election Commission. Ballot papers for the polling station in the DCRO are sent by express mail, and after the voting and processing are completed, they are sent as diplomatic mail. For the local elections in 2016 the voting was organized in the following DCROs: Embassy of BiH - Belgrade, Embassy of BiH - Vienna, Consulate General of BiH - Stuttgart, Consulate General of BiH - Munich and Honorary Consulate of BiH - Gratz.

It has been recently noted that a smaller number of voters are registered for voting, regardless of how they vote, at DCROs or by-mail. The reasons are following:

- Registration or confirmation in the central voter’s register every two years;
- Complicated and outdated application procedures for voting outside BiH;
- Lack of web forms that voters would fill in (a simpler registration or a certificate for registration in the central voters’ register);
- An unequal position of BiH citizens residing abroad in relation to BiH citizens who vote at the regular polling stations in BiH;
- The polling stations abroad are located at the headquarters of the DCROs (the long distances that voters have to travel on the E-Day to personally vote in the host countries);
- Problems with recognition of foreign documents when registering in official records and issuing identification documents;
• The problem of digital identification of voters who use online services i.e. e-mail.

Recommendations for improving the electoral process for OCV, personally in DCROs or by-mail:

• Enable voters outside Bosnia and Herzegovina to register or confirm registration in the central voter’s register through a web application. The Active Registration System should enable online submission of applications by voters outside BiH, which should fully replace the existing, out-of-date system for registration to vote outside BiH;

• Indicate to the legislator the need to equalize access to the registration of voters outside BiH and voters living in BiH, so that parts of active registration are integrated into the passive voter registration;

• Citizens of BiH who have applied for issuance of a travel document at DCRO should be included in the procedure of registration and certification of voters abroad;

• Organize elections in the recipient country in places where there is no DCRO, but where is a large number of BiH citizens who want to vote in person at the polling station;

• Organize two-day (Saturday and Sunday) elections in DCROs;

• Ensure that the polling material, which voters send by mail, are collected in DCROs and sent as a diplomatic mail to the center for counting;

• Indicate to the legislator the need to introduce early voting;

• On the Election Day, as a long-term goal, allow online voting.
Independent voting of blind, visually impaired and illiterate persons in elections*

Summary

In the procedure of implementation of new technologies in the election process, it is necessary to pay special attention to development of software for blind, visually impaired and illiterate persons. That is the population that, so far, couldn’t vote without the assistance of another person. Independent voting of blind and illiterate persons is one of the most complex problems in introduction of new technologies in the election process.

The UN Convention for persons with disabilities, ratified by BiH, states in Article 29 that the countries are obliged to provide persons with disabilities to participate in public and political life under equal conditions as other citizens.

Software for blind persons

Specialized agency for software development for blind computer users Agency Insert, for the needs of election voting, developed accessible software that can be used in the process of voting.

During the development process, focus was on adaptation of the software for blind, visually impaired and illiterate persons.

With this software, the blind, visually impaired and illiterate persons can independently participate in the election process because it is completely adjusted to their needs so they can vote without anyone’s assistance, which guarantees the secrecy of the vote.

Voting speed is satisfactory, because the system enables fast crossing over closed/opened lists, enabling the voter to skip the candidate lists he/she is not interested in.

*Hamdo Kenta, Insert Agency Sarajevo
Following principles were applied in development of this software:

1. Voting is completely anonymous.
2. Each vote must be appropriately recorded.
3. The vote may not be lost or altered, entire process is checkable and reliable.
4. It is possible to apply all the rules that are used in the classical voting process.
5. Its usage doesn’t require ICT knowledge.
6. It is used on all Windows operative systems.

**Voting is completely anonymous**

Usage of earphones with the software is planned. The voter gets all the information audibly. Software compiled a realistic pleasant voice of a speaker which serves as an assistant and informs the voter on what should be done to have a correct voting. Simultaneously, the screen doesn’t show the ballots, which enables completely discrete voting.

**Each vote must be appropriately recorded**

It is not possible to make a mistake in the voting process, since each marking (vote) needs to be confirmed by the voter. When the voter completes the voting, the decision also must be confirmed. In the end of the voting, the voter can listen to own selection registered by the software.

**The vote may not be lost or altered, entire process is checkable and reliable**

After the voting, the ballots can be printed or, in digital format, be sent online to a specific location according to valid election rules.
Reliability of this process is guaranteed with checking the software code by an expert team to whom it is submitted.

*It is possible to apply all the rules that are used in the classical voting process*

Software has the ability of preferential voting. It is also possible to apply all rules or procedures foreseen by the election law. Software is adaptable and eventual alternation of election rules or adding new shall not impact the accessibility of the voting software for the blind, visually impaired and illiterate persons.

*Its usage doesn’t require ICT knowledge*

This software is accompanied by a specially designed keyboard, which has, per its characteristics, the most similarities with the phone keyboard. Phone keyboard, as one of the most common and used keyboards, proved to be the most practical and the simplest input device. Known distribution of buttons on the regular phone keyboard enables simple navigation with appropriate audible instructions of the program.
The software was successfully tested by illiterate and blind persons, with no assistance.

It must be highlighted that classical input devices (mouse, touch screen, electronic pen, regular and numerical keyboard, etc.) are not accessible to blind, visually impaired and illiterate persons without ICT skills.

Using this keyboard that comes with the software, aside to blind and visually impaired persons and persons with sight problems, independent voting is also enabled for illiterate persons and persons who cannot, due to numerous reasons, hold a pen in the hand.

**It is used on all Windows operative systems**

The software is portable, it can be used on all computers, laptops with Windows operative system. It doesn’t require usage or installation of screen readers and speech synthesizers.
Video presentation of this software’s usage is available on the following YouTube link:
https://www.youtube.com/watch?v=Kyc-2BEXyEI&feature=youtu.be

fig 3: blind person voting

**Conclusion with recommendations**

Procurement of this voting set doesn’t require massive funds. Once procured equipment for voting of blind, visually impaired and illiterate persons pays off through multiple usages.

Install at least one such software-hardware set in all municipalities in BiH, which would provide equal voting rights to blind, visually impaired, illiterate and other persons with sight issues.

This would respect their basic human rights, taking care of their dignity, anonymity, discretion and independence, so they could anonymously, discretely and independently give their vote to whom they desire.

**Literature**

*United Nations Convention on Rights of Persons with Disabilities*

Hamdo Kentra  
Agency Insert  
http://www.ainsert.com
Inspection of the ballot papers before the E-Day, problems that slowdown and hinder electoral process observed, possible solution*

**Introduction**

Certain criteria that subjects must meet in order to be entitled to certification of the list for participation in the elections for any level of authority are defined by constitutional and legislative set up of electoral regulations and electoral law in Bosnia and Herzegovina. Different information, plans, policies, projects and ultimately political parties' candidates will be available to the public or to the voters during the election period.

The pre-election period will allow familiarization with the political subjects and their goals, as well as with the candidates, but what the practice shows is the voter's problem on the Election Day, which is reflected in the slowdown in the electoral process. Decreasing or hampering the implementation of the electoral process is reflected in the lack of knowledge about the lists, i.e. order of the political subjects and candidates on the lists. Presenting political subjects and candidates has a certain degree of importance in the fulfillment of the voters' voting rights, but what appears to be the problem in an electoral cycle and process is the lack of familiarization with the ballot paper in its original form.

**General information**

In accordance with Article II 1, Article IV 1, 2 and 4a) and Article V 1a) of the Constitution of Bosnia and Herzegovina and Article V of Annex 3 (Agreement on Elections) of the General Framework Agreement for Peace in Bosnia and Herzegovina aimed promoting free, fair and democratic elections that ensure achievement of democratic objectives, the Parliamentary Assembly of Bosnia and Herzegovina, adopted the Election Law\(^5\).

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\(^5\) BiH Election Law („Official Gazette of BiH“, nos: 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16).
The current Election Law has undergone several amendments that set principles applicable to elections for all levels of government in BiH, the authorities responsible for the conduct of the elections, funds for conduct of elections, the means of dispute settlement, and other matters of importance for conduct of elections.

The Election Law in Bosnia and Herzegovina, i.e. its Constitutional set-up, determines the levels of government that are subject to elections, so in two separate cycles of four years we have general and local elections, i.e. general elections for members of the Presidency of BiH, Members and delegates of the Parliamentary Assembly of BiH, members and delegates of the Parliament of the Federation of Bosnia and Herzegovina, members and delegates of the National Assembly of Republika Srpska, and the local elections for the members of the Cantonal Assembly, members of Municipal/City Assemblies/Councils, municipal and city.

The Election Law also defines the basic rights of voters, the right to vote and the right to be elected, the rights of political subjects, both the right of a political entity of a legal person / party and a political subject / natural person.

The election process, which lasts six months, until the E-Day, begins with announcing the elections, and certifying political subjects' lists.
In this period and in accordance with the legal provisions, the EMBs undertake a large number of activities in organizing and preparing the elections. The Central Election Commission of BiH is the basic body established by the Election Law, which is responsible for conduct of elections, interpretations and all other activities of electoral process.

On the day of elections are announced and candidates' lists certified in BiH, political subjects start election campaign, presenting their program goals, candidates and established policies.

Political subjects offer to citizens, more precisely to the voters, an array of instruments to get familiarized with their political goals, programs, activities and their candidates.
Voters have a multitude of pre-election materials in the form of different articles, advertising systems, and public performances by all certified political subjects. During the pre-election activities the voters i.e. the public will be informed and will rest their confidence in one of the political subjects that demonstrated and gained the confidence of the voters.

However, regardless of political subject's presence and pre-election campaign, the problem of electoral process is its slowing down or hindering due to the lack of knowledge on distribution of political subjects and candidates within the political subject on the ballot paper.

The detected problem is an aggravating fact and factor that significantly influences the electoral process, because when voting a voter need much more time to find his/her preferred candidate than the time the voter needs to get acquainted with the basics of the electoral process.
Too many people and the inability to simplify, will not be solved by any pre-election policy or program of the political subjects. The problem of getting the public or the voters acquainted with the process is only solved by systemic means, by using one of the IT solutions that have already proven to be significant and more effective.

Source: http://www.faktor.ba (Tuesday, 21.03.2017)

**Conclusion**

The aforementioned and identified problem of electoral process, which is present and which cannot be solved in any way through election campaigns, programs and various activities, and which we cannot hand over to political subjects for resolution, can only be solved by the electoral process regulator through systematic approach.

Namely, we have pointed out the fact that one of the previously recognized problems of voter is registration as well as the fact that they are not „familiar“ with the polling station.

The Central Election Commission of BiH has detected this problem and solved in a very effective way, through the IT system, allowing the voter to get the registration information and the location of polling station by sending a SMS message containing his/her Citizens' Single Identification Number. In this way one of the voters' basic rights to be informed was enabled.
The problem of not knowing layout of the ballot paper i.e. order of political parties on the ballot paper and order of the candidates on the lists can be solved by using the existing IT solution.

The voter could send his/her Single identification number via SMS as before and apart from receiving the information on registration and location of the PS, the voter could also receive layout of the ballot. In this way the voter would be able to view the ballot, to see the order of the political subjects, and on the Election Day he/she could vote more easily, exercising his constitutional right to vote and to be elected.
Communication between the Central election commission of Bosnia and Herzegovina and municipal/city election commissions*

Introduction
In the sea of various types of communication, depending on the subjects of that communication, the media in which it is carried out, its purposes and outcomes, social roles and goals, its optional or obligatory nature, free forms or norms, communication between the public authority holders is distinguished. Because these bodies are part of a public, state apparatus, partly having autonomous powers to act in the implementation of laws, partly in the system of subordination that communication must be and is standardized both in terms of content and technical parameters.
Thus, the communication between the election management bodies, primarily the CEC and the municipal/city election commissions, both in the normative and technical sense, is decisive for the final outcome - the success of the election. The point of this article is to present elements of this communication with the aim of initiating its improvements in the normative and technical aspect.

Communication between the Central election commission of Bosnia and Herzegovina and municipal/city election commissions
Good, i.e. quality, accurate, fast, efficient, and transparent communication between the election management bodies is cause sine qua non of successful and democratic elections. The assumptions for this are: a) normative regulation, determination and harmonization of regulations, b) technical equipment compatible with normative documents, and c) training of actors, members and EMBs for the application of both previous assumptions.

aa) Normative regulation, determination and harmonization of communication CEC-MEC

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- The BIH Election Law, already in chapter 2 - Election management bodies, i.e. in Article 2.13, which prescribes the jurisdiction of the MEC, sets the contours of this communication. It is inter alia set that the MEC: - oversees and controls the work of the Center for Voters' Register (p-1). As the BiH Central Election Commission is responsible for the Central Voters' Register, its accuracy, updatedness and overall integrity (Article 3.6, paragraph 1 of the Law) it follows that the MEC is a link and control mechanism between the CEC and the municipal centers for the voters' registers as its branch offices.

- The next competence of the MEC is to determine the polling stations in the area of the municipality for voting at all levels of government. Immediately after the determination, the MEC submits a list of the locations of polling stations to the CEC, so that the CEC has an immediate insight into all 5,300 regular polling stations in BiH, whereat it monitors compliance with the statutory requirements or limitations of Articles 5.1 and 5.2 of the Law. This primarily relates to the location of the polling station, where the system of negative enumeration determines where the polling stations cannot be located, as well as the number of voters at one polling station or the distance of the polling station from the electorate.

The competence of the MEC is also to conduct process of nominating, appointing and training members of the polling station committees (Article 2.13 point 3 of the Law). It is about 50,000 members at the level of BiH, and it is procedure that is repeated for every election. The whole process must be transparent, and the CEC must and can have insight in the whole process, and see whether everything was done in accordance with the Instructions on determining the qualifications and procedure for the appointment of members of polling station committees (consolidated text - Official Gazette of BiH No. 32/16).

- The Municipal Election Commission issues accreditation to observers who will monitor its work, the work of the Center for Voters' Register and the work of polling station committees. The MEC may refuse to issue, and in case of any obstruction of the electoral process it can annul already issued accreditation, which
can be appealed before the BiH CEC (Chapter 17 of the Election Law). There are hundreds or thousands of observers (i.e. procedures for issuing accreditations under the conditions prescribed by the Law!) at the level of the municipality / city and tens of thousands at the entity or BiH level. This area is fully covered by the information system and the CIK-MEC communication functions impeccably.

The key competence of the MEC prescribed by the Law is the one referred to in Article 2.13, paragraph 1, p.8, according to which the MEC: "compiles the results of elections from all Polling Stations in the municipality, separately for each body for which elections were administered and forward the results to the Central Election Commission of BiH!"

The spectrum of this communication is elaborated in detail in Chapter 5 of the Election Law - the conduct of the elections, as well as the Rulebook on the manner of conducting the elections in Bosnia and Herzegovina (Official Gazette of BiH, No. 32/16, consolidated text). The procedure of the CEC and the MEC in certain situations has been elaborated in detail, however, one situation seems to be incomplete. Namely, in critical situations, when the voting is interrupted for less than three hours due to violation of the order (Article 5.9, paragraph 3 of the Law), the president of the PSC decides about prolonging the time of voting after 19:00, but MEC decides about prolonging the voting time if the interruption lasted more than three hours. Having in mind that these are critical situations, on which the regularity of the elections depends (or, possibly the cancellation!!), the PSCs regularly consult MECs, and the MECs consult CEC, which had a positive effect, and in the current practice these situations were successfully solved. However, these obligations of consultations are neither in the Law nor in the Rulebook, which leaves the possibility for the consultations not to happen which can result in major challenges in the election process. It should be noted that, although this is not prescribed as an obligation, the CEC requests the MEC through the Instructions on the sequence of actions and the reporting procedure, and they regularly provide information on the opening and closing of the polling stations, i.e. whether or not all polling stations opened and closed on time, as well as on the turnout of voters.
This reporting is, however, only a post festum statement, and cannot have an operational impact on the quality of the electoral process, that is, on the prevention and elimination of risks.

A very specific type of communication requires a statutory possibility of voting by so-called tendered- enveloped ballot (Article 5.18 paragraph 1 and 2). PSCs are obliged to enable voting for each voter registered in the central voters' register, but whose name, for some reason, is not found on the excerpt from CVR for voting at the regular polling station. This happens most often because the voter's name is found on the excerpt for by-mail voting, and on the E-day the voter came to his/her place of residence claiming that he/she did not take the voting material by mail and that he/she did not vote in that manner. The PSC hands over such voting material to the MEC, which sends it to CEC in a package. The CEC, in a special procedure, checks the voting rights and verified ballots are counted and the results are added to the other results. The situation is the same with voting by special polling station committees - mobile teams that are formed for the voting of persons in their homes and apartments, homes for elderly people, healthcare institutions and prisons. The procedure partially overlaps with the voting procedure of displaced persons within BiH for the municipalities of residence according to the 1991 census.

In the past local elections, for the first time, a new procedure was introduced for unifying and determining results at the municipal level by the MEC. Namely, in the practice so far, in the event that when consolidating results at the municipal level for sending them to the CEC, the results do not match i.e. if during the control of the results errors are determined that cannot be resolved mathematically or logically, all material was sent to the CEC which ordered a re-count in the main counting center in Sarajevo. However, for these elections, a by-law prescribed the procedure according to which, at the request of the MEC, the CEC approved re-counting in the municipal election commission and under its control. According to the results of such action, it seems that this communication and the procedure have passed the exam, so we had faster and more easily determined election results.
This is a way of communication between the MEC and the CEC in the area where
the information is originally broadcast, i.e. created by the CEC and the MEC. But
the most important information, data and documents are made by the polling
station committees. After the closure of polling stations they are immediately
determining results of the voting, they compile a record of the work of the PSC, fill
in the appropriate forms, publish the voting results at that polling station, and then
immediately, and no later than 12 hours after the closure of the polling station,
submit the material to the Municipal Election Commission, including the remaining
unused material. All this is done physically. It is a procedure prescribed by the law,
(Articles 5.25 and 5.26 of the Law). T

The addition of the norms to the Law enabling other ways of delivering results,
primarily using information technologies, would provide for the introduction of
them into the electoral process, with the great benefit that it carries.

bb) Technical equipment (compatible with normative procedure)

It seems that CEC-MEC communication in the election process had definitely
exceeded the pen-paper-phone-fax level. Namely, the aforementioned
competencies of the MEC and the actions and procedures necessary for the
realization of these competences are technically and technologically set, so that the
CEC and MEC are connected and communicate electronically through developed
applications, more than twenty of them, within the developed information and
technical system known as JIIS BiH.
Thus, for the designation of polling stations, there is a specially developed application through which decisions are delivered or made available to the CEC, and the CEC can intervene in accordance with Article 5.1 of the Law and change the location of the polling station. The most important obligation of the MEC in this segment, “consolidating and determining, entering and controlling the election results from all polling stations in the municipality, especially for each body for which the election was held and the delivery of these results to the CEC” is carried out through the developed system- an application that fully meets all the required standards of accuracy, efficiency, safety, reliability and credibility.

The work of the MEC on complaints and appeals, i.e. its competence in this area, which is very widely set out in Chapter 6 of the Election Law is also modernized. MEC enters all complaints and appeals into the application, and uses the application to update the status of complaints and appeals, so it is visible and accessible to the CEC at any time.
The technical equipment of the MEC and the CEC, i.e. its effects, are limited by the lack of technical capacities in the polling stations and by the normative limitations to the method of determining the election results, as stated above in the section on the normative.

This technological inferiority at polling stations, at the level of paper and pen, manual filling of the forms, recording, rewriting, manual summation leads to the situation where determination of election results is slow, subject to errors, suspicions in accuracy and credibility. Thus, polling stations and polling station committee are a weak link, the weakest link in the electoral system, which requires urgent normative intervention and technical equipment. Then we would have fast and fully valid election results, protected from unlawful interference by human factors, primarily parties and candidates through members of polling station committees.

cc) Training of stakeholders- EMBs and its members in the application of new technologies

Technology is just a mean of facilitating the electoral process, and at the center of all events, it is always a human being. In order to manage the process as well as the modern technologies involved in this process, the members of the EMBs are obliged to improve their knowledge and educate themselves. This process is permanent and obligatory, just as the Law stipulates: "Members of the competent authorities responsible for the conduct of elections shall have to undergo the continued training during their mandate, in accordance to the educational curricula issued by the Central Election Commission of BiH“ (Article 2.2 paragraph 5) and „If a member of the election commission or polling station committee fails to undergo the training referred to in the previous paragraph during his/her mandate, he/she shall be released from the duty." NGOs also point out the importance of training in their election observation reports in Bosnia and Herzegovina, for example, Coalition „Pod Lupom“ (under the magnifying glass). In the final report on the civic, non-partisan observation of the 2016 local elections in BiH, recommendations for improving the electoral process directly suggest that it is
necessary "to provide continuous training to local election commissions in order to increase the efficiency of their work in the electoral process" (recommendation No. 23), as well as "to make thorough changes and concrete improvements in the training of the members of the polling station committees" (recommendation No. 24).

From the aforementioned legal provisions, as well as from opinions and attitudes of neutral observers, the significance of education, as well as the consequences that occur through the failure of this obligation, is clearly visible. However, in practice, there are various obstacles. Amendments to the legislation are also occurring immediately prior to the announcement of elections, and therefore harmonization of by-laws is done immediate before the elections, which leaves little time for organization of high quality education. Then, members of the MEC are engaged in their workplaces, so education is done partially or insufficiently in depth. The particular problem is that members of the MEC are by nature of things and according to the Rulebook mostly lawyers or have degrees in social sciences, that is, they do not have or cannot have technical education in the field of new technologies. From this comes the need for special experts to be engaged in this field, which in itself may be a problem, as they are not officially integrated into the system of EMBs.

Conclusion with recommendations
1. Standardized communication between the election authorities, primarily between the CEC and the MECs, as the supporting pillars of the entire electoral pyramid is a condition for the successful elections, i.e. for elections to be assessed as free and democratic.
2. Achieved level of relatively high degree of information-technical communication needs to be maintained and further improved, existing applications simplified and new ones developed.
3. In order to achieve this, it is necessary to review and update the complete normative area, in particular by-laws, eliminate ambiguities and contradictions, and
make these policies and instructions more comprehensible. They need to be shortened, avoiding overdevelopment syndrome, copying of legal norms, or their unnecessary paraphrasing. I consider that cooperation with MEC this area could have great results.

4. Training of MEC members to be systematically done by CEC and other experts from certain areas, preferably through an institutionalized Education Center (prosecutors and judges and at the BiH and Entity level have their own education centers)! To plan in the budget of BiH (for the implementation of the Law of BiH, Article 2.2, paragraphs 5 and 6 of the Election Law - is obligation of the budget of BiH), necessary funds, and not to leave this obligation to the capabilities of individual municipalities, understanding or misunderstanding of their leading people, even of lower municipal officials.

5. For administrators and controllers of the results, engaged by the MECs, it is necessary to have CEC prescribe professional and other qualifications, perform their selection, prescribe the plan and contents of the training, carry out the training and license them, thus institutionalizing them and making them responsible to work that they do. Clearly, funds need to planned and provided for all these activities. Due to so established normative position of the polling station committee and the polling station and its lack of informational and technical capacities a very unpleasant situation arises after the voting is done. Political and other public, political parties, candidates (thousands or tens of thousands) expect the results. They are rightly expected them from the MEC and the CEC. However, we are all waiting for the results from the PSCs, around 5,300 of them. Until the results from the last PSC are delivered and entered into the system, they are incomplete and preliminary. This creates nervousness, mistrust, and even suspicion.

In order to eliminate this, it is necessary to strengthen this longest and weakest link of the electoral process, i.e. polling stations and PSCs have to be technologically improved, which would make the CEC-MEC communication faster and more efficient, and the complete electoral process more credible.
Literature

1. Election Law of BiH (Official Gazette of BIH, no. 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 32/07, 37/08, 32/10, 18/13, 7/14 and 31/16).
2. Rulebook on procedure of conducting elections in BiH (consolidated text – official gazette of BiH 32/16).
3. Instruction in determining qualifications and procedure of appointment of PSCs, (consolidated text – official gazette of BiH 32/16).
4. Instruction on types, method and deadlines for designating polling stations (Official Gazette of BIH, no. 37/14).
5. Decision on realization of the JIIS BiH program under competence of the BiH CEC (Official Gazette of BIH, no. 25/10).
Removing deceased people from the central voters' register*

Introduction

The passive registration of voters was first time introduced for the 2006 General Elections. This registration mode implies that every citizen who owns some of the BiH documents is automatically registered in the Central Voters' Register. 6 This method of registration showed that, due to bureaucratic procedures regarding the registration and de-registration of persons, especially de-registration in case of death, there is a situation where the Central Voters' Register every year contains a certain number of persons who died, but are still kept as active voters.

The president of the Central Election Commission, Ms. Irena Hadžiabdić pointed out this problem in her statement to the "Frontal" saying: "It is perfectly clear that the voters' register contains people who have died and it is either ineffective work of the register offices, which I do not think is the case. The fact is that the deaths are not being reported to the register offices on time..."7

On the request of the Central Election Commission, the City Election Commission Bijeljina reviewed the lists of deceased persons submitted by the City Register Office of Bijeljina for the territory of the City of Bijeljina for the period 2008-2016 (as of June 30, 2016). The procedure of verification and a detailed description of the procedures for the removal of deceased persons from the Central Voters' Register is given in more detail in the description of the topic.

*Fljorina Nullesi and Zoran Ranilovic, members MEC Bijeljina

We emphasize that in the given period the City Election Commission and the Center for Voters' Register had to check the list of 13,618 deceased persons by individually entering each ID number into the CEC database, which is available to the local Center for Voters' Register. After checking it was found that 759 persons are registered as active voter. These persons were again to be manually entered into tables and processed for the register office, because the list was again submitted to them for further action. The Central Election Commission, as the supervisory body of the City Election Commission, was also informed about all the undertakings.

Description of topic

The Bijeljina constituency (026B) is the second constituency in the Republika Srpska. The total number of voters is 107,154 (data taken from the CEC BiH database on March 6, 2017). At the 2016 Local Elections there were 146 polling stations and 180 polling station committees. The number of register offices in the City of Bijeljina is 15 (one office belongs to the City of Bijeljina, and the rest are local offices in populated areas).

Subjects competent to remove the names of deceased persons and legal framework

In the process of official records of data on the Citizens’ Single Identification Number, place of permanent and temporary residence, subjects responsible for updating and entering data in the Central Voter Register are:

- The Central Election Commission (in accordance with Article 2.9, paragraph 4 of the Election Law of BiH, is responsible for the accuracy, completeness and overall integrity of the Central Voters’ Register for the territory of Bosnia and Herzegovina).

- Public Security Center (competent for the removal of a deceased persons' names from the records on Citizens’ Single Identification Number, based on

8 „Official Gazette of BiH“, nos.23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 37/08, 32/10, 18/13, 7/14 and 31/16
a letter from the register office, and all in accordance with the “Instruction on keeping registries of RS”

- Register office (more precisely the registrar who based on the written report of the family or household members with whom deceased live, and in case there are none based on the report of other persons who have learned about the death. This procedure is set forth in the „Law on registries“

- City Election Commission (as a mediator between the Central Election Commission, on one hand, and the Center for Voters' Register based on aforementioned BiH Election Law as well as the Rulebook on maintaining and using of the Central Voters' Register (CVR).)

- Center for Voters' Register (in line with Article 7 of the Rulebook on maintaining and using the CVR it keeps and updates information important for CVR)

Verification procedure

As we have already mentioned in the summary, the BiH Central Election Commission, in accordance with Article 2.9, paragraph 4 of the Election Law, is responsible for accuracy, update and overall integrity of the Central Voters Register for the territory of BiH.

Article 3.5, paragraph (8) of the Election Law Act stipulates that the competent Registry Offices provide to the authority competent for maintaining the official records concerning the Citizens’ Single Identification Number, Permanent and Temporary Residence of the Citizens of BiH with the data on all changes that affect the accuracy of the Central Voters Register, in writing, not later than within seven (7) days from the date the change has occurred.

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9 „Official Gazette of BiH“, no.: 55/10
11 the Rulebook on maintaining and using the CVR, BiH CEC April 28, 2016
In this regard, and pursuant to Article 3.6 paragraph (2) of the Election Law of Bosnia and Herzegovina, the BiH Central Election Commission had during the publication of the Provisional Voters' Register for the 2016 Local Elections sent a letter to the Municipal Election Commission of Bijeljina on the need for the staff of the Center for Voters' Register, in co-operation with the registry offices, reviews preliminary Excerpts from the Central Voters' Register and verifies whether dead persons were removed from the records.

Therefore, the City Election Commission Bijeljina filed a request for the delivery of data on the deceased persons on the territory of the City of Bijeljina from 2008 to 2016 to the competent Registry office.

Based on the submitted by years records of the Bijeljina Registry Service, an official of Center for Voters’ Register has checked the list against the database - Passive voter registration.

*The lists contained the following data:*

- Ordinal number of the entry year,
- Date of entry,
- Name and last name,
- DoB,
- Citizens' Single Identification number -JMBG,
- Permanent place of residence,
- Date of death,
- Place of death,
- Place of burial.

On the territory of Bijeljina, in the period from 2008 to 30.06.2016, the number of deceased persons was 13,618, and from this number 759 persons, who were categorized as active voters, were found in the base-Passive Registration.

A more detailed overview of the year-by-year status is shown in Table 1. Data Control on June 30, 2016.
The processed lists of 759 persons, who were categorized as active voters in the database, were submitted in hard copy and electronically to the competent Registry Office for further action.

Records of death

In order to better address the topic and to get an expert opinion, the City Election Commission had turned to the Bijeljina Registry Office. Further down in this document we are presenting report of the head of Bijeljina Registry Office that provides a detailed explanation of the procedures for reporting and recording time of death.

Recording time of death

The time of death is entered into the registry of deaths on the basis of the oral or written report of family members or household members with whom the deceased lived and if there are none, based on the report of other persons who came to know about the death. The time of death is entered in the registry of deaths on the basis

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<tr>
<td>2015</td>
<td>1761</td>
<td>92</td>
</tr>
<tr>
<td>2016</td>
<td>825</td>
<td>45</td>
</tr>
<tr>
<td><strong>Ukupno</strong></td>
<td><strong>13618</strong></td>
<td><strong>759 0.07% ukupnog broja birača</strong></td>
</tr>
</tbody>
</table>

Table 1
of the Law on Registers (Official Gazette of Republika Srpska, Nos. 18/99, 111/09 and 43/13). Minutes on report of the death are made in case of an oral report.

Overview of procedure for recording death

Based on the Instruction on keeping the registry ("Official Gazette of the Republika Srpska“, No. 55/10), the registrar is obliged to inform the competent authority (the competent Public Security Center or the police station) on whose territory the deceased had permanent place of residence in order to update the records on issued ID cards and citizens' permanent place of residence. In the letter, the registrar will include the following information for the deceased person: surname and first name, parent's name, date, month and year of birth, place of birth, Citizens' Single Identification Number, municipality, place of residence and address of the apartment, date of death, name of the death register where the death was entered, as well as the ordinal number of the entry and the page of the registry. Based on this letter, the dead person is deleted from all records, including the voters’ register.

In case the dead person has not been deleted from the register of the citizen, but was recorded in the death records, it may be that there was an omission made or that the competent body could not act on the letter of the registrar because there is a
disagreement with the personal data of the deceased (name and surname, date and year of birth, etc.).

There are persons who died and their relatives or bodies and institutions where death occurred (hospitals, homes for the elderly, correctional facilities, prisons, etc.) did not report to the authorized registrar the death and these persons are still categorized as alive in all registries.

Conclusion

After the meeting with and talking to the competent representatives of Bijeljina Registry Office and the persons from the Department of Information Technology on the topic "Analysis of the Situation and Proposing Modalities for the Introduction of New Technologies in the Election Process of BiH", with a special focus on the topic "Deletion of the deceased from the Central Voters’ Register”, a joint solution to this problem is to link the database of the Republika Srpska and the Federation of Bosnia and Herzegovina with the database of the IDDEEA Agency, i.e. with the Central Election Commission of BiH.

Literature

Election Law of BiH, Official Gazette of BiH nos.: .23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 37/08, 32/10, 18/13, 7/14 and 31/16;
Rulebook on registries „Official Gazette of RS“ nos. 18/99, 111/09 and 43/13;
Instruction on maintaining registries „Official Gazette of RS“; no.: 55/10;
The Rulebook on maintaining and using the CVR, BiH CEC April 28, 2016
Websites:
https://sr.wikipedia.org/sr/Општи избори у босни и херцеговини 2006
Fast delivery of election results  
from the polling station committee to the election commission*

Introduction

The process of modernization and introduction of innovations in the electoral process in Bosnia and Herzegovina started in 2006, and covered the following segments:

- Development and update of the Central Voters' Register
- SMS Center
- Development of Unified Information Election System of Bosnia and Herzegovina (JIIS BiH)

By introducing the Unified Information Election System of Bosnia and Herzegovina (JIIS BiH), the process of processing and reporting the election results is accelerated. The Rulebook on procedure of conducting in Bosnia and Herzegovina, namely its Articles 56 and 57, define obligations of an Election Commission.

The election commission is obligated to enter into JIIS BiH application election results established on a green copy from all regular polling stations for the level referred to in Article 39, point a), indent 1) or point b) indent 1 of this Rulebook by 23.00, namely by 21.00 hours for levels referred to in Article 67 of this Rulebook for the municipal/city mayor, when selected directly i.e. by of the municipality/mayor of the city, when selected directly by 21:00 hours, i.e. by 23:00 hours for the municipal council, the municipal assembly, the city assembly, the city council and the Assembly of Brčko District of Bosnia and Herzegovina.

*Darjana Jovičić, member of MEC Rogatica*
For these purposes, an election commission may hire and authorize persons who will take the credible election results from the polling station committees at regular polling stations, as well as hire and authorize personnel who will make the entry of the election results, which is subject of a special decision. After the results of the election from the polling station have been entered, the election commission controls the results through the JIIS BiH application in accordance with Article 60, paragraphs (1) and (2).

The long-standing practice of the Municipal Electoral Commission of Rogatica is to carry out data collection and direct entry into the application by telephone, and only after receiving and checking we control the entered data collected by telephone. Due to possible irregularities, the entire polling station committee is obliged to be present until control is executed. After the polling station committee arrives at the premises of the Municipal Election Commission, the person in charge of the receipt of the election material checks the received green copies from the polling station, as well as the control of the packaging of the election material that the polling station committee was obliged to do. Only after receipt is completed, the president of the polling station committee is obliged to bring green copies from his polling station to the person in charge of entering, processing and controlling the election results from all polling stations in the constituency. On-site controls of the entered results collected by the telephone are carried out, together with the entry of remaining results that we are obligated to enter. As for the results for the original levels by the majority system, we have no problems. But the process of collecting, entering, processing and controlling the votes won by the open list system for all election levels would be greatly accelerated if the method of entering the election results that we are proposing would be included into the process of conducting electoral process.

The problems we are facing are simultaneous arrival of a large number of polling station committees that after completion of their duties at the polling station, come to the premises of the Municipal Election Commission, and often make a hustle. Another, also, no less important problem is the distance of individual polling
stations. The full composition of the election commission and additional hired persons put in additional effort, knowledge and desire to have the process of controlling the receipt of the election material and the control of the election result entry pass smoothly. But the fact that many have worked for days makes the job more difficult since the fatigue reaches its maximum in those late evening hours. From our experience came the idea that the introduction of direct entry of results from regular polling stations would significantly accelerated the entire process of entering, processing, controlling and reporting on election results.

Proposal to overcome the problems

Mobile internet and smart phones

We think that it is more rational and more profitable to use what we already have, rather than to think about purchasing computers for all polling stations in Bosnia and Herzegovina. As far as we know, a total of 5000 computers for 5000 polling stations would have to be procured. Likewise, we all know that a large number of the population has smart phones, and the fact is that population in BiH has satisfactory knowledge of IT and computers.

Proposal for solving problems of faster data delivery from the polling station to the city / municipal election commission:

- Take advantage of the coverage and presence of mobile Internet;
- Upgrade the existing JIIS BiH, which we have been using for years for entering, processing and reporting both the Central Election Commission and the wider public;
- Develop an application for Android phones that will be used to enter data and results directly from polling stations, or a module that would be integrated into JIIS BiH;
- It would be necessary to make both the selection and the additional training in accordance with the Training Program for administering JIIS BiH, which is determined by the Central Election Commission of Bosnia and
Herzegovina, with the members of the polling station committees who would be in charge of entering the results or possibly to think about increasing the number of PSC’s members for one member who would be only responsible for data and results entry into the application.

- A member of the polling station committee in charge of data entry would receive already well-known role of MECClerk, and MECSupervisor would at any time have an insight into the currently entered data.

- The duty of the entry operator would be to enter data on the opening of the polling station, on turnout at 11:00, 16:00 and 19:00 hours, on closing of the polling station as well as to enter the results from a certain polling station.

- The operator would be obliged to enter the election results into the application in the manner that the polling station committee had determined at the polling station.

- The controller's duty would be to control all data entered for all polling stations after taking over the form for aggregated results, and correctly consolidate the results from the regular polling stations of the basic constituency in Bosnia and Herzegovina, which in a way would also mean verification of the entered data.

Conclusion and recommendations

- The approach is gradually and in stages comes to the introduction of new technologies
- An advanced technical solution that supports the improvement of the electoral process
- Technology suitable for use in our country
- By choosing and implementing this idea, it is not necessary to change the legal framework at the constitutional level
- Upgrade of the existing information system.
- IT literacy in Bosnia and Herzegovina is at a satisfactory level
- Investments in computer equipment avoided
- The problem of remote polling stations will be minimized.
- Data collection speed achieved, which is directly reflected on transparency and the publication of preliminary results by the Central Election Commission.
Our view is that this is in some way a transitional solution until all the necessary conditions for the introduction of Electronic Voting on the territory of Bosnia and Herzegovina have been met.

Literature:

- BiH Election Law („Official Gazette of BiH“, nos: 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16).
Application of new technologies in the process of voter identification at polling stations*

Introduction
One of the processes in the voting process is the identification of voters. In the practice so far, due to possible abuses the deficiencies in the current method of identification have been identified. Namely, it turned out in practice that the role of the person in charge of identification of voters is very. The intention is to reduce the influence of the human factor. In this paper we will propose possible solutions to the problems that were present in the electoral process on election day. We think that by introducing new technologies in the voter identification process, as well as in the entire electoral process, the process would be substantially improved. By introducing electronic readers, the possibility of manipulating and violating the electoral law by polling station committee members would be reduced.

Valid identification documents
One of the following valid photo documents is used to determine the voter's identity:

a) ID card
b) BiH passport
c) Driving license

*Željko Ćorić and Antonio Vrljić, members of Election commission of City of Mostar
When entering a polling station to vote, each voter must present one of the valid personal documents. A member of the PSC in charge of identification shall be required to determine whether the voter's appearance corresponds to the voter's photograph on the identification document and to compare the Citizens' Single Identification Number (JMB) on the identification document with Citizens' Single Identification Number contained in the extract from the final Central Voters Register next to the voter's name.

**Disadvantages of the present voter identification process**

a) **Tardiness of identification**

Polling stations with a large number of voters have a slower voter identification process.

b) **Intentional slowdown of voting**

If a person who wants to interfere with the conduct of the electoral process is member of a polling station, he or she may intentionally slow down the voting process by time-consuming search of voters in the excerpt from the Central Voters Register.

c) **Restricting the right to vote**

Here too, member of the PSC in charge of voter identification can make certain abuses by intentionally not finding the voter who has the right to vote and is on the excerpt from the CVR and by sending him/her to another polling station.

d) **Voting for other persons**

Namely, the current way of identification allows abuses in a way that a person misrepresent him/herself as another person with the help of a member of the PSC in charge of identification who reads the name from the CVR excerpt and another person comes to collect the ballot and vote.

e) **Multiple voting**

One person may come to the polling station or even at different polling stations multiple times and misrepresent him/herself, thus making multiple criminal offences.
f) Voting on behalf of a dead person

Deceased persons may be found on the excerpt from the CVR since it is concluded 45 days before the election, and the members of PSC can abuse this and vote instead of these persons.

Proposals for improvement

We believe that the introduction of electronic readers of identification documents will significantly improve and speed up the voter identification process.

Examples of electronic readers that are in use:
Advantages of new technologies

a) Faster identification
   Identification is done via an electronic reader that immediately registers who the voter is. It takes very little time to complete the identification process.

b) Multiple voting is not possible
   The introduction of new technologies in the voter identification process at a polling station implies the existence of a computer program that will, in the event that a person comes to vote for the second time, give a warning that the person has already voted.

c) Voting on behalf of another person is not possible
   Electronic identification completely disables multiple voting since after the valid document is read the screen shows information about the person whose ID document was put through the reader, and so the members of the PSC and observers can see the picture from the ID card and the voter who came to vote, thus deterring any manipulations from the PSC member in charge of identification.

d) Faster and more accurate information on turnout
   Using this method of identification the BiH CEC can at any time have precise information about the voter turnout.

Disadvantages of new technologies

a) Price
   Introduction of new technologies requires significant funds for the procurement of both the equipment and a new computer program.

b) Networking
   In this case the Internet should be available on the entire territory of BiH, which is currently not the case.
c) Mobility (application in rural areas)
   These technologies will be difficult to use in rural areas where there are weak internet connections or none due to the position of mountains and hills as well as sufficient number of transmitters.

d) Hacking – unauthorized access to system
   Given that today's technological development is at an enviable level, it can be said that there is no absolute security of the system and therefore in this case it is possible to unlawfully access the voting system

Conclusion
Regardless of the flaws and disadvantages of introducing new technologies, we feel that they are needed. We are all aware that new technologies are being introduced into all spheres of the social life and thus also in the process of voter identification during voting as well as in the entire electoral process.

Literature
➢ BiH Election Law – consolidated text,
Registration of by-mail voters*

Summary
BiH citizens who are abroad, can realize their legally prescribed active voting right only after registration for each election.

The introduction of basic technologies (post, facsimile, and internet) in the registration process, besides facilitating wider availability and easier registration of voters abroad, has also enabled abuse in registration of voters without their knowledge and against their will.

In order to prevent the registration of voters to vote by-mail without their knowledge, which is becoming more and more present, and in order to enable the realization of active voting right along with the organizational and legal measures it is necessary to apply new advanced technologies in the process of registering voters who are temporary residing abroad or have refugee status.

Legal framework

The right to vote by-mail from abroad is regulated by Article 1.5. Paragraph 2 of the Election Law of BiH as one of the possibilities of voting for persons temporarily residing abroad ("Official Gazette of BiH" No. 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20 / 04/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14, 38/15 and 31/16).

In order to exercise his/her active voting right a BiH citizens, who is temporarily residing abroad, provided that he/she is registered in the Central Voters Register, must register for each election (Article 3.15 of the Election Law of BiH). With the application for registration (PRP-1 form) the voter must submit a copy of one of the personal documents (ID card, driver's license, BiH passport).

BiH refugees who are not in the Central Voters Register are required to submit a proof of citizenship of BiH and proof BiH place of residence together with a registration application and an ID card (can also be a refugee card).

An application for registration with the necessary evidence must be submitted no later than 75 days before the day of the election.

Applications are submitted by post, fax or electronic mail.

If registered in the previous elections, a voter who is temporarily residing abroad is obliged to confirm the voting option for the next elections with the PRP-2 form, or the PRP-1 form if the PRP-2 form is not delivered to the voter.

*Marijan Živković, president of MEC Orašje
and Sadija Subašić, member of MEC Orašje
The Implementing Provisions on Registering and by-mail voting of persons temporarily residing abroad are contained in the Rulebook on the procedure of conducting the elections in BiH (Official Gazette of BiH No. 32/16 and 43/16) and the Rulebook on maintaining and using CVR ("Official BiH Gazette "No. 32/16).

**Critical view of existing situation**

**Small number of voters register to vote abroad**

At the previous 2016 local elections there were 65,398 voters registered to vote by mail, which is relatively much higher than in the previous general elections in 2014 but is still too small compared to the number of citizens of BiH who have the right to vote. Given that the elections are held on the first or second Sunday in October, which is not a holiday season, a large number of voters living abroad do not obtain active right to vote because they would have to come to their place of residence in BiH on the Election Day.

**Registration of by-mail voting done without knowledge of the voter**

First, by verifying the voter's right for people registered for voting through the mobile team, we learned that some of them were registered to vote by-mail and it was done without their knowledge and consent. Based on the excerpts from the provisional voter lists and the passive voter registration program in the Center for voters' register other voters are not aware if someone has registered them to vote by mail. Change in the voting option for voting abroad is only recorded after the end of the process of publishing the excerpts from the provisional central voter list of the Central Election Commission of BiH that the voters trusted thinking that they will vote at the polling station listed in the provisional voters register. However, on the Election Day many voters learn at the polling station or in the Center for Voters' register that they have been registered, without their knowledge, to vote by mail. The possibility of checking the voting rights and voting options on the web site of the Central Election Commission of BiH is mostly not used until the day of the elections.

A voter registered by mail without his/her knowledge cannot change this option and can only vote at a polling station authorized to issue tendered ballots, which the voter often refuses because of the revolt or distance of the polling station with tendered ballots.

Homebound voters, who someone has registered to vote by mail, can neither be registered for voting via the mobile team not vote by a mobile team, and
since they are homebound they cannot go to the polling station for voting with tendered ballots and practically cannot exercise their active voting right.

**Proposals for improvement of the process**

**Active role of the Center for Voters' Register in registration of by-mail voters**

Voters living abroad are required to register for elections after the election is announced, mainly before the deadline for registration (75 days prior to Election Day). Registration is done by completing the application form PRP-1 with the necessary attachments if they are registering for the first time or if the PRP-2 form is not delivered to their address registered for the last elections.

If the registration of voters residing abroad would only be done once, then the Center for Voters' Register could be included in this process. Most of the voters from abroad came to their place of residence during the year, especially at the time of the vacations (July and August), and with the more active role of the Center for Voters' Register and the local communities, all voters who reside abroad could be registered. Only in case of data change (especially address abroad) it would be necessary for voters who live abroad to report these changes by submitting PRP-2 form.

**Displaying the voters' list for by-mail voting**

When displaying the excerpts from the provisional Central Voters' Register, all voters are on excerpts according to their place of residence, so it also contains the voters who are abroad and who have been registered for voting abroad at previous elections.

In order to enhance the electoral process in the segment of voter registration abroad (by-mail or at Embassies) all voters who were registered to vote abroad at the last elections should be separated on the excerpt for every regular polling station, understandably without the exact address abroad. In the process of displaying such excerpts, all stakeholders in the electoral process would be able to influence updating of the voters' register. Local communities, register offices and other institutions and citizens would be more active in separating the voters on the voters' register who live abroad. Addresses for voters abroad, who are found in the part of the CVR for voters in BiH, could be submitted not only by these voters, but also by members of their family, local community, register offices and all others who have that information and these addresses should be delivered for the CVR through the Centers for CVR. Incorrect registration of voters living in BiH for
inclusion in the CVR that relates to out of country voting would not have any since, since all voters from abroad who find themselves in BiH on the Election Day have the right to vote, and we propose voting to be done at their polling station in line with the place of residence and not by tendered ballots at one polling station.

Publishing list of voters registered to vote by mail before the CVR is concluded, with the possibility of changing the voting option

After the expiration of the deadline for registering voters abroad, the data on this registration are not known to both voters and the public for a long period of time. In the case of registration without voter's knowledge, change of the voting option is not possible, and homebound voters cannot vote.

So, the list of people voting abroad should be published shortly after the expiry of the registration deadline for voting abroad. It must be at least 15 days before the deadline for the conclusion of the Central Voters' Register (45 days before the day of the election). Within this period of 15 days, voters abroad would be able to check their registration and eventually make a correction, especially voters living in BiH who someone has registered for out-of-country voting without their knowledge. Local voters would make that correction in the Center for CVR, and for homebound voters would be visited by the Center's officer to make the correction.

Passive voter registration program to contain data on by-mail registration

When checking the voting right for homebound persons in the program of passive voter registration in the Center for CVR, after the expiration of registration deadline for OCV, there was not information that the voter was registered for OCV, but at the regular polling station in line with the place of residence. Only later it was clarified that the passive voter registration program did not record this change of voting option, but that the up-to-date voter registration information can be found on the web site of the Central Election Commission of BiH.

Therefore, it is necessary to enter the registration OCV data immediately in the passive voter registration as well. The center for CVR often does not have access to the webpage of the BiH CEC in order to check the voting right and voting option. The official verification tool should be passive voter registration program and not the internet.

Voters who were registered by someone else for OCV without their knowledge should be allowed to vote at their regular polling stations
A voter who has established his/her electoral right and the right to vote at a regular polling station on the provisional voters' list, and who was subsequently registered by someone else to vote abroad, should in any case have the right to vote in a regular polling station without tendered ballots, like a regular voter. The footing for voting at the regular polling station can be also found in the Election Law of BiH (articles 5.18, 5.23, 5.25 and 5.26). Only for practical reasons, the Central Election Commission has in its bylaws determined that it is only one polling station in the basic constituency.

At the last local elections in 2016, the voters' register was copied for voters who voted in the polling station with tendered ballot and delivered to the Central Election Commission of BiH in order to eliminate the votes of voters from abroad under the identification data of voters who voted with tendered ballots. Given that voters who had been registered for voting outside the country without their knowledge, as well as voters who registered for voting abroad and who were at the place of residence in BiH on election day, should be allowed to vote at a regular polling station without tendered ballots, and based on the supplementary voter register for each polling station that would contain a list of voters registered for voting abroad, the election commission of basic constituency would copy identification data of voters who voted from the supplementary voters’ register and forwarded to the Central Election Commission for elimination of OCV by-mail votes.

Proposing modalities for introduction of new technologies

Using fingerprint as identification on PRP form

In order to prevent registration of voters from abroad without their knowledge, the PRP forms should contain a part for putting the index fingerprint, which would identify the person registering for OCV.

Just introducing a fingerprint identification on the form would certainly reduce the abuse of by-mail registration of voters from. Checking the identity of a person who is registered for OCV with the person who put the fingerprint, if not applicable to all forms due to the introduction of new technologies, could be conducted in those cases where registration is found or suspected to be done without knowledge of the voter who is registered to vote by mail.

Fingerprint identification would also help detect perpetrators, which would have preventive effects not only on the correctness of the voter registration, but it would also increase confidence in the legitimacy of the election.
Application of new technologies for the identification of counterfeit copies of identification documents as well as signatures on application forms (software, scanners and other advanced technology).

When registering for OVC applicants most commonly use original copies of identification documents that have been obtained by unauthorized access to some other procedures that the voters led (employment, loans, pensions, insurance, health and social care, personal ID documents, etc.) and their use in the process of registering the voters to vote by mail. A minor portion is most probably falsification of a duplicate of identification documents.

In order to prevent the falsification of duplicate identification documents, as well as for the purpose of determining the falsification of signatures on the application form for OCV registration, subject to the condition of being eligible for the introduction of new technologies in the electoral process from other aspects, we suggest the introduction of software, scanners and other advanced technological means that would detect these abuses.

Conclusion with recommendations

Although it is increasing, the number of BiH citizens residing abroad is still low, and the ones who have the right to vote do not register for voting outside BiH nor do they come in person to their regular polling station on the E-Day.

The possibility of by-mail voting is used by others, and also register voters who are not residing abroad. So registered voters only learn about this on the Election Day and can only vote at the PS that issues tendered ballots, and homebound voters cannot even exercise their right to vote.

To facilitate the registration and voting of voters living abroad, it is recommended to introduce aforementioned organizational and legal measures:
- the active role of the Center for CVR in by-mail registration,
- Displaying Voters' Register for by-mail voting from the previous elections when displaying excerpts from the provisional CVR,
- Publicly announcing the list of voters registered to vote by-mail before CVR is concluded, leaving the opportunity to change the option,
- Passive voter registration program to contain data on by-mail registration,
- Voters who were registered to vote by-mail by someone else should be allowed to vote at their regular polling stations.

To prevent abuse in the process of registering by-mail voters, it is recommended to:
- Use fingerprint as identification on PRP forms,
• Application of new technologies for the identification of counterfeit copies of identification documents as well as signatures on application forms (software, scanners and other advanced technology).

Literature:
- BiH Election Law („Official Gazette of BiH“, nos 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14, 38/15 and 31/16),
- Rulebook on procedure of conducting elections in BiH („Official Gazette of BiH“, no. 32/16 and 43/16),
- Rulebook on maintaining and using CVR („Official Gazette of BiH“, no. 32/16).
Introduction

Following the fundamental principles of the election process, such as: the principle of legality, the principle of transparency, the principle of openness, the principle of access to voters, the principle of objectivity.

It is necessary to commence the introduction of new technologies in the election process and instead of tin ballot boxes to introduce translucent ballot boxes for the following reasons. Translucent ballot box increases the trust of voters, trust of observers, candidates and trust of media in correct execution of election rules and regulations on the Election Day. Aside to that, translucent ballot box contributes to better control and prevention of misuse of ballots at the polling station. On the Election Day, provide one translucent ballot box for ballots for each level of authority, which would contribute to faster selection and counting of ballots after closing polling station, given the fact that polling station premises are incapacious, thus enabling less possibility for ballot manipulation. During ballot counting for one level of authority, there would be no mixing up ballots from different levels, and the ballots would be safe from possible misuse. Election process observers could, during observing, see the current state of the ballots in case they weren’t present at the poll station opening at 07:00. Election boar member in charge of the ballot box control would easier monitor the insertion of ballots and that would reduce the possibility of misuse, theft or insertion of suspicious ballots (plagiarized ballots).

*Safet Zahirović, president of MEC Breza*
Translucent ballot box would also reduce the number of mistakes during ballot counting, and the correctness of provided ballots and number of signatures would be equal to the number of ballots in the ballot box.

During creation of the BiH budget, the Central Election Commission /CEC/ BiH asked for 950,000 KM for procurement of Plexiglas ballot boxes in order to implement the recommendations of OSCE Office for democratic institutions and human rights on implementation of translucent ballot boxes, but that request was not approved. In order to gain support for that request to be inserted in the draft budget, CEC held a meeting with committees for finances and budget in House of Representatives and the House of Peoples of the Parliamentary Assembly of Bosnia and Herzegovina.

In those meetings, it was said that CEC is using metal ballot boxes, huge and impractical for transport, for years and it was stated that in line with contemporary standards in the election process the translucent ballot boxes represent one of the most important instruments for implementation of fair and democratic elections. During the adoption of the budget in 2014, which planned the resource for general election in October, additional funds for provision of translucent ballot boxes were not approved.
What must be highlighted is the fact that each level of authority would have a separate ballot box. And the “voting cabins” would be translucent as well, in a way that one could see the voter filling in the ballot, but for whom the voter voted. The idea is to prevent the “Bulgarian train”, namely taking photographs which served as a proof basis for voter to get the money or some other service for the vote, as well as taking one or more ballots out which are later filled in and inserted in the box. The Central Election Commission (CEC) BiH requested the funds for translucent ballot boxes, instead of current metal ones, for the last election as well.

**Conclusion with recommendations**

In order to execute fair and correct election process, it is necessary to introduce new methods and procedures in the voting process, all in order to remove any doubts in the correctness of election results and election process as a whole. One of the procedures is introduction of translucent ballot box. Translucent ballot box is very important for the following reasons:

1. Translucent ballot boxes are one of the most important instruments for execution of fair and democratic elections;
2. Translucent ballot boxes increase the trust of voters;
3. They increase the trust of observers;
4. They increase the trust of candidates;
5. They increase the trust of media in correct execution of election rules and regulations on the Election Day.
6. Translucent ballot boxes contribute to better control and prevention of misuse;
7. Each level of authority would have its own ballot box.

This system has its advantages, some of which are:

1. Easier control of ballot usage at the polling station.
3. Faster and more efficient vote counting.

Technical-technological solutions that lead towards fair and correct election process need to be, first of all, implementable. It is necessary to keep in mind the ICT literacy level in BiH as one variable, and then number of computers, internet connections and other technological devices owned by the citizens. All these segments need to be precisely determined, and till then, the implementation of translucent ballot box shall be a significant progress and success within the election process.

**Literature and sources**

Analysis of the situation and application of new technologies in education of EMBs*

Introduction

The quality of administering the elections in all segments depends on the work of the election administration. Educated, skilled, trained and politically independent election administration is the basis for successful implementation of prescribed election actions and activities during the preparation and implementation of the elections.

In training of PSCs, as a body directly conducting the elections, the MEC faces a number of difficulties and problems that can affect and influence the legitimacy and success of the election being conducted.

Since 2008 MEC Kalesija is using video material for PSC training. It also prepared posters with election activities after the closure of PS and packing scheme in to improve the training of PSCs.

In the education of the electoral administration, improvements are required from the amendments to the Election Law of BiH, the amendment of bylaws and the introduction of new technologies in electoral education, which would have a significant impact on improving the quality of the electoral process.

Analysis of the situation and application of new technologies in education of EMBs

Election administration is made up of election commissions and polling station committees.

Election commissions are the BiH Central Election Commission, the election commissions of entities and cantons, municipal and city election commissions and election commission of Brcko District of BiH.

*Hajrudin Huseinović, president of MEC Kalesija
Educated election administration is the basis for successful implementation of prescribed election actions and activities during the preparation and implementation of the elections.

**Education of election administration**

The legal basis for education is the Election Law of BiH\(^{12}\) and by-laws of the BiH CEC BiH – Rulebook on determining the qualifications and procedure for appointing members of the PSCs.

The obligation to educate the election administration is set forth by the Election Law of BiH, namely Article 2.2, paragraph 5 reads „Members of the competent authorities responsible for the conduct of elections shall have to undergo the continued training during their mandate, in accordance to the educational curricula issued by the Central Election Commission of BiH“

Furthermore, the Rulebook on determining the qualifications and procedure for appointing members of PSCs\(^{13}\), in Article 15, paragraph 2 says „In accordance with the plan and program of education that is adopted by the BiH Central Election Commission, the election commissions shall organize training on the manner of voting, counting of the votes and of the envelopes containing ballots for president and members of the polling station committees, as well as for their deputies and for the president and members of mobile teams, and their deputies.“

The BiH Central Election Commission adopts the election administration education plan and program.

Election administration training is conducted in such a way that the Central Election Commission of BiH continuously educates the Municipal Election Commissions for the purpose of training them on implementation of electoral process.

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\(^{12}\) Official Gazette of BiH, nos. 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16

\(^{13}\) Official Gazette of BiH no. 32/16
The Municipal Election Commissions conduct training of the members of the polling station committees immediately prior to each election and after the training they take a test and successful candidates are issued certificate.

In the training of PSCs, as a body that directly conducts the elections, MEC is experiencing a series of difficulties and problems that can and do affect legitimacy and success of the elections that are being conducted.

**Lack of training uniformity for PSCs by MECS on the territory of entire BiH.**

This lack of uniformity, among other things, results from the position of Municipal Election Commissions in the local community, that is, the MECs have different support from the authorities, as well as various human, material, technical, spatial and other conditions.

Also, there is no uniform training methodology so that the MEC is given, in a sense, room and freedom for training, which can lead to creativity but also to a number of weaknesses in education of PSCs.

As a result of this, there is a different level of PSCs' qualification that can ultimately lead to irregularities in their work, which is particularly visible in the counting of ballots, recording of voting results and packing of election material.

**Short deadlines for training**

After the appointment of PSCs, there is relatively short deadline for their training taking into account the composition of the PSC in terms of their education, earlier engagement in administrative affairs, interest, etc.

This is especially true in situations where certified political subjects use legal remedies, leading to an additional shortening of already short deadlines for training of PSCs.

Withdrawal from membership in PSC makes it harder for MEC to work, since PSC members can give up and, as a rule, in the practice so far, waive
membership on PSC at all stages, namely after training, until the election day and on the election day.

This makes it difficult to fill in vacant places on PSCs with good personnel, who must undergo training to be engaged in work of the PSC.

Existing legislative legislation does not provide for sanctions for waiver and abandonment of membership on the PSC nor for a person who has done so neither to a political entity on whose proposal the person became member of the PSC.

This problem has to be promptly addressed since the number of qualified and responsible people interested in work on a PSC is decreasing.

**Appointment of polling station committees' members**

The appointment of the President and members of the Polling Station Committee and their deputies is done by the Municipal Election Commission no later than thirty days prior to the date of the election.\(^{14}\)

Appointment is made in such a way that all political subjects certified for a particular constituency propose candidates for PSC members who have to meet general and special conditions to be appointed and appointment is done by MEC.

Only if political subjects do not submit proposals to the respective places within the given deadline or the submitted proposals do not meet the general and special conditions, vacant positions are staffed by MEC from the records of the work and the composition of the earlier PSCs.

Candidates proposed by political subjects are not sufficiently qualified, do not have election-related experience, and were not dealing with administrative affairs before.

Due to this candidacy procedure, some of them report to the political subject that proposed them as candidates and do not think of themselves as being part of election administration.

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\(^{14}\) Article 2.19, paragraph 3 of the BiH Election Law (Official Gazette of BiH, nos. 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16)
Certain number of candidates are not interested in work and training which makes transfer of required knowledge and skills necessary for successful work in PCS more difficult for the MEC.

**MEC Kalesija**

The aim of education is the general goal of all election commissions – to have as many members of the PSC as possible acquiring enough knowledge of the electoral process to successfully run the elections.

Since 2008 the training of PSC members consisted of:\(^{15}\):

- Theoretical part
- Practical part, and
- Video material – videos that are designed in the way to show entire election process, bringing it closer to the PSC members in a simple and understandable way, and it include:

1. Pre-election day - transfer of election material to the MEC-PSC, arranging the polling station.
2. Election Day - arrival and opening of the polling station, work of PSC and observers, voting method, closing PS, counting of the ballots, recording voting results and submitting the election material of the MEC.

The result of such planned and implemented training has been successful elections in all election cycles to date.

Analyzing the previous elections and determining the part of the electoral process, which can be improved, POSTER - PACKING SCHEME\(^{16}\) which is compatible with the scheme from the PSC Handbook but having more details, A0 format, was completed in 2014.

The goal was to provide PSC members with a visual guide for all actions after closing of PS.

The poster is divided into multiple units depending on the elections being conducted (local, general).

\(^{15}\) Repport on work of MEC Kalesija for 2008
\(^{16}\) Repport on work of MEC Kalesija for 2014
The first part contains the activities of PSC after the closure of the PS to the opening of the ballot box, namely the sequence of activities, checkbox for completed activities, data entry form, envelope for packing forms with an indicator on sequence of actions that follow.

Other parts of the posters are displayed by election levels, giving order of actions, data collection, and data entry in appropriate forms and packing of election material in appropriate colored bags for that particular level.

Election material that the PSC must hand over to MEC when submitting material for that election level is showed at the end of poster.

PSCs were instructed to display the poster at PS after the closure so that it could serve them as a guide if they found it was easier to work in that way. They were also instructed to contact members of the MEC or coordinator any time certain uncertainties arise so they could successfully complete their part of the job.
Waiving membership on the PSC

It was especially evident in 2014 at the general elections and continued, in a smaller number in 2015, at the early elections for the mayor and the local elections in 2016.

This was addressed by publishing a public call for membership on PSC where persons with election-related experience could apply and undergo training in order to be engaged, if needed, to work on the PSC.

The public call had to be repeated three times as there were not enough candidates for members of PSCs after first and the second call.

Council of Europe in BiH

Council of Europe in BiH\textsuperscript{17} had, inter alia, through the Pre-electoral assistance project for the 2016 Local Election provided financial assistance.

The objective of the assistance was to educate EMBs in order to achieve:

- Development of election administration,

\textsuperscript{17}www.izbori.ba (accessed: 13. 03. 2017)
- Development of a database of certified presidents/deputy presidents of PSCs,
- Professionalization and reduction of political influence.

**Proposals for improvement**

**Suggestions for improving** the electoral process and achieving better results through electoral administration education start with the change of the Election Law of BiH to the amendment or adoption of by-laws of the CEC BiH.

1. **Appointment of PSCs** – new appointment method should:
   - decrease influence of political parties
   - have more professionals working on the PSC
   - minimum changes would be reflected in the professionalization of the president/deputy president's position on the PSC who should be appoint by the MEC amongst educated, certified and capable candidates found on the aforementioned database.

2. **Education** – There is a need for continuous training for both the MEC and PSC in the election as well as in the non-election period with the aim of creating a good database of PSC members from which the PSC members and their deputies would be nominated and appointed by the presidents, depending on the legal solution.

   Apart from educating the EMBs, it is also necessary to educate representatives of political parties, who would thus be better informed about the respective rights and obligations in all parts of the electoral process and thus contribute to the successful implementation of the elections.

   Also, education of the public and voters is needed - through print and electronic media, social networks ...

3. **To develop uniform training methodology** - In order to ensure uniform training, it is necessary to prescribe a uniform training methodology whilst providing necessary material and technical conditions.
4. **Developing video material** – the use of video material proved successful so far and has to be used in the future, but an accent should be placed on counting of the ballots, determining the results of the vote and packing of election material. The videos should be available to and obligatory for all MECs and PSCs.

5. **To technically improved education**– by using new technologies, which would make conduct of elections more successful and easier.

What is particularly important for the successful implementation of any election activity, and also for the education of the EMBs, is that amendments to the Election Law of BiH are adopted in the non-election year in order to:

- CEC BiH - promptly adopt by-laws and
- The MEC on time prepare and perform some its election related activities

**Acronyms**

- PSC – polling station committee
- BiH CEC – Central Election Commission of BiH
- MEC – Municipal Election Commissions

**Literature**

- BiH Election Law (Official Gazette of BIH nos. 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16)
- Instruction on determining qualifications and process of appointing PSC members – consolidated text („Official Gazette of BiH, no. 32/16“)
- Rulebook on method of conducting elections in BiH („Official Gazette of BiH“, no 32/16, and 43/16)
- www.izbori.ba
PART II
The main objective of this work is to assess potential technical improvements to the electoral process in BiH, with the aim of making future elections more efficient and transparent, while reducing the possibility for electoral fraud.

When considering technical improvements, some more general issues have been found in the current electoral set-up in BiH which cause inefficiency and hinder use of technology. Most notable examples of this are ballot composition and central re-counting model used by CECBiH. As a result, proposed improvements presented in this document are not strictly technical.

This report is divided into two parts:
1. General observations and recommendations.

In some cases general recommendations are enablers for engaging new technologies and processes but apply to current procedures as well. However, some of proposed new methods have no prerequisites and can be implemented independently.

**General note on verifiability and engagement of technologies in election processes**

Verifiability is a desired property of any process. It means that input and output of the process can be correlated by means alternate to basic process. Most visible verification process in elections is re-counting of ballots. Re-counting is usually performed by different crew to provide independence to verification process. Need for re-counting is determined based on multiple factors including but not limited to:

- overall trust to the original process,
- estimated accuracy of the original process,
- unforeseen impact of external factors to the original process.

When a primary process is replaced by automated one certain risk factors will be minimized (such as accuracy) but some of them will deserve elevated attention. Software in automated machines are programmed by error-prone humans.

*Tarvi Martens, Project Manager for Estonian e-voting project, National Electoral Committee*
Even though tested in laboratory environment with a single exemplar (and even having “certified” sign from independent lab) it would tell automatically nothing about large-scale manufacturing and deployment – any single machine could be subject to manufacturing error or malicious attack, not to mention hidden agenda of the original engineer.

Attacks to automated machines could be very sophisticated – they can be designed to remain undetected to highest possible extent. For example attack could also be time-scheduled meaning. That otherwise decent and correctly behaving machine is programmed to misbehave only within certain date and time for certain operations. After successful attack this malware could remove all traces and delete itself.

When testing machines automating election processes the following shall be kept in mind:
- Testing of machine has to cover all foreseen use cases
- It is impossible to cover all situations without thorough examination of software source code (e.g. “time-bombs” described above).
- Testing of single machine does not provide automated security for all exemplars to be manufactured and deployed in production.
- Tester or the machine is of importance.

Vendors of electronic voting machines do their best to ensure integrity of their production – discovery of fraud would have direct impact to their reputation and hence commercial success. However, insider attacks and external attacks remain possibility to be taken into account.

Machines might be quick, accurate and even honest but they still have price tag and require proper handling both from operating/management side and user side. They usually require electricity and sometimes even internet connection subject to availability given certain location and time.

| Observation 1: Verification of automated process shall be foreseen to extent determined by prior risk analysis. Full duplication is desirable if applicable. |

This complex problem is even bigger when thousands of machines are to be distributed between polling stations around the country. Each of them would require connection, operation and maintenance including proper handling in case of malfunctioning. This can be translated into man-hours and -weeks to be spent for proper training of polling station employees and development of procedures in case of malfunction or loss of connectivity (e.g. temporary switch to manual process). At
the same time – improved voter experience must be always first priority in considerations.

Depreciation time for ICT hardware varies between 5 and 8 years. In other words procured hardware could be used for maximum 2.4 elections or even less if unexpected circumstances occur (eg. unforeseen fundamental flaw in design or construction). Therefore procurement of ICT equipment shall not seen as long-term investment but rather expenditure item for given number of elections.

**Observation 2: Use of automated machines in polling stations must be carefully considered before deployment.**

For example, if it is apparent that if certain automation would not scale to all polling stations then it does not make any sense to pilot it even in smaller scale.
General Observations and Recommendations

Ballot composition

BiH election system enjoys certain type of open list scheme where voters vote for individual candidates by marking them in a ballot paper. A voter can mark multiple candidates as long as they belong to the same political subject. Vote given to certain candidate also determines choice of political subject (candidate list or party). It is also allowed to vote just for a single political subject without marking individual candidates.

Number of candidates and political subjects in certain election levels yield to large number of choices. Because of marking on ballot is used, ballots are big and could be even growing. Today, largest ballots in BiH are exceeding size of standard A2 by 10cm in width (40x70cm).

Size of ballot papers presents actually substantial problem in almost all stages of voting process, namely:

- **printing**: in addition to size issue ballots have to be printed individually for each constituency,
- **transport**: from printing house to polling stations and back to Sarajevo for central counting and later destruction,
- **voting** and casting: handling of large ballots is not comfortable, ballot boxes need to be large enough,
- **counting**: large ballots impede use of ballot scanners available for election purposes.

Besides of size, possibility to select several candidates is the other complication of current system.

The simplest imaginable preferential voting system (in terms of ballot composition) is single-candidate system with write-in ballot form. Candidates are uniquely numbered and voter writes number of the desired candidate to the ballot. Numbers of candidates are displayed at bulletin board at inside wall of voting booth and could be disseminated beforehand in multiple ways (e.g. candidate is advertising his/her assigned number).

Single candidate election is a small step away from current open list system in BiH but definitely does not represent closed list principle. It is still preferential voting system that can take into account personal votes to the extent defined by method for distribution of mandates. Analysis of various methods for the latter is beyond scope of this paper, Estonian example of ascertaining election results in
Riigikogu elections\textsuperscript{18} could serve as an initial reference for elaborations. Use of write-in instead of marking the candidate introduces another interesting problem and possible source for rejection of ballots – individual handwriting and interpretation of thereof. It could be hard to differentiate between certain digits (such as “1” vs “7”, “6” vs “8” etc). There have been known attempts to force people to write numbers in predetermined “font” but success of those attempts is not known \textsuperscript{19}.

Proper procedures for resolving such a disputes shall be introduced when using manual candidate number writing. All above applies also in case of automated ballot scanning and recognition.

Recommendation 1: Consider reducing of ballot size by using candidate numbering and possibly limiting number of choices to a single candidate.

Vote counting and dissemination of election results

One of issues causing most of dissatisfaction about BiH election process is time required to come up with official results. BiH election law foresees 30-day deadline for announcing official results counted from the Election Day. Period of one month for assuring final undeniable results is generally quite common in practice, provided that \textit{preliminary and partial results are communicated in timely manner}. The latter does not seem to be the case in BiH.

To general public dissemination of voting results goes by the following schedule:

\begin{itemize}
  \item \textsuperscript{18} http://vvk.ee/info-for-voters/determing-results/verification-of-results-at-riigikogu-elections/
  \item \textsuperscript{19} In Soviet Union postal system all envelopes carried blanks for marking down postal code of addressee. This simple 9-line blank allowed for unequivocal interpretation of all digits from 0 to 9. There were rumors that automated postal code recognition was used in some large postal centers but no known evidence of thereof. These blanks were often ignored and “natural handwriting” was used instead of prescribed “font”.
\end{itemize}
1. First preliminary results are announced in CEC press conference at midnight of Election Day. This covers only first level (presidency/municipal mayors) results;
2. Next announcement is scheduled for noon next day. Even though all polling station should have finished their work on counting, only 60-70% of preliminary results of all levels are available;
3. CEC continues to announce preliminary results in press conferences **at most** once a day. Publication of results to internet occurs only after press conference is held.
4. No later than 20 days after Election Day preliminary result shall be completely counted and verified. Then dispute process is started and complaints are to be submitted to CEC within three days.
5. The dispute period is completed by 30th day after Election Day when final results are announced.

General perception about the process however is that vote counting itself is slow and needs improvement. Indeed, counting large-sized ballots of all four levels in general elections takes considerable amount of time. There is a tentative time-schedule for PS-s set by CEC that foresees completion of tallying process in polling stations for all four levels by early morning next day and entering of results to information system by MEC-s by 10:00 a.m. so there is no direct correlation between speed first count in PS-s and 30-day period.

The fact that only 60-70% of results are announced at noon after theoretical finish of tallying in polling stations is a revealing factor leading us to research reasons for such a discrepancy. Indeed, votes received by other voting methods and requiring for central counting (tendered ballots, votes from abroad by mail, absentee voting) are tallied separately but they represent only 3-4% of overall votes. The missing part is result of **inadequate quality of tallying by polling stations** that is primarily detected by discrepancies found in PS tally report.

There has been lots of discussions about overall quality of polling station work, their members, appointment of polling station president etc. so this report is not going to assess those issues directly. However, general observations show that there is direct correlation between coordination efforts spent by MEC for preparation and supervision of polling stations and quality of tallies produced by polling stations.

MEC-s are entering data from PS protocols to information system for preliminary results but are not ultimately responsible for quality of thereof. Obvious glitches in protocols are corrected on-fly, sometimes with help of ("unofficial") consultations with PS presidents. Re-counting is not foreseen in MEC level and all protocols and ballots from PS-s are sent to central counting center with MEC being as logistical coordinator only.
PS protocols are still written in paper only and “green copies” of protocols are used to transfer results physically from PS to MEC. Communication between MEC-s and PS-s has a lot of room for improvement given contemporary communication tools available to the general public.

Recommendation 2: Allow for and popularize any available communication channels for exchange between PS and MEC, require only final PS tally report signed on paper (until digital signatures are not available).

Alternate communication means to paper include but are not limited to:
- phone conversations, including numeric
- information transfer, telefax,
- e-mail.

Subject to availability, PS results could be entered directly into computer (smartphone?) and delivered electronically. This does not have to be integrated with existing central information system immediately but rather ad hoc solution for interim period. Regular word processing/spreadsheet tools could be used for recording tally and e-mail for communications as a good start. However, in order to unify procedures for mass deployment, some common forms of engagement are recommended to develop. For example MS Excel template for PS protocol represents a good start.

Recommendation 3: Develop and distribute computer/smartphone applications for general counting aid in PS level, composing of PS protocol and transmission of thereof. Make use of them voluntary. PS-s have to agree with their MEC-s which tools and formats will be used.

Efficiency of use of technology in PS depends on skills of people working with it as was underlined above. Skills shall be developed in trainings and practice under supervision. Natural choice for supervision/training body for PS-s is MEC. Here comes the controversy – MEC-s are responsible for preparation of PS-s but they are not held accountable for PS work results. As described before, MEC-s role in handling PS work results is mere entry of protocol data and logistical support. Handling consequences of inadequate quality is passed to central level.

Recommendation 4: Transfer responsibility for ballot re-count and destruction to MEC level. Require MEC-level approved results of PS-s and rely on them when tallying of overall approved result.

This structural change shortens significantly chain of responsibilities by bringing PS-s activities fully under MEC umbrella. When MEC would be responsible for PS tally
quality then it would automatically allocate more efforts for PS preparation by all means.

While unimaginable in short-time perspective, setting MEC responsibilities into this new level as a long-term target allows for dynamic and stepwise transfer from current system to new one.

**Corresponding action plan has to be developed separately with adequate reallocation of financing.**

In addition there seems to be some confusion with release of election results to the public. Preliminary results are communicated always in press conference with subsequent publication in the internet. This contradicts with current understanding of information dismissal.

CEC secured webpage (https://www.izbori.ba) serves as an official information resource and is very suitable for publishing approved results on 24/7 basis. There is no need for press conferences as such. Approval requires good quality control usually performed by dedicated staff in all levels, not by every individual member in CEC. This has to be reflected in the dissemination process as follows:

- Chairman of CEC is ultimately responsible for approval of consolidated election results. However, Chairman can appoint another person/persons (“chief(s) of quality control”) to take this responsibility/responsibilities fully or partially.
- Approved election results shall be published on Internet immediately.
- Press conferences could be used in cases when additional explanations (which are not published for some reasons in internet) to pure number-reading are required. However, few press conferences are still desirable to maintain traditions and provide “human touch”.

Proposed way opens doors to effective dissemination of election results in real-time basis. If there is no quality control step foreseen, “raw results” could be released automatically and published immediately. This applies most visibly to preliminary results collected with help of information system from MEC-s in election night. However, release “in batches” is sometimes desirable for various reasons, including quality control of published data.

Principle publish-as-soon-as-approved applies also to any other relevant information available to CEC before confirmation of final election results. Number of claims filed, progress of dispute resolution, intermediate decisions taken etc are also matters of public interest.

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20 „Election results” in current context means any type of result, which could be partial or complete, machine-produced or human-calculated, approved or non-approved, confirmed (final) or not.
Recommendation 5: Outline quality control system in CEC to match reality and give authority to people actually responsible for (parts of) quality control to approve and publish information as soon as it becomes available.

**Transparency is crucial to elections.** Tallying and dispute settlement are integral parts of elections where public attention and interest is still high – even higher than during and before Election Day with all eyes now on CEC. Therefore it is natural to do the best to get this curiosity satisfied to the maximum possible extent.

**Alternate and New Methods**

**Collection of Biometric Data during Identification Process**

Perhaps it is not fully apprehended but biometric data are collected even today during identification process in PS-s in form of written signatures. Besides just marking the signature field in voters list, another reason of getting signature from the voter is to get some evidence that a person was present.

Written signature is used **primarily** to indicate signatory's commitment to some written text. Identity of signatory does not necessarily have to be directly derived from the signature itself, hence “name and signature” are usually required separate in the paper-signing process. Due to common practice that people use to reflect (part of) their name in their signature and that dynamics of handwriting is also somewhat specific to an individual, **secondary** use of of signatures has been developing. It is called **graphology** or an art of analyzing handwriting with an aim to identify author of particular piece of handwriting.

Indeed, signature in voters list is not commitment to some text but just sample of personal signature with aim to identify a voter. At the same time handwriting is one of the poorest biometric properties for identification of a person and can serve only for very indirect evidence.

Contemporary technology provides affordable tools for acquiring much better biometric evidence of voter than handwriting. Facial picture or fingerprint are easy to acquire and can be paralleled with ones stored in ID-card of the voter or database of IDDEEA. This comparison should not be done on-the-fly but only in subsequent analysis for verification purposes when required.

Getting fingerprint is easy for the voter but might be trickier for subsequent analysis requiring computer assistance. Picture is more human-processable but getting proper photo is somewhat trickier. Imaginative scenarios for the latter include:

- Photo is taken in ad hoc basis
- Photo is taken in specific booth (as for document photos)
There is nice corner for photographing within polling station with proper lightning as in photo studio. Background carries name of polling station and current year. Copy of photo taken is given instantly on paper or over e-mail to voter as a souvenir with accompanied text: “This is your complimentary copy from … Original will be not distributed and will be destroyed after announcement of official election results in 30 days”.

It seems that one of the most frequent reasons for rejecting an appeal for electoral fraud is that “we do not have data to verify and personal rights of claimant were not violated.” Improved collection of biometric data allows for substantive analysis to the question “who was there in the polling station and marked his line on voters list”. From that perspective, picture (recommended) or fingerprint taken from voter can fully replace signature.

**Recommendation 6: Envisage improvements in biometric data collection from voter.**
Pre-filled Ballots

Traditional mode of voting in PS includes filling of ballot in controlled PS environment with prior identification. This is seen as a way to ensure voter's free will. The other reason is that empty ballots cannot be obtained elsewhere, especially when they are specific to elections and constituency as in BiH.

Let us just forget about the other reason for a moment by imagining that there are universal type of ballots that can be used repeatedly (in case on number-writing) and/or they are available from other channels (like kiosks, paper shops, available on internet for home printing). This leaves us only the one question – is “forced privacy” the only way to ensure voter's free will?

Most notably, voting abroad by postal mail does not include any measures for ensuring privacy. Also voters needing (or wanting!) assistance is a current problem in PS environment. Conflict between provisions for privacy in current voting methods is obvious and therefore we need to concentrate on higher goal – ensuring of free will.

Free will is manifested in paper voting process when casting ballot with knowledge what is written in ballot (and how this is understood). Voter can also choose to not cast the ballot, discard it and come again if applicable.

This requires assisted privacy during ballot casting with prior identification similar to visit to a medical doctor. Pre-filled and folded/enveloped ballot is boxed (or discarded) in closed room after proper identification and biometrics collection.

From election administration viewpoint it will shorten controlled process – time from identification to ballot casting. In current process it also involves handling over empty ballot and filling it by voter.

Voter will have more freedom at the same time to choose time and environment for thinking through choices and filling the ballot. Voter can also choose to come to PS for ballot-filling where there are all preconditions for it – blank ballots, pens, candidate lists, private booths etc. But this sort of ballot-filling environment resembles more library than pressurized voting environment today.

Candidates will enjoy newly opened opportunities to distribute pre-filled ballots among other developments.

**Recommendation 7:** Launch a discussion encompassing pro's and contra's of pre-filled ballots.

E-Pen and Ballot Scanners

Automation methods available to automate vote counting process can be divided into two stages:

- ballot scanning – generating computer image from paper ballot,
- automated counting – processing of computer images using OCR (Optical Character Recognition) or OMR (Optical Mark Recognition) methods.

Ballot scanners are designed to work on certain size of paper. Whereas A4 scanner is almost commodity, scanners that would be needed to scan ballots used in BiH (A2+) are rather exception that is represented in their size, weight and most importantly – price tag. There are no known use of A2 ballot scanners in election process besides Norway where they are used for central counting.

Ballot paper it has to be unfolded when scanned which introduces privacy concern. If ballot box is designed as a scanner to be used by voter then additional sleeves shall be used for covering content of the ballot. A voter shall be instructed to use sleeves and feed one end of ballot to the ballot box which then would suck the ballot in, much like regular paper shredders do it.

This rather cumbersome technique shall not be used when ballots are scanned by PSC members after voting closes. Then ballots are anonymous (by definition) and privacy-providing mechanisms along with special paper-sucking scanners are not directly required. However, scanning at the time of vote casting saves significant effort and time.

Another interesting way of getting computer image of a ballot is to use so-called ePen. This is otherwise a regular pen but equipped with mini camera capturing handwriting of voter. Ballot paper shall have special marks printed close to unnoticeable to human but required for camera pen for orientation. The ePen is also equipped with radio transmitter which forwards all strokes and marks of writer to the base station.

Computer images recorded from ePen or scanned from ballot shall be further analyzed using OCR or OMR methods in order to recognize content. Software to this is not standardized and shall correspond to specifics of election – ballot composition, tallying method etc. Therefore ballot analyze and count software represents significant cost to the overall system and is not directly related to extent of use.

Simple feasibility study between ePen and ballot scanning options for BiH (courtesy of Smartmatic) is in Annex of this report.

Both ePen and automatic ballot boxes will certainly generate fear of voters that their privacy is compromised. Indeed, it seems that machines are recording their handwriting or their ballot so extra effort shall be devoted to explain that a given
handwriting or a given ballot is not attributed to person. At the same time these methods are effective against fraudulent addition of extra ballots after opening of ballot box as primary count is already done and cannot be altered.

Automated ballot counting is a typical example of election automation where verification requires elevated attention. Some countries practice 1-2% manual recount just for crude attack discovery, some require full re-count in loosely defined circumstances. One quite feasible option would be to use both ePen and after-vote ballot scanning whereas equipment for that comes from separate vendors. This solution, of course, comes with double price tag.

**Recommendation 8:** Consider use of ePen and ballot scanning techniques having in mind general concerns about use of technologies in election process. Recall that overall ballot counting complexity is directly dependent on ballot composition.

**Advanced Voting**

Nowadays mobility of the electorate requires also changes in electoral system. One possibility to increase (or rather maintain) voter turnout is to increase availability of voting period and give more freedom for selection of PS location.

Well-known method for achieving this is advanced voting with selected PS-s open for vote casting before Election Day, usually for the period of 3..7 days. People who cannot be there for the Election Day can exercise their voting right prior to it. If only one polling station (naturally: location of MEC) is open for given municipality then it must serve all voters in the district meaning that all voters lists shall be there.

Another step to take is to allow for advanced voting outside home constituency. In this case voters lists are not applicable and votes are collected in double envelopes like tendered ballots today. Every PS participating must have specific ballots (candidate-marking) or candidate lists (number-writing) for every constituency in BiH.

There must be enough time between advanced voting period end and Election Day for transport of double envelopes to their destined home polling station. Voters lists must be processed prior opening of PS in Election Day – all voters who have sent tendered ballot to their home PS must be marked accordingly and not allowed for casting another vote during Election Day.

It shall be noted that advanced voting will contradict principle of advertisement-freeness during the voting period. This will be not an actual issue when introduced but grows in line with popularity of advanced voting. In Estonia where share of advance votes (which includes internet votes) has been surpassed share of votes...
given in Election Day for several elections already, this issue is still unresolved.

**Recommendation 9:** Consider introduction of advanced voting in BiH with possible option to vote outside original constituency.

**Internet Voting**

By “internet voting” we are denoting a method of voting where voter uses internet-connected computer to make his choice and transmits it over internet to central facility where votes are stored and onwards tallied. Voter has means for authentication for validation of his eligibility and receiving e-ballot. After ballot filling it is encrypted and after this e-signature of voter is applied. E-signature provides for integrity of the encrypted ballot and undeniable authenticity of signatory. It should be noted that true identification of voter is determined from e-signature only – voter is denied from casting a ballot if e-signature does not check out\(^{21}\). From that perspective authentication serves only for preliminary check of eligibility.

Internet voting is quite a new method and has been practiced only during past dozen years. It is used in number of countries as an alternative to traditional voting enabled for partial (e.g. for expatriates) or for full electorate. Most experienced country from this respect is Estonia\(^{22}\) which has been practicing internet voting pan-nationally for full electorate since 2005 in 8 elections.

Estonia has been enjoying widespread use of e-authentication and e-signatures in other fields since national electronic ID-card was introduced in 2002. From that perspective internet voting in Estonia shall be seen as “another ID-card application” rather than weird but outstanding phenomena.

As internet voting dematerializes voting and counting process completely to cyberspace, security of thereof becomes focal issue. Confidentiality (i.e. secrecy of vote) is fairly easy to solve by using contemporary cryptology whereas integrity of the whole system requires most of the attention. Not surprisingly, verifiability is seen as key property\(^{23}\) for having proper internet voting system with integrity provided. It is easy to verify certain process when input and output of it is public for verification – process can be repeated by other people/means and results can be verified. Unfortunately this is not a case with elections. Vote has to remain private and nobody else shall be able to track individual vote. Therefore verifiability of e-

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\(^{21}\) This logic is further elaborated in the chapter „Pre-filled Ballots” above


\(^{23}\) 2012 Electorate: 3,149,280 (According to the report Election Indicators 2002-2012 published by Central Election Commission Bosnia and Herzegovina) and assuming 600 voters (aprox.) per polling place.
voting is classically separated into three parts:

- **recorded as intended** – will on the voter is unequivocally recorded in digital form,
- **cast as recorded** – the vote was received by relevant service as recorded,
- **tallied as recorded** – all recorded votes were tallied correctly.

First two parts of verifiability are sometimes combined into “cast-as-intended” property meaning that voter can verify by alternate method whether his will was received properly. This is also called “individual verifiability”. This is by now commonplace for example in Estonia where smartphones (or tablets) can be used for individual verification.

All encrypted and recorded votes shall be tallied in a way that preserves voter privacy. It would be desirable that anyone could verify correctness of the tallying process – this is called **universal verifiability**. In internet voting systems allowing for repeated vote casting it becomes important to also preserve confidentiality of **time and location** of the last vote casted by certain user. Whether it is unavoidable that some parts of the system will record these data, universal verifiability cannot be applied to whole tallying process – all encrypted and recorded votes cannot be published. In those systems **restricted verifiability** will apply – tallying process can be verified by (randomly) selected persons who would sign for preserving confidentiality of time and location of individual votes cast.

Nowadays techniques in applied cryptography such as *homomorphic cryptography* and *mixnets* can be used to provide for end-to-end verifiability in server side allowing for fully controlled path from recorded votes to final tally. Parts of this shall be performed under restricted verifiability mode whereas final counting of votes can be verified publicly.

In a nutshell, internet voting can be set up in secure way providing full end-to-end verifiability. Security as centerpiece has to be in mind in all other aspects as well. We mentioned voter tools for authentication and e-signature creation that also must be **secure enough** to be used in voting.

The term **enough** in this context needs further elaboration. It is understandable that if holder of e-signature tool (e.g. ID-card) is using it for widely for other vital purposes such as money transactions, signing of deeds etc then it is **secure enough** to be used in election setting. If such a tool is used for e-voting only then it has potential to become subject of bargaining – ID-card along with PIN code could be borrowed (for money) and probability that e-signature tool is actually used by its legitimate holder will decrease.
If voter does not have e-signature tool issued according to e-signature legislation then it is still possible to issue one for one-time-use for specific elections. This will require extra processing time for every voter to undergo identification process according to requirements for e-signature certificate issuance but is still doable.

Internet voting practiced in Estonia makes use of widely used national ID-card with both e-authentication and e-signature capabilities. Voter has to have internet-connected computer with smart card reader and can electronically sign his e-vote. The same scheme could be transferred to one-time-signing case without need for an ID-card. Identity of a voter could be established using teleconferencing tool, just like Skype is used for public servicing for example in Georgia. After positive recognition e-signature keypair and certificate is generated for one-time signing of a ballot.

**Imaginative scenario:** voter starts an application downloaded from izbori.ba webpage which instructs to enter personal code first. Upon entering the application displays list of candidates for applicable constituency. Voter fills the ballot and presses key “Submit” after which he shall await for availability of e-PS member for identification procedure. Voter checks whether video camera faces him and whether lightning is adequate. He knows that when video session is started then he has to do the best to be similar to the facial image in his ID-card (and IDDEEA database). He also knows that video feed is saved for further processing and if e-PS worker answering the call remains hesitant this video will be reviewed by others. Finally video contact is established and after few pleasant smiles vote is accepted.

Internet voting can also be used in the polling station environment. If voter does not have e-signature certificate then one is generated for him and delivered on smart card or USB stick which would be subsequently used by voter to sign a vote and then returned to PS worker. Identification procedure has, again, to correspond to requirements foreseen by e-signature legislation. Internet voting in PS environment seems a little odd but so is the use of e-voting kiosks (special e-voting machines). Internet voting can make use of off-the- self but perhaps security-enhanced computer hardware whereas e-voting kiosks represent certain vendor lock-in.

In general, security level of local or remote identification of a voter is in the hands of service provider – in out case: election management. When considering new methods of voter identification it is reasonable to compare it to existing accepted ones. For example voting over postal mail features quite low level of identification security
limited only by (easily falsifiable) handwritten signature along with indirect evidence from (possibly untrusted) postal systems.

End-to-end verified internet voting is probably the most convenient and trustworthy voting method when implemented correctly. Internet voting has repeatedly brought to the practice in binding elections all over the World. Low general understanding about mechanisms behind it, especially in security matters, causes intelligible resistance. This might be manifested by political subjects spreading FUD (Fear, Uncertainty and Doubt) because they lack knowledge and they may think new voting method will work against them. Balanced and educated disputes on the subject are much needed.

Recommendation 10: Start immediately studies of internet voting techniques and their applicability in BiH.
Annex: Feasibility Study for Ballot Counting in Polling Places  
(provided by Smartmatic)  

Executive Summary  
Analyze the financial, technical and voter experience variables of implementing ballot counting at the polling place using three possible technological solutions:  
1. Optical scanner for A2 ballot size, based on COTS (Commercial off-the-shelf).  
2. Optical scanner for A4 ballot size, based on e-counting voting technology.  
3. ePen to vote in A2 ballot size, based on digital capture of voter’ strokes.  

Financial:  
Assuming a total number of 5,254 polling places distributed across the country, and a single device to count votes on each polling place, it is seen in the tablet below, the cost related to hardware and software of each solution proposed.  

<table>
<thead>
<tr>
<th>Device</th>
<th>Units</th>
<th>Unit Cost.* (Ref.)</th>
<th>Software * (Ref.)</th>
<th>Total</th>
<th>Impact on ballot layout</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical scanner for A2</td>
<td>5.254</td>
<td>$13.300</td>
<td>$310.000</td>
<td>$70.188.200</td>
<td>None</td>
</tr>
<tr>
<td>Optical scanner for A4</td>
<td>5.254</td>
<td>$1.230</td>
<td>$210.000</td>
<td>$6.672.420</td>
<td>Yes</td>
</tr>
<tr>
<td>ePen to vote in A2</td>
<td>5.254</td>
<td>$ 850</td>
<td>$170.000</td>
<td>$ 4.635.900</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Note: Commercial reference  

Cost considerations of the optical scanner, for A2 ballot size, based on COTS:  
- The scanner for A2 ballots has a market price of USD 13,300, which represents an expensive option in terms hardware procurement, if it is required purchase one scanner per polling place.  
- The large dimensions and weight of the scanner represent an increment in the cost of transportation and storage.  
- This option does not have any cost related to the re-design of paper ballots layout. The cost in this area remains unchangeable.  

Cost considerations of the optical scanner, for A4 ballot size, based on e-counting voting technology:  

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24 2012 Electorate: 3,149,280 (According to the report Election Indicators 2002-2012 published by Central Election Commission Bosnia and Herzegovina) and assuming 600 voters (approx.) per polling place.
The market offers a scanner specially designed for election purposes. This scanner can handle ballots with a maximum length of 1400 mm and 210 mm width (A4 width). This scanner has a referential price of USD 1,230, which represents a significant reduction in cost, compared with A2 scanners (USD $ 12,070 savings per unit).

Transportation and storage cost is reduced in 50% compared with an A2 scanner, thanks to smaller dimensions and weight.

The ballot size has to be modified to make it fit in a 210 mm width. The main advantage of this scanner over the A2 scanner is that both faces of the ballot (front and back) can be scanned simultaneously.

*ePen Technology:*
The ePen is a new technology where it is used a digital pen that the voter uses to mark his/her choice, and a paper with dots pattern used to capture the stroke or mark. The digital pen includes a camera that captures every stroke performed by the voter on the paper dots.

The components of this solution are:

- **Paper Ballot:** It can be used a paper ballot with the official layout. The only difference is that the paper will contain a special pattern with quasi-invisible dots that the ePen can read.
- **ePen:** Digital pen that contains a camera to record the voter’s mark. It is recommended a minimum of two pens per polling place, but this number can vary depending on the number of voters per polling place.
- **Consolidation station:** The consolidation station is the place where the ePens are going to be placed after a voter vote, in order to store the electronic vote. The consolidation station also is in charge of transmitting the result after closing polls.

Cost considerations of the ePen, for A2 ballot size, based on digital capture of voter’s strokes:

- The average cost of the ePen and Consolidation Stations is 30% less than the A4 scanner, which represents a reduction of hardware procurement.
- Transportation and storage cost is reduced considerably compared with an A4 scanner. Due to the fact that the equipment of this solution is limited to two pens (minimum), the paper ballot and the consolidation station, that has the size and weight of a tablet.
- The impact on paper is limited to print the dot pattern on the paper. The ballot paper should be printed in a digital printing certified by the provider (Smartmatic).
**Technical aspect:**
In the technical aspect, it is shown on the table below, a comparison in terms of scan and vote interpretation speed of COTS scanners (for the A2 size) and a purpose specific devices for elections, such as the A4 optical scanner and the ePen.

Assuming a robust backend for processing the OCR\(^25\) (Optical Character Recognition) on the ballots images, we can estimate the total time to scan a ballot and interpret a vote as it is shown in the following table:

<table>
<thead>
<tr>
<th>Device</th>
<th>Paper ballot dimension (mm)</th>
<th>Capture Area</th>
<th>PPM Scan (sec)</th>
<th>Vote interpretation (sec)</th>
<th>Total time for vote interpretation per ballot (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical scanner for A2-COTS</td>
<td>A2: 420 x 594</td>
<td>Front</td>
<td>4.00</td>
<td>12.00</td>
<td>16.00</td>
</tr>
<tr>
<td>Optical scanner for - E-counting voting tech. A4</td>
<td>Half A2: 210 x 594</td>
<td>Back-front</td>
<td>5.94</td>
<td>6.14</td>
<td>12.08</td>
</tr>
<tr>
<td>ePen to vote in A2</td>
<td>A2: 420 x 594</td>
<td>Real Time</td>
<td>Real Time</td>
<td>8.00</td>
<td>8.00</td>
</tr>
</tbody>
</table>

The faster option in terms of image capturing and vote interpretation is the ePen. The ePen captures the voter mark or stroke on the paper when the action is performed. The interpretation of the number of letters takes around 8 seconds\(^26\). The paper size does not represent a barrier for this technology.

As a second option, in terms of speed, we have the optical scanner for 210mm x 594 mm ballot size (half A2 size). In just 12.08 seconds, this scanner can capture simultaneously both faces of the ballot and interpret votes. Half of the A2 ballot should be located in the front of the ballot and the other half in the back.

Finally, the optical scanner for A2 ballot size captures the image (only front face) in 4 seconds, and interprets the votes in 12 seconds. A total time period to capture and interpret the votes is 16 seconds.

Both scanners have limitations in terms of ballot size and number of ballots:
- For the A2 size scanner: If the election requires a ballot slightly larger than 841mm (A1 size), this scanner would not be able to capture the entire image.
- For the A4 scanner: If the election requires a ballot slightly wider than 210 mm, this scanner would not be able to capture

\(^{25}\) For OMR case, the interpretation time may be lower
\(^{26}\) According to the software related to each scanner on the table located on financial section.
For both A2 and A4 scanner: If the election requires more than one ballot, the scanning and interpretation time is increased to double. This would generate a bottleneck and queues.

**Voter Experience:**
For the ePen and A2 scanner options, the voter experience remains invariable. The voter will vote as he/she is used to vote. However, for the A4 scanner option, the ballot size and maybe the ballot layout may change. Some recommended changes in form and size of the ballot would be the following:

![Diagram of ballot size and layout changes]

Take the A2 size ballot paper and have four A4 pages pre-cut.
- Option 1: The ballot can be cut horizontally (Image 1) and it can fold, as a book, to vote. After the voter mark his/her vote in the ballot paper, the voter has to introduce it, horizontally, on the scanner.
- Option 2: Similar to option 1, but the ballot can be cut vertically (Image 2) and it can fold, as a notebook, to vote. After the voter mark his/her vote in the ballot paper, the voter has to introduce it, vertically, on the scanner.

**Conclusion:**
The conclusion for this brief feasibility analysis, can be summarized as the following:

The ePen seems to be the best option to develop an Election using an A2 paper Ballot, based on:
- Financially, represent the most cost effective option
- Technically, represent the faster option, and
- It does not change the current voter experience.
Strengthening the capacities of the Central Election Commission BiH
Council of Europe Technical Assistance and Expert Mission*

Findings and Recommendations

Executive summary

This report includes findings and recommendation of the Council of Europe Technical Assistance and Expert Mission to Bosnia and Herzegovina conducted in March 2017.

It contains an overview of 16 key issues in relation to the introduction of new electoral technologies in BiH that have been identified during this mission.

These issues form the basis for 16 recommendations. The recommendations are not meant to be a detailed work plan. They rather present various options for the use of electoral technologies in BiH and support decision makers in setting related short, medium and long term priorities.

Once such priorities are agreed upon, a detailed work plan for the chosen options needs to be developed.

Background

The Central Election Commission (CEC) of Bosnia and Herzegovina (BiH) has launched an initiative for the introduction of new technologies in the electoral process in BiH. The BiH CEC’s effort is directed to making certain improvements for the 2018 General Elections so that all stages of the electoral process would be significantly adapted to the new information technologies aimed at the accurately and promptly generation of final election results.

Upon the initiative of the BiH CEC an Inter-departmental working group for analyses of the situation and proposal of modalities for the introduction of new technologies to the electoral process in BiH was established.

This report was prepared as part of the Council of Europe’s (CoE) Longterm-Electoral Assistance Programm to Bosnia and Herzegovina. It is based on an expert mission conducted in March 2017 aimed at providing assistance to CEC BiH to develop a roadmap for the implementation of new technologies.

*Peter Wolf, Technical Manager in Election Processes Unit of International IDEA and CoE expert on new technologies
The report includes:

- Consolidated mission findings and assessment of the current situation
- Recommendations on how to implement new technologies in the electoral process in BiH
- For each recommendation a suggested priority level and suggested time frame: short-term (2017/2018) and mid-term (2022-2026) activities and long-term steps (2030 and beyond)

The findings in this report are based on a review of existing documentation, the discussions in two meetings of the Inter-departmental working group on March 13 and March 20, the presentations at a round table event on new election technologies held at the BiH Parliament on March 15, 2017, as well as discussions with commissioners and staff at the CEC.

**Consolidated mission findings and assessment of the current situation**

In recent years, the CEC BiH has implemented and utilized three key election ICT applications. All three are mission critical and essential for the successful conduct of elections in BiH:

1. The passive voter registration (PVR) system and related ICT services established in cooperation with the Agency for Identification Documents, Registers and Data Exchange (IDDEEA) in 2006
2. The Unified Electoral Information System (JIIS, Jedenstveni Izborni Informativni Sistem), a continuously improved and consolidated set of election related IT applications used by the CEC
3. A public website providing electoral information, including voter registration details and a recently significantly improved close to real-time result publication system.

An assessment of the status of these applications together with an overview of current needs and challenges in the electoral process identified the following key issues in relation to the introduction of new electoral technologies in BiH:

**Issue 2017/1: Institutional capacity**

Both the CEC and IDDEEA are facing difficulties in retaining key expertise, staff, development capacity and analytical skills, especially in the ICT area. Consequently, available technology cannot be used to the maximum possible extent and important institutional knowledge is continuously lost. This makes it difficult to efficiently introduce, manage and sustain new technologies.

**Issue 2017/2: Outdated existing technology**

The PVR software, maintained and operated by IDDEEA, is in use for almost 10 years and requires technical and functional updates. This outdated technology
poses several security and operational risks that can put the entire voter registration process in jeopardy. Even though the passive voter registration software is essential for the electoral process in BiH, resources for the required updates are not readily available. Similarly, parts of the JIIS are outdated and need upgrades and improvement.

Issue 2017/3: Voter registration, loss of residency

Based on the PVR system, the CEC receives a voter register for in-country voters from IDDEEA. As this register only contains all eligible voters, the CEC lacks information about voters that were removed from the register due to deregistration of their residence (prebivaliste). Such deregistration often affects citizens with multiple residences (e.g. out of country, in country between entities). Such citizens can be involuntarily unregistered as a result of regular residency checks conducted in parts of the country by the competent authorities. The CEC does not obtain full information about such cases and cannot analyze or follow up such cases, nor can it inform affected citizens.

Issue 2017/4: Voter registration, deceased

There are still reports about a significant amount of deceased citizens on the voter register. This is in several cases establishing avenues for electoral irregularities. Further analysis needs to be conducted, but it appears that update for current cases process is mostly working. A spot check in Bijeljina municipality for example revealed that around 95% of recently deceased citizens were removed from the register. The majority of problematic cases reportedly dates back to the years 2003-2007, the timeframe after the new civic registration system was introduced and before proper procedures for processing death records were established.

Issue 2017/5: Voter registration, out of country

The number of out of country voters is, after several years of decline, currently increasing significantly, from approx. 27,000 in 2004 to 65,000 in 2017. There are indications that this increase is partially linked to registration fraud. Specifically, it is suspected that copies of ID cards available at various institutions are misused for such fraudulent registration.

Additional operational difficulties are created by the large number of last minute registration applications submitted by email within a few days before the registration deadline. In 2016 40,000 emails with registration forms, or about 60% of all applications arrived in the last days before the registration deadline.

Issue 2017/6: Voter registration, IDPs

Citizens with Internally Displaced Person (IDP) status have special voting rights in BiH. Obtaining updated information on citizens with this status from the Ministry
of Human Rights and Refugees is difficult and the CEC does not have access to the latest information.

Issue 2017/7: Polling stations, voter identification

The identification process in polling stations is not always conducted properly. Sometimes due to a lack of training and mistakes, sometimes as a suspected avenue of fraud. Suspected manipulation includes compromised polling station officials conducting the identification unobserved, accepting voters in possession of other citizens’ ID cards and also misusing voter list entries of citizens known to be deceased or currently not residing in their area of registration.

Issue 2017/8: Polling stations, delays

Voters unfamiliar with the complex ballots cause delays in polling stations. It takes these voters a long time to study the ballot before casting the vote.

Additional delays are caused by a sometimes slow voter identification process where election officials, both intentionally and unintentionally, take a long time for finding voters on the paper voter list.

Issue 2017/9: Vote count

Manipulation during the vote count at polling station level is a possibility, especially on open list ballots where additional candidate preferences may be added to ballots during the count. However, vote counting audits are only conducted in case of official complaints and appeals. This leaves a very low risk for perpetrators.

Issue 2017/10: Slow vote tabulation and result publication

Some stakeholders considered the vote count, tabulation and publication process too slow leading to calls for automation of related procedures. However, available statistics from recent elections indicate that the availability of results appears relatively acceptable. After the 2016 municipal elections held on October 2nd, 66% of the results for the mayors and 15% of the results for the municipal council were available at midnight on election day. At 9pm on the following day 97% of the results for the mayors and 84% of the results for the municipal councils were completed.

Issue 2017/11: Accessibility

Blind voters find the large and complicated ballots unsuitable for exercising their right to vote and have proposed accessibility technology. Homebound and immobile voters are often unaware about the possibility of requesting a visit of a mobile polling team.

Issue 2017/12: Election day complaints
The official complaints process is paper based and very slow. This makes it difficult for the CEC to receive up to date easily analyzable information about problems that occur throughout election day and to respond accordingly.

Issue 2017/13: Party and candidate registration

The currently paper based party registration process is slow, ineffective and error prone, and involves substantial data entry work at the CEC Secretariat upon receipt of the paper registration forms.

Issue 2017/14: Observer registration

The current, paper based observer registration process is ineffective an error prone, including the data entry process conducted by the CEC Secretariat upon receipt of the paper registration forms.

Issue 2017/15: Publication of mandate holders

CEC maintains a database of elected officials and the mandates they hold. This database is not available publicly for now.

Issue 2017/16: Social Media

The CEC has currently no social media presence. Website, phone and email remain the main electronic communication channels with stakeholders

Recommendations on how to implement new technologies in the electoral process in BiH

The CEC BiH has made remarkable progress in the use of ICTs in recent years, including the passive VR system, the new, detailed online results publishing system, and the creation of the JIIS.

However, moving forward with ICT upgrades it is important to bear in mind that successful advancements of the electoral process cannot be expected from technology alone. Sustainable improvements always require a combination of appropriate technology, procedures and staff at all levels. Annex 1 of this document therefore contains selected recommendations from the 2014 OSCE/ODIHR Election Observation Report that go beyond the immediate application of ICTs, but would all have a positive impact on the issues identified in this report.

It also needs to be noted that any technology needs maintenance and upgrades after introduction. For any new systems, no matter whether funded from state budgets or donations, it is important to plan for the long term cost of ownership beyond the initial purchase. In this regard a limiting factor for the introduction of new election technologies in BiH is the fact that some mission critical election technologies
already in use are in need of updates, but the necessary human and financial resources are not readily available.

It should also be noted that in a BiH, a country where mobile devices and internet access is available to the vast majority of citizens, including election officials, the use of web based and online information systems can be very cost effective. Especially when compared to purchasing and maintaining hardware for thousands of polling stations and for use on election day only.

The electoral issues identified in this document are the basis for the following recommendations. The recommendations do not attempt to be a detailed work plan, but are rather meant to support decision makers in setting short, medium and long term priorities for the use of electoral technologies in BiH. Only after such priorities are established, a detailed work plan, including securing the required funding, for the various options should be developed.

Working out detailed costs for the various projects are beyond the scope of this assessment. It can however be estimated that the required investment for improving centralized ICT systems (such as JIIS, Passive Voter Registration, web site) are in the range of several 100,000 Euros. This is about 10 times less compared to the cost several millions of Euros for deploying new technologies and devices (such as voting machines, voter identification devices, etc.) to each of the 6,000 polling stations.

Recommendation 2017/1: Institutional capacity

For the efficient use of new technologies, the capacity of CEC and its secretariat staff should to be increased. In the technology area the CEC specifically lacks capacity in the fields of IT project management, data analysis, software and database development and social media. While this is a well-known and long-term challenge for the institution, the lack of expert staff and high turnover should to be addressed as much as possible, including by staff incentives such as trainings, professional development, etc.

In case of large scale technology upgrades in the future, increasing ICT expertise may even need to go beyond the CEC secretariat staff. Some EMBs that apply a high degree of automation, such as the COMELEC in the Philippines, even strive to include technology experts amongst the Commissioners.

Timeframe: short term

Priority: high

Recommendation 2017/2: Maintenance of existing election technology
Budgets should be secured and prioritized for the ongoing operation and improvement of existing, mission critical systems, such as the JIIS and Passive voter registration system, and the public website with its online information services before any additional, new technologies are introduced.

Timeframe: short term
Priority: high

Recommendation 2017/3 Technology ownership

The CEC should avoid dependence on single vendors and to retain oversight, control and ownership of the technologies it uses as far as possible. This requires adequate expertise within the institution, the usage of open standards, the use of Commercial off the shelf (COTS) systems for generic applications, and the use of open source technologies or at least source code ownership and a right to modify for custom developed systems.

Timeframe: short term
Priority: high

Recommendation 2017/4 Updates of the passive voter registration system

The passive voter registration system should be technically upgraded to the latest database and software versions. As part of this upgrade, functional changes in the software should be implemented. Detailed requirements for the newly required functionalities and system documentation should be developed in cooperation between the CEC and IDDEEA. The following new features should be considered:

- Direct online data exchange between the CEC and IDDEA to replace the current physical transfer of data files on a storage medium
- Access for the CEC to data about all citizens that have been removed from the voter register, including detailed reasons (loss of citizenship, death, lack of residency, etc.)
- Access for the CEC to available data about citizens that have the right to vote, but are not included in the voter register. This covers mostly data about citizens abroad that have applied for passports at embassies that can be included in the out of country voter registration and confirmation procedures.

Timeframe: short term
Priority: high

Recommendation 2017/5: New data exchange mechanisms
For increasing the accuracy of the voter register additional data exchange mechanisms should be negotiated and established with several institutions, including:

- Regular data exchange with the Ministry for Human Rights and Refugees such that the CEC has access to an updated database of all citizens with IDP rights for conducting data cross checks with the voter register.
- Regular data exchange with entity authorities in charge of maintaining death records enabling the CEC to conduct data cross checks with the voter register. Specific should be placed on clarifying the registration status of citizens deceased between 2003 and 2007.

Timeframe: short term
Priority: high

Recommendation 2017/6 Strengthening audit and analysis capacity

The above recommended measures enable the CEC to gain full oversight of the voter registration process and voter register. This should be combined with increased data analysis capacity and resources at the CEC and the establishment of systematic data analysis procedures. With this in place the CEC is able to detect voter registration problems and decide about counter measures.

Voter registers for out of country voters should also be routinely be analyzed for pre-defined patterns of possible fraud (such as multiple registration from an address, unusually high fluctuation in registration for certain municipalities, etc.).

Expansion of registration forms for out of country voters considered to include additional details, e.g. additional proof of identity, additional contact details.

Polling station results should be audited systematically and not only after complaints and appeals. This would increase the likelihood of detecting and deterring manipulation and errors. Such result audits are important integrity measures, both for the current manual count and also for any future use of voting machines in polling stations.

Finally, the recently abandoned double data entry procedures for election results should be reintroduced, possibly with the first data entry happening immediately at municipal and the second later at central level.

Timeframe: short term
Priority: high

Recommendation 2017/7: Improving and expanding online services
The CEC public website and related internal databases should be expanded to cover a range of additional services (listed in descending order of priority):

- New online forms and processes for the registration of out of country voters. This system could entirely replace the problematic registration process via email.
- A new online party and candidate registration process that will enable parties and candidates to submit most of their registration documentation online. This system can improve and complement manual and paper based process currently in place.
- Expansion of the online polling station information system for citizens to include additional information about one month before the election. The additional information should include the location of the voter’s name on the polling stations voter list and an image of the ballots the voter will receive. Such details will help speeding up the voter identification and voting processes in polling stations.
- A new online system for submission of complaints and appeals: such a system provides the CEC fast and efficient access to complaints and appeals, especially those submitted during election day. The system could consist of two parts: one for official complaints that can only be entered by the municipal election commission and one for unofficial input from the general public that can be directly submitted on the website.
- A new online observer registration process that will enable observer organizations to submit most of their registration documentation online. This is to replace the inefficient and error prone manual and paper based process currently in place.
- Online publication of the CEC database of mandate holders that is currently only available internally.

For tasks such as party, candidate and observer registration, elections complaints and appeals, any new application should only complement, not replace the current paper processes to reduce security and integrity concerns. Phasing out the paper process should only be considered in the mid-term and after the reliability and security of these applications is established.

Timeframe: short term

Priority: high – medium

Recommendation 2017/8: Open data

Election data should be provided in according to open data principles. Open data greatly increase the transparency of the electoral process and enables media, civil
society organizations and other interested stakeholders to use the election data directly in their analysis, visualization and information services.

Open data entails publishing data close to real time, disaggregated and in machine readable format. Previous achievements by the CEC to publish detailed election data on its website provide a good starting point for further opening of election data.

Timeframe: short term
Priority: high

Recommendation 2017/9: Increasing social media presence

The CEC should increase its social media capacity and subsequently utilize social media tools for direct communication with stakeholders and citizens by establishing at least a basic presence in social media, including Facebook, Twitter, Instagram. Life streaming of CEC sessions and important electoral events through various streaming services should be explored.

Timeframe: short term
Priority: high - medium

Recommendation 2017/10: Voter identification

Voter identification issues in polling stations should in the short term mostly be addressed by procedural changes allowing of more transparency in polling stations.

Recommendations 2017/4, and 2017/5 will yield additional improvements through more accurate voter registers and the provision of more related information for polling station officials and citizens.

Timeframe: short term
Priority: high

Recommendation 2017/11: Voter identification technology

While generally not widely used in Europe, the application of voter identification technology and specifically biometric technologies in polling stations, can address some of the shortcomings in the voter identification process in BiH. The CEC should further explore available technologies with a short term perspective for piloting and a medium perspective for the introduction of such technologies.

The more secure and the more manipulation resistant voter identification technology needs to be, the more complex and costly it becomes. Therefore the CEC should evaluate three options considering effectiveness, fraud deterrence,
impact on polling station procedures, achievable voter throughput and applicability:

1. Equipping polling stations with electronic voter lists, ideally including online access to an online voter register, possibly through the “5000 polling stations -5000 laptops” initiative (see below)

2. Equipping polling stations with dedicated voter identification devices based on ID card readers and OCR technology.

3. Equipping polling stations with dedicated biometric voter identification systems, based on automatic fingerprint identification systems and IDDEEA biometric data. (see also Annex 2, recommendation 2015/6)

Exploring the various identification technologies in the short term should include field tests and pilots of various systems during upcoming elections. The results of these trials should then inform the decision if and how to move ahead with electronic voter identification.

Legal and technical aspects of data protection should be considered in the evaluation phase as well as fall back procedures in case voters cannot be identified electronically.

Timeframe: short-medium term

Priority: medium

Recommendation 2017/12: Vote count, transmission and tabulation

The CEC should consider further improvements to speed up the vote count including:

- Updating and streamlining existing result sheets based on the CEC’s experience on shortcomings.
- Further prioritizing vote count and data entry between the various electoral races
- Encourage the use of any available communication channels for exchange between polling stations and municipal election commission for the preliminary transmission of result sheets. Share experience with and between municipal election commissions that have already used various mobile applications for this purpose (see also Annex 2, recommendation 2015/2, 2015/3)
- Explore options for providing all polling stations with secure online access to the CEC result tabulation system, either through existing mobile device or through the “5000 polling stations – 5000 laptops” initiative (see below).

Timeframe: short term
Priority: medium

Recommendation 2017/13: Voting machines

Any implementation of electronic voting machines in BiH should be guided by the Council of Europe Recommendations for electronic voting, Rec(2004)11 and Rec(2017)xx\textsuperscript{27}. Some important standards from this recommendation include:

27. Member States that introduce e-voting shall do so in a gradual and progressive manner.

28. Before introducing e-voting, member States shall introduce required changes to the relevant legislation.

29. The relevant legislation shall regulate the responsibilities for the functioning of e-voting systems and provide that the electoral management body has control over them.

36. Member States shall develop technical, evaluation and certification requirements and shall ascertain that they fully reflect the relevant legal and democratic principles. Member States shall keep the requirements up-to-date.

37. Before an e-voting system is introduced and at appropriate intervals thereafter, and in particular after any significant changes are made to the system, an independent and competent body shall evaluate the compliance of the e-voting system and of any ICT (Information and Communication Technology) component with the technical requirements. This may take the form of formal certification or other appropriate control.

In line with the Council of Europe Recommendations for electronic voting, any introduction of voting machines in polling stations should be gradual and therefore seen as an option for the medium term. In the short term various technologies could be piloted in selected locations upcoming elections.

Considering the complexity of BiH’s ballots, languages and electoral system all of the following technologies from various vendors should be further explored:

- Ballot scanners, including the required changes in ballot format (as used in Kyrgyzstan and the Phillipines for example)

\textsuperscript{27} Recommendation Rec(2017)XX of the Committee of Ministers to member States on standards for e-voting
• Direct Recording Electronic (DRE)/touch screen devices with voter verifiable paper trails (as used in the US and Canada for example)
• Electronic Ballot Printers (EBP) (as used in Belgium for example) where voters make their choice on a touch screen and print a machine readable ballot containing their vote. The vote is subsequently cast by scanning it on a separate device.
• Digital pens (with so far limited implementations)

DREs with paper trails and EBPs have not been considered in previous demonstrations. One advantage of such systems compared to scanning technologies and digital pens is that complex ballots in multiple languages can be easier displayed on screens than printed on paper. There is also no need for ballot paper and related logistics. Disadvantage is that it is not possible to a fall back to a paper process in case of technology failure and that more devices will likely be needed to process all voters in a timely manner.

Decisions about any future large scale implementation of voting machines should be informed by the findings of such tests and pilots. Trials should be evaluated and compared in terms achievable improvements of the electoral process, efficiency, impact on polling station procedures, polling staff, voters, voter throughput, costs, reliability and overall stakeholder acceptance in the BiH context. (see also Annex 2, recommendation 2015/8)

As voter identification appears to be a bigger problem in polling stations than the vote count, the introduction of voter identification technologies should have higher priority compared to introducing voting machines.

Timeframe: medium term
Priority: medium - low

Recommendation 2017/14 Remote voting

Similar to other European EMBs, the CEC should closely follow and study global and European developments in the field of internet voting, participate in Council of Europe e-voting initiatives, follow the ongoing development and application of required domestic infrastructure (including online identification and signatures) and strengthen related expertise and capacity.

For now, any implementation of internet voting should be a long-term goal for BiH, similar to most other European countries. (see also Annex 2, recommendation 2015/10)

Timeframe: long term
Priority: high

Recommendation 2017/15 Accessibility

Several initiatives for increasing the accessibility of elections exist in BiH, including the development of voting technology for blind voters. The CEC should continue supporting and cooperating in the development of such accessibility solutions, and study the feasibility of their application.

Timeframe: short term

Priority: medium

Recommendation 2017/16 “5000 polling stations – 5000 laptops”

The “5000 polling stations – 5000 laptops” initiative aims at equipping polling stations in BiH with laptop computers. The effectiveness of this initiative depends on the applications that can be developed and deployed on the laptops. The hardware should therefore only be purchased when the related applications are certain to be available.

The laptops in question would be used most efficiently if both voter identification and vote tabulation/data entry applications can be deployed on them and if no other devices for voter identification, voting and counting will be used in the foreseeable future.

Additionally the availability of stable power supply and secure network connections in target polling stations for this project should to be surveyed.

In conjunction with developing the required software and ensuring infrastructure availability, the use of some laptops should be piloted in selected polling stations.

It should further be noted that configuring and deploying thousands of individual laptops (for example with a specific voter list for a given polling station) is a significant, resource intensive task. A system based on online applications is usually be easier to configure and maintain.

Timeframe: short - medium

Priority: medium

Appendix 1: Findings of the 2014 ODIHR Election Observation Mission

The Final Report of the OSCE/ODIHR Mission to the BiH General Elections on 12 October 2014\(^\text{28}\) contains several recommendations that are directly or indirectly

\(^\text{28}\) http://www.osce.org/odihr/elections/bih/133511
related to technology upgrades. For successful election technology implementation the following recommendations should specifically be addressed:

- **Recommendation 5**: Investigation of electoral offences by prosecutors should be carried out in a timely manner to ensure effective remedy. Where irregularities are established, those found guilty should be held accountable.
- **Recommendation 8**: While the presence of political party representatives in polling stations is a potential safeguard of the process, the authorities should address the high risk of political imbalance in PSCs by conducting a thorough review of the legal provisions and practice for allocation of PSC members. This should be done in a public consultative process that includes MECs and other relevant stakeholders. Furthermore, the CEC could consider disclosing the names of the nominating organizations of PSC members per polling station.
- **Recommendation 10**: The CEC could consider improved voter education on issues that directly impact voters’ rights, especially in case of changes in procedures.
- **Recommendation 11**: The election administration should consider additional safeguards to enhance confidence in postal voting and to protect the integrity of the process. This could include requiring the use of registered mail or hand-delivery of ballots to voters.
- **Recommendation 12**: The state, entity and local-level authorities should make more efforts to ensure IDPs participation by maintaining accurate data. Consideration could be given to reviewing existing co-operation mechanisms between the CEC, the Ministry of Civil Affairs, and the Ministry of Human Rights and Refugees.
- **Recommendation 26**: The relatively high number of occurrences of group voting and irregular assisted voting underlines the need for authorities to enhance voter education programs, including a focus on the importance and obligation to ensure secrecy during the voting.
- **Recommendation 27**: In order to increase the transparency of the process, the CEC should ensure that copies of the results protocols are provided to all accredited observers who request them. Consideration could be given to identifying a practical way for this, which would ensure that each observer is given a copy without hindering the process.
- **Recommendation 28**: To ensure consistency and increase transparency of the tabulation process of preliminary results, the CEC could consider regulating in greater detail the work of MECs during the reception of election materials and tabulation.
Recommendation 29: The CEC should publish the results per polling station as soon as possible after election day, including partial and preliminary results.

Recommendation 30: To increase transparency of the verification of results, the process should be thoroughly regulated and the CEC could consider providing more public information about its activities, having in mind the scale, complexity and the importance of this process.


Objective of the 2015 CoE expert mission was to assess potential technical improvements, with the aim of making future elections more efficient and transparent, while reducing the possibility of electoral fraud.

The final report of the 2015 mission contains 2 observations and 10 recommendations:

- Observation 2015/1: Verification of automated processes shall be foreseen to the extent determined by prior risk analysis
- Observation 2015/2: Use of automated machines in polling stations must be carefully considered before deployment
- Recommendation 2015/1: Consider reducing of ballot size by using candidate numbering and possibly limiting number of choices to a single candidate.
- Recommendation 2015/2: Allow for and popularize any available communication channels for exchange between PS and MEC. Require only final PS tally report signed on paper.
- Recommendation 2015/3: Develop and distribute computer/smartphone applications for general counting aid in PS level, composing of PS protocol and transmission thereof Make use of them voluntary.
- Recommendation 2015/4: Transfer responsibility for ballot re-count and destruction to MEC level. Require MEC-level approved results of PS-s and rely on them when tallying overall approved results.
- Recommendation 2015/5: Outline quality control system in the CEC to match reality and give authority to people actually responsible for quality control to approve and publish information as soon as it becomes available.
- Recommendation 2015/6: Envisage improvements in biometric data collection from voters.
- Recommendation 2015/7: Launch a discussion encompassing pros and cons of pre-filled ballots.
• Recommendation 2015/8: Consider the use of ePen and ballot scanning techniques, having in mind general concerns about the use of technologies in the election process.
• Recommendation 2015/9: Consider introduction of advanced voting in BiH with possible option to vote outside original constituency.
• Recommendation 2015/10: Start immediately studies of internet voting techniques and their applicability in BiH.

Annex 3 Overview of interlocutors and meetings

March 13, 2017
• Preparatory meeting and introduction with CEC BiH, Suad Arnautovic, Stjepan Mikic and CEC staff
• 4th Meeting of the Inter-agency working group on “Voter registration and the role of IDDEEA and CEC BiH

March 14 - 20, 2017
• Daily meetings and discussions with CEC staff

March 15, 2017
• Round table event at parliament
• Discussions with OHR representatives
• Discussions with CEC attendants

March 20, 2017
• 5th Meeting of the Inter-agency working group, presentation of first findings and recommendations

This document was prepared in March 2017 by Peter Wolf, Technical Manager at International IDEA and Expert on New Voting Technologies Expert of Council of Europe.
Report on work of the Inter-departmental working group for the status analysis and proposing modalities for introduction of new technologies in the election process in Bosnia and Herzegovina

General introduction

The Council of Minister of Bosnia and Herzegovina, at 87th session, held on 29th December 2016, passed a Decision on appointment of interdepartmental working group for the status analysis and proposing modalities for introduction of new technologies in the election process in Bosnia and Herzegovina ("Official Gazette BiH", # 8/17). Also, the Council of Minister of Bosnia and Herzegovina, at 98th session, held on 12th April 2017, passed a Decision on amendment to the decision on appointment of interdepartmental working group for the status analysis and proposing modalities for introduction of new technologies in the election process in Bosnia and Herzegovina. Provision of Article 4 of the Decision established that the task of the interdepartmental working group is to, by 30th April 2017, prepare the status analysis and propose modalities for introduction of new technologies in the election process in Bosnia and Herzegovina, and to forward that document via authorised proposer into parliamentary procedure.

The following are appointed to the Interdepartmental working group for the status analysis and proposing modalities for introduction of new technologies in the election process in Bosnia and Herzegovina (hereinafter: the interdepartmental working group):

- Representatives of the Central Election Commission of Bosnia and Herzegovina dr. Suad Arnautović, Stjepan Mikić and Novak Božičković, members of the Central Election Commission of Bosnia and Herzegovina;
- Representatives of the Agency for identification documents, registers and data exchange (IDDEEA): Mersiha Lonić Pašalić and Aleksandar Kapikul;
- Representatives of the Ministry of transport and telecommunications of Bosnia and Herzegovina: Irida Varatanović and Zoran Andrić;
- Representative of Ministry of security of Bosnia and Herzegovina: Stela Šunjić;
- Representative of Ministry of finance and treasury of Bosnia and Herzegovina: Mario Živković and
- Representative of Ministry of civil affairs of Bosnia and Hercegovina: Fehma Kalkan.

Decision on formation of the Interdepartmental working group prescribes that technical and administrative issues for the Group shall be carried out by the Central Election Commission of Bosnia and Hercegovina and the Agency for identification documents, registers and data exchange.

Sessions and activities of the Interdepartmental working group

At the session held on 20th February 2017, the members of the Interdepartmental working group elected Dr Suad Arnautović, member of the Central Election Commission of Bosnia and Herzegovina as the Chairman, and Marko Živković, on behalf of the Ministry of finance and treasury of Bosnia and Herzegovina and Aleksandar Kapikul, on behalf of the Agency for identification documents, registers and data exchange (IDDEEA) as Deputy Chairmen.

Interdepartmental working group held a total of 12 sessions.

Aside to regular sessions, Interdepartmental working group organised, supported by the Council of Europe and the Association of election officials in BiH, on 15th March 2017 in the Parliamentary Assembly of Bosnia and Herzegovina a Round table titled “Analysis of state and proposing modalities for introduction of new technologies in the election process in BiH”, with purpose of public discussion, presentation, dissemination and gathering opinion of the public on type, manner and tempo od introduction of new technologies in election process in BiH. The Round table gathered more than 80 participants, representatives of entity and state institutions, representatives of city/municipal election commissions, election experts both domestic and foreign, representatives of political parties, non-governmental sector and legal entities. Key recommendation of this gathering was that the Parliamentary Assembly of Bosnia and Herzegovina needs to urgently review and adopt the Strategy for application of new technologies in election process in BiH.

Also, on 12th April 2017, Interdepartmental working group organised in the Parliamentary Assembly of Bosnia and Herzegovina a technical discussion titled “The role of competent bodies in creation of the Central Electoral List”, in order to exchange opinions and proposals for undertaking measures in relation to creation of accurate Central electoral list proscribed by Chapter 3 of the Election Law of BiH, and to include the adopted conclusions and recommendations into the final report of the Interdepartmental working
group. Dr Suad Arnautović was the keynote speaker at the discussion, on topic of the Role of competent bodies in creation of Central electoral list, and attendees were representatives of entity and cantonal ministries of internal affairs, Ministry of civil affairs BiH, Ministry of security BiH, State investigation and protection agency (SIPA), Agency for identification documents, registers and data exchange (IDDEEA), Agency for protection of personal data, etc.

Interdepartmental working group session dates:

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<td>4. session</td>
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Interdepartmental working group sessions were open for public, and sessions were attended by representatives of the Council of Europe, Office of the High Representative (OHR), EU Delegation to BiH, Coalition “Pod lupom”, “Jedan svijet” foundation, etc.

Following presentations were delivered in the sessions of the Interdepartmental working group sessions:

1. “The role of DCM in Bosnia and Herzegovina the election process – experiences and lessons learnt”, presentation held by Stela Šunjić, Ministry of foreign affairs BiH;

2. “Social networks in election process – possibilities and limitations”, presentation held by Kemal Bajramović, Civil service agency of BiH;
3. “Entry of voters into Central electoral list – the role of Agency for identification documents, registers and data exchange (IDDEEA), Central election commission of Bosnia and Herzegovina and other competent bodies “, presentation held by Mersiha Lonić Pašalić, Agency for identification documents, registers and data exchange (IDDEEA) and Nebojša Klačar, Secretariat of the Central Election Commission BiH;

4. “Method of keeping Central electoral list and method of usage of electronic voter’s identification devices in Montenegro“, presentation held by Veljo Ćadenović, secretary of State election commission of Montenegro and Milijana Radulović and Nikola Mugoša, independent advisors in the State election commission of Montenegro;

5. “Analysis of state of election process and achieved level of technologies”, presentation held by Adi Agić, Secretariat of the Central Election Commission of Bosnia and Herzegovina,

6. “Proposed solutions for safe and controllable automatization of the election process in Bosnia and Herzegovina“, presentation held by representatives of the “Smartmatic” company, Alexander Rakov and associates;

7. “Electronic voting systems DVS-3s”, presentation held by Željko Ninkov, project manager in Smart System Solutions, Istočno Sarajevo;

8. “Unification of election results on the level of basic electoral units”, presentation held by Mustafa Laković, Secretariat of the Central Election Commission of Bosnia and Herzegovina;

9. “Presentation of the electronic voting system by Dominion Voting”, presentation held by Dallas Newby, representative of the company.

Aside to the given presentations, the Round table, held on 16th March 2017, hosted also the following presentations:

1. “Recommendations of the Council of Europe for application of new informatics technologies in election process”, presentation held by Peter Wolf, ICT expert engaged by the Council of Europe,

2. “Possibilities of utilisation of new technologies in the election process in Bosnia and Herzegovina“, presentation held by Suad Arnautović, member of the Central Election Commission of Bosnia and Herzegovina and Chairman of the Interdepartmental working group, and


In line with the Rulebook of the Interdepartmental working group, all decisions were made in consensus.
At the last session, 12th session which took place on 26th April 2017, members of the Interdepartmental working group unanimously adopted and decided to submit to the Council of Ministers the Report on the work of Interdepartmental group, which includes an annexed document titled “The analysis of status and proposal of modalities for introduction of new technologies in election process in Bosnia and Herzegovina”.

Identified problems and recommendations

Analysis of application of technologies and identified problems and obstacles that slow down or complicate election process due to lack of application of new technologies in certain phases of election process, is given in chapter I – ANALYSIS OF THE STATUS OF APPLICATION OF NEW TECHNOLOGIES IN LECTION PROCESS IN BiH.

Proposal of possible solutions with recommendations for overcoming problems are given in chapter III – PROPOSAL OF MODALITIES FOR INTRODUCTION OF NEW TECHNOLOGIES IN ELECTION PROCESS IN BiH.

Conclusions

Given the above, the proposal is that the Council of Ministers of Bosnia and Herzegovina, after reviewing the Report on the work of interdepartmental working group for the status analysis and proposing modalities for introduction of new technologies in the election process in Bosnia and Herzegovina, adopt the following:

Conclusions:

1. the report on work of Interdepartmental working group for the status analysis and proposing modalities for introduction of new technologies in election process in Bosnia and Herzegovina with “Analysis of status and proposal of modalities for introduction of new technologies in election process in Bosnia and Herzegovina” is adopted;
2. The Report from item 1 will be sent to both Houses of the Parliamentary Assembly of Bosnia and Herzegovina for parliamentary procedure;
3. Ministry of transport and telecommunications of Bosnia and Herzegovina is assigned to, in cooperation with Central Election Commission BiH, to continue monitoring innovations in ICTs applicable in election process in Bosnia and Herzegovina and report, twice a year, on it to the Council of Ministers of Bosnia and Herzegovina with highlighted recommendations for the Council of Ministers of Bosnia and Herzegovina for implementation;
4. Ministry of civil affairs Bosnia and Herzegovina and Ministry of foreign affairs Bosnia and Herzegovina are assigned to, in cooperation with Central Election Commission BiH, continue activities necessary for creation of accurate Central Electoral List, including excerpts from the Central electoral list of citizens of Bosnia and Herzegovina who reside outside of Bosnia and Herzegovina.
With that in mind, the Agency for identification documents, registers and data exchange (IDDEEA) is assigned to provide all necessary technical and other forms of support for creation of the accurate Central electoral list;

5. Ministry of human rights and refugees of Bosnia and Herzegovina is assigned to, in cooperation with Central Election Commission Bosnia and Herzegovina and entity ministries in charge of displaced persons and refugees (Ministry of displaced persons and refugees of Federation Bosnia and Herzegovina and Ministry of refugees and displaced persons of Republika Srpska) and Public Records Department of Brčko District of Bosnia and Herzegovina, to undertake all necessary measures for creation of excerpt from Central electoral list for voting of displaced persons;

6. Ministry of security of Bosnia and Herzegovina is assigned to, in line with its duties given in the Law on ministries and other governmental bodies Bosnia and Herzegovina (“Official gazette BiH“, # 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09 and 103/09), coordinate activities of entity ministries of internal affairs and police of Brčko District Bosnia and Herzegovina and other police agencies and analyses identified occurrences of application of residence regulations for those older than 18 years, as well as other important data for creation of accurate Central electoral list.

7. Parliamentary Assembly of Bosnia and Herzegovina is recommended to form a Working group for development of STRATEGY FOR APPLICATION OF NEW TECHNOLOGIES IN ELECTOION PROCESS IN BOSNIA AND HERZEGOVINA and Action plan for implementation of the Strategy for application of new technologies in election process in Bosnia and Herzegovina as strategic documents of Parliamentary Assembly of BiH, which shall establish short-term, mid-term and long-term directions of development and utilisation of ICT in election process in BiH. Formation of this Working group shall not result in provision of additional funds in the budget of Institutions of Bosnia and Herzegovina;

8. Ministry of civil affairs Bosnia and Herzegovina is assigned to, after adoption of the Strategy referred to in Conclusion 7 of this report, propose formation of a permanent Coordination body for monitoring of Strategy application to the Council of Ministers of Bosnia and Herzegovina. Formation of this Coordination body shall not result in provision of additional funds in the budget of Institutions of Bosnia and Herzegovina;

9. Central Election Commission Bosnia and Herzegovina is assigned to, after adoption of Strategy referred to in Conclusion 7 of this Report, in cooperation with Ministry of finance and treasury BiH, in line with the Law on financing of institutions of Bosnia and Herzegovina (“Official gazette BiH“, # 61/04, 49/09, 42/12, 87/12 and 32/13) provide funds needed for its implementation. ***
Analysis of situation and proposal of modalities for introduction of new technologies into BiH electoral process

Inter-departmental Working Group for analysis of the situation and proposal of modalities for introduction of new technologies into BiH electoral process

Introduction

The beginnings of the use of new technologies in Bosnia and Herzegovina are linked to the holding of the first multi-party elections in the Socialist Republic of Bosnia and Herzegovina after the Second World War, held on November 18, 1990. At that time, the Republic Election Commission was responsible for the conduct of the election, and the technical support was provided by the Republic Institute for Public Administration and the Computer Electronic Centre (REC) of the then Self-managed interest group for pension and disability insurance (SIZ PIO). The aforementioned Computer Electronic Centre enabled quick delivery of election data from all municipalities in Bosnia and Herzegovina as well as a very simple and comprehensive presentation of results for the media in the building of the Socialist Republic of Bosnia and Herzegovina Assembly. The system was based on an electronic connection between each municipality, i.e. the SIZ for Pension Disability Insurance and the Computer Electoral Centre (hereinafter: REC), which was located in the premises of today's BiH Federation Pension Disability Insurance Fund. After the elections, held on November 18, 1990, the next significant step in the technological sense was referendum on February 29 and March 1, 1992, in whose realization the REC had a significant contribution.

Thereafter, until 1996, there was no significant use of new technologies in the electoral process in Bosnia and Herzegovina.

With the arrival of the Organization for Security and Cooperation in Europe (OSCE) - Mission to BiH, i.e. with the implementation of Annex
3 of the General Framework Agreement for Peace in Bosnia and Herzegovina, the OSCE Provisional Election Commission was established in 1996 and all technological and technical assistance in the electoral process was provided by the OSCE headquartered in Vienna and Sarajevo. The significant feature for that period was the use of optical scanners with a bar code for voter identification at the polling station, i.e. in the Central Voters’ Register, and sprays (a spray for the index finger) were also used to prevent a single voter from voting twice at one or several polling stations.

Active registration of voters was introduced in Bosnia and Herzegovina in 1997 meaning that every voter had to come in person to the Centre for voter registration for the purpose of filling in the voter registration form, which was then scanned and translated into electronic form.

In that period, the OSCE developed 26 modules (applications) that were used for the implementation of all segments of the election process.

In 2001, the Parliamentary Assembly of Bosnia and Herzegovina adopted the Election Law of Bosnia and Herzegovina, which entered into force on 28.09.2001, thus ending the application of the Rules and Regulations of the Provisional Election Commission.

In 2006, the Parliamentary Assembly of Bosnia and Herzegovina amended the Chapter 3 of the Election Law of Bosnia and Herzegovina, and the most important change concerns the abolition of active voter registration and introduction of automatic, i.e. Passive Voter Registration\(^\text{29}\). It meant that every citizen of Bosnia and Herzegovina, who attained the age of 18, was to be automatically entered into the Central Voters’ Register in the basic constituency in which he/she resides by registering his/her permanent place of residence. This change in the Election Law of BiH meant that a Voting Centre was equipped

\(^\text{29}\) Decision on adoption of design project “Passive voters registration in BiH” (“Official Gazette of BiH”, number 21/06)
with computers and linked through a protected SDH network with the
Central Election Commission of Bosnia and Herzegovina, meaning that
the election commissions of the basic constituencies were first time given
the opportunity to directly enter data into the Central Voters’ Register
from their jurisdiction.

In 2010, the Central Election Commission of BiH introduced the
Integrated Election Information System of Bosnia and Herzegovina (JIIS
BiH) 30, which imported all OSCE modules into one compatible,
rounded, upgraded and automated system.

At the initiative of the Office of the High Representative in Bosnia and
Herzegovina (OHR), the BiH Central Election Commission had, in
cooperation with the Association of Election Officials in Bosnia and
Herzegovina (hereinafter: AEO BiH), and with the financial support of
the Embassy of the Kingdom of Norway 31 in Bosnia and Herzegovina,
and with engagement of an expert from Estonia, prepared an analysis of
potential technical improvements in the electoral process in Bosnia and
Herzegovina with the aim of having more efficient and transparent future
elections in Bosnia and Herzegovina, while reducing the possibility of
electoral fraud. 32

The outcome of the project was the Final Report - feasibility study with
the suggestions of potential solutions 33 that might be relevant to the BiH
electoral process. The BiH Central Election Commission had at its 2nd
session, held on January 14, 2016 adopted the report of the Working
Group on the Project of assessing possible technical improvements to the
electoral process of Bosnia and Herzegovina, as well as a pilot project
proposal that was implemented in the second phase of the project. The
Pilot Project was implemented in accordance with the Terms of

30 Decision on realization of the Program Integrated Election Information System of BiH – JIIS under
competence of BiH CEC (“Official Gazette of BiH”, number 25/10)
31 Total project budget was 55.452,70 convertible marks (KM)
33 Project assessing possible technical improvements to the electoral process in BiH

Integral part of this project is the conference titled “Presentation of the use of advanced technologies in the electoral process recommended for BiH electoral process by an international expert” held on 09.02.2016 Sarajevo, bringing together 220 participants, representatives of legislative and executive authority, the diplomatic corps, election administration, the non-governmental sector and the media. The application of new technologies in the electoral process was demonstrated by five companies: Smartmatic, Smart System Solution, Indra, Scytl and Gemalto, and simulated elections were conducted using the electronic pencil (ePen) in the voting and counting process.\footnote{Annex no.5 Report on exhibition of advanced technologies, BiH CEC, 09.02. 2016}

The result of the conference were conclusions that were adopted, and that were together the Initiative for establishment of an Inter-departmental Working Group for the analysis of the situation and proposal of modalities for introduction of new technologies to BiH electoral process (document no.: 04-50-2-32-16/16 from 10.02.2016), were sent to the Parliamentary Assembly of Bosnia and Herzegovina, the Council of Ministers of Bosnia and Herzegovina and the BiH Ministry of Civil Affairs.\footnote{Ibid}

Upon the initiative of the member of the BiH PA House of Representatives, the House of Representatives of the Parliamentary Assembly of Bosnia and Herzegovina had at its 25th session held on 16.02.2016 considered the “BiH CEC’s Information on the possibilities
of testing (pilot project) of advanced technologies in the electoral process at the 2016 Local Elections” (act number: 01-50-1-522/-16 of 12 February 2016) and in line with Articles 85, 86 and 165 of the Rules of Procedure of the BiH PA HoR adopted the following conclusion:

“The Central Election Commission of Bosnia and Herzegovina is given 30 days to provide information on the possibilities of using the pilot project on a representative and statistically relevant number of polling stations aimed at testing various advanced technologies in the electoral process (e-technology, electronic voting ...) at the 2016 Local Elections by using the existing budget funds. In addition to all relevant details, the information should explain which types of tests are possible in accordance with the existing legislation and for which amendments to the Election Law of BiH may be required.“.

The Central Election Commission of Bosnia and Herzegovina had on 08.03.2016 submitted an Information on possibilities for testing (pilot project) advanced technologies in the electoral process at the 2016 Local Elections number 04-2-50-2-165-2/16.

The BiH Council of Ministers had at its 87th session, held on 29.12.2016, adopted a Decision on the of an Inter-departmental Working Group for the analysis of the situation and proposal of modalities for introduction of new technologies into BiH electoral process (“Official gazette of BiH“, no 8/17) consisting of three representatives of the BiH CEC; two representatives of the Agency of Identification Documents, Registers and data exchange (IDDEEA) and Ministry of communication and transport respectively, and one representative of the BiH Ministry of Security, BiH Ministry of Foreign Affairs, BiH Ministry of Finance and Treasury and BiH Ministry of Civil Affairs, respectively.

Also, the Council of Ministers of BiH has on its 98th session held on 12.04.2017 adopted the Decision on Amendments to the Decision on the
Appointment of an Inter-departmental Working Group on analysis of the situation and proposal of modalities for the Introduction of New Technologies into the Electoral Process in Bosnia and Herzegovina. Pursuant to Article 4 of the aforementioned decision, the task of the Inter-departmental Working Group is to prepare an analysis of the situation within 60 days i.e. by 30 April 2017 from the date of the appointment of the Inter-departmental Working Group, and to propose modalities for the introduction of new technologies into the electoral process in Bosnia and Herzegovina, to send this document, through an authorized proposer, into parliamentary procedure.

The Inter-departmental working Group held 12 sessions and submitted a final report and analysis of the situation to the BiH Council of Ministers on 27 April 2017.

Within the framework of activities aimed at analyzing the situation and proposing modalities for the introduction of new technologies in the BiH electoral process, the Inter-departmental working Group, with the support of the Council of Europe and the Association of Election Officials in Bosnia and Herzegovina, had in the BiH PA on 15.03.2017 held a Round Table entitled "Analysis of the Situation and Proposing Modalities for the Introduction of New Technologies to the Electoral Process in Bosnia and Herzegovina", and on April 12, 2017, the Inter-departmental Working Group organized in the BiH PA an expert discussion entitled "The Role of Competent Bodies in the Development of the Central Voters' Register" with the purpose of exchanging opinions and suggestions for undertaking measures regarding the development of an accurate Central Voters' Register. Recommendations from these events are included in this document.

The last session, at which the Report of the Inter-departmental working group, accompanied by this analysis, was considered and unanimously adopted, was held on 26.04.2017.
Summary of recommendations

1. In accordance with the task set out by the decision of the Council of Ministers of Bosnia and Herzegovina on the appointment of an Inter-departmental Working Group for analysis of the situation and proposal of modalities for the introduction of new technologies into the electoral process in Bosnia and Herzegovina, the Inter-departmental Working Group has undertaken a series of activities within 60 days from the day it started working aimed at detailed and comprehensive analysis of the situation in the area of application of new technologies in the electoral process in Bosnia and Herzegovina, as well as identifying the problems and thereby establishing the modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina.

2. Inter-departmental WG held 12 sessions at which various areas of the BiH Election Law were discussed and the presentations were held by the following companies: CEO Clever Collaboration Group, Smartmatic, Smart System Solutions and Dominion Voting, and a special presentation on how to maintain the Central Voters' Register and on manner of using electronic voter identification devices in Montenegro was held by representatives of the Montenegrin State Election Commission.

3. The work of the Inter-departmental Working Group was followed by an expert commissioned by the Council of Europe, Peter Wolf, who gave certain opinions and recommendations and presented the Council of Europe's Recommendations for electronic voting\(^{37}\) at the session of the Inter-departmental Working Group held on March 20, as well as on the Roundtable discussion held on 15 March 2017.

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4. The members of the Inter-department Working Group, each from the domain of their jurisdiction, held presentations in which they have, apart from pointing out the problems, provided modalities for their resolution as well as specific recommendations.

5. In analyzing the state of implementation of new technologies in the electoral process in BiH the Inter-departmental Working Group has followed the election process activities, i.e. the timing of electoral activities, i.e. the election activities timeline.

6. In defining modalities, the Inter-departmental Working Group identified the following key issues related to the introduction of technologies into the BiH electoral process: institutional capacity for introducing new technologies, normative alignment of relevant legislative and subordinate regulations.

7. Identification of the technology to be used in each individual part of the electoral process.

8. In the segment of voter registration in the Central Voters' Register, several problems have been identified that ultimately result in an incorrect Central Voters' Register. To overcome this problem, modalities of introducing new technologies relate to a unique web portal for elections as part of state e-services, mobile applications and info kiosks. Additionally, it is necessary to link the databases of the entity register offices' databases with the IDDEEA database and the BiH Central Election Commission. In addition, it is necessary to harmonize all regulations affecting the creation of the correct Central Voters' Register.

9. In the segment of political parties' registration, application of political parties and independent candidates for participation in the electoral process, the modalities relate to the improvement of the existing JIIS by enabling political entities to electronically submit applications for participation in the elections and candidates' lists, and when submitting signatures of support, it is necessary to allow
political entities to enter their personal information and to identify themselves electronically.

10. In the segment of accreditation of observers of political subjects, non-governmental organizations and international observers, enable the use of new technologies in the form of online registration of observers.

11. Election campaign to be technologically improved in such a way that this process is also based on the web portal, and in the part of the violation of the election campaign create a violation reporting with the possibility of electronic submission of the evidence material.

12. Designation of polling stations as a part of the electoral process can be improved in a way that is based on the address register application and the spatial units' register, and by using a GPS device to digitally map polling stations' locations. Also, it is necessary to carry out house numbering, which is within the competence of the local self-government units, i.e. to upgrade the application in such a way that municipal / city election commissions can independently subdivide polling stations for settlements where there are no specific streets or where no numbering is performed.

13. Possible modalities, when it comes to election day, refer to upgrading the existing SMS center, so the voter knows the exact number under which he/she is registered on the voters' register, providing insight into the ballot via an online application, so that when voters comes to the polling station he/she can easier find the desired candidate, as well as to redesign ballots, so that beside the candidate there is an option blank ballot so that it would not be abused.

14. In the segment of voters' identification at the polling station, the modalities relate to the introduction of electronic voter identification system at a polling station, i.e. equipping polling stations with voter identification devices based on personal card readers and/or OCR MZR technology and/or bar code, or technology
based on the automatic fingerprint identification, as well as the use of the identification device that would take a picture of the person who votes.

15. Voting is one of the stages of the electoral process in which, taking into account the complexity of ballots, language and the electoral system in BiH, the existing technologies from different suppliers should be further explored, and decisions on wider introduction of voting devices in the future should be based on analyses of previously performed tests. More in-depth monitoring and study of global and European developments in the field of internet voting is needed as well as participation in e-voting initiatives of the Council of Europe.

16. Determining consolidated voting results for a municipality is the stage of an electoral process where one of the existing applications (Viber or other applications) should be applied, which would enable faster and more dynamic communication of the BiH Central Election Commission with municipal / city election commissions. Also, it is necessary to improve the application for entering consolidated results from the JIIS so it is available on a cell phone or tablet of an authorized user at the polling station, so the elections results would be entered directly at the polling station immediately after the ballots for a certain level are counted.

17. Improve by-mail voting by enabling online voters' registration and monitoring of pre-registered shipments, and collecting mail at the BiH embassies abroad would reduce the cost of sending polling packages by mail.

18. The electoral process stage in which the election results are determined can be improved in terms of the application of new technologies in such a way as to encourage the use of all available channels of communication for exchange between polling stations and the municipal election commission, and it is suggested to explore the possibility of introducing secure online access to the system of summing up results in all polling places either through mobile applications or through the initiative of "5000 polling stations-5000 Laptops".
19. Appeal procedures in the sense of using new technologies need to be innovated in such a way as to enable an online system for filing complaints and appeals.

20. Problems regarding the appointment of the polling station committees, which have proved to be the weakest link in the electoral process in BiH, can be overcome, inter alia, by creating a web form that will allow certified political entities to submit the names of the persons they propose as members of the PSCs, as well as a reserve list formed by the municipal / city election commission. Likewise, the web portal would have to provide overview of nominated members of the polling station committees and the reserve list.

21. New technologies in the work of municipal and city election commissions should ensure faster communication and data exchange, and the proposed modalities are the use of social networks, the creation of mobile applications for delivery of polling results, the creation of a system of rapid notification of the president and members of the PSC in crisis situations and the introduction of an application that will allow municipal councils/assemblies to deliver all the documentation for obtaining approval for the appointment of election commission members electronically.

22. Finally, further improvements are possible in the work of the Central Election Commission of BiH concerning the use of new technologies, particularly in relation to the public relations segment (use of social networks), live sessions, live streams, skype conferences, open media data (Open data) and so on.
**Definitions of terms**
Certain terms used in this Analysis have the following meaning:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Voters' Register</td>
<td>constitutes the records of citizens of BiH who have the right to vote in accordance with this Law and shall be established, maintained and used for the following purposes: to organize and conduct elections in accordance with law, to conduct referendums, to conduct recalls of elected officials and to elect bodies of the local self-governance in accordance with Law (see Article 3.1, paragraph (1) of the BiH Election Law);</td>
</tr>
<tr>
<td>Electronic voting and vote counting systems</td>
<td>include different systems, including machines for counting paper ballots to voting machines used at polling stations and internet voting;</td>
</tr>
<tr>
<td>Electronic signature</td>
<td>are data in electronic form or are logically linked to other data in electronic form and enable identification of signatories (see Article 3 of the Law on electronic signature);</td>
</tr>
<tr>
<td>DRE – Direct Recording Electronic machine</td>
<td>Records ballots using a mechanical or electronic display activated by the voter (usually a button or touch screen); processes data using computer program; records the voting data and the image of the ballots in the memory. After completion of the election, it produces tabular views of voting data in electronic and printed form. Also, the system may have the ability to transfer data to the central records / locations (see <a href="https://aceproject.org/ace-en/topics/et/eth/eth02/eth02b/eth02b3">https://aceproject.org/ace-en/topics/et/eth/eth02/eth02b/eth02b3</a>).</td>
</tr>
<tr>
<td>Electronic Ballot Printers - EBP</td>
<td>electronic ballot printers print voters' preference on a paper, which is then put into the ballot box (see: <a href="https://www.ndi.org/e-voting-guide/common-electronic-voting-and-counting-technologies">https://www.ndi.org/e-voting-guide/common-electronic-voting-and-counting-technologies</a>.)</td>
</tr>
<tr>
<td>Electronic voting (e-voting)</td>
<td>Entails the use of electronic devices in the electoral process for one or more electoral process segments (voter registration, voter verification, voting through DRE or using ballot scanners, vote recording, vote counting, manual or automatic vote recordings in the central register). Depending on the realization, e-voting may also include the use of Internet services (i-Voting), i.e. voting by voters using their own devices and voting apps via the Internet (see <a href="https://aceproject.org/ace-en/topics/et/eth/eth02/eth02b/eth02b4">https://aceproject.org/ace-en/topics/et/eth/eth02/eth02b/eth02b4</a>).</td>
</tr>
<tr>
<td>Barcode</td>
<td>Is optical, machine readable representation of data, data describe object that carries a barcode (see <a href="https://aceproject.org/main/english/et/et73.htm">https://aceproject.org/main/english/et/et73.htm</a>).</td>
</tr>
<tr>
<td>Optical scanner</td>
<td>Acronym scanner – is a device that optically scans (examines, monitors, remembers) images, printed text, handwriting and other objects and coverts them into digital images (for further use) (see <a href="https://aceproject.org/main/english/et/et72.htm">https://aceproject.org/main/english/et/et72.htm</a>).</td>
</tr>
<tr>
<td>OCR – Optical Character Recognition</td>
<td>Optical character recognition implies the ability to convert a scanned image to editable text. OCR Scanner is a scanner where the OCR software is integrated into the scanning software (see <a href="https://aceproject.org/main/english/et/et72.htm">https://aceproject.org/main/english/et/et72.htm</a>).</td>
</tr>
<tr>
<td><strong>ID card with biometric data</strong></td>
<td>ID card contains electronic memory element (a chip) which stores biometric data during personalization and protects them cryptographically</td>
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<td>--------------------------------</td>
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<tr>
<td><strong>Cloud computing</strong></td>
<td>Enables computer services (servers, software, database, analytic tools,....) through internet (“the cloud”) (see: <a href="https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/">https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/</a>)</td>
</tr>
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1. Analysis of the application of new technologies in electoral process in BiH

1. Analysis of the state of implementation of new technologies in the electoral process in BiH will follow actions in the electoral process i.e. the time course of electoral activities in BiH, i.e. the time schedule for the activities prescribed by the Election Law of BiH. The first step in this series is to make a decision about calling and holding elections.

The next activity concerns the voter registration in the Central Voters' Register:

1.1 Registration of voters into the CVR and preparation of excerpt from CVR – weak points of this stage of electoral process

2. The process of maintaining Central Voters Register, preparation of the excerpt from the CVR and registration of voters is set forth in Chapter 3 of the Election Law of BiH – CVR and the Rulebook on maintaining and using Central Voters Register. The Central Voters Register is a Register of BiH citizens who have voting right in accordance with the Election Law of BiH and it is established, maintained and used for organization and implementation of elections in accordance with law, for the conduct of a referendum, for the recall of an elected official and the elections of local self-government bodies in accordance with law.

The central voter register is unique, permanent and regularly updated. In addition to the above mentioned regulations, there are a whole range of regulations regulating citizenship issues, travel documents, ID cards, temporary and permanent, Citizens’ Single ID number, personal data protection, etc. relevant for acquiring voter rights and voter registration in the Central Voters Register.

38 Official Gazette of BiH, no: 23/01, 7/02, 9/02, 20/02, 25/02, 4/04, 20/04, 25/05, 52/05, 65/05, 77/05, 11/06, 24/06, 32/07, 33/08, 37/08, 32/10, 18/13, 7/14 and 31/16
39 Official Gazette of BiH, no: 32/16
40 Law on BiH citizenship (Official Gazette of BiH, no: 4/97, 13/99, 41/02, 6/03, 14/03, 82/05, 43/09, 76/09 and 87/13), Law on BiH travel documents (Official Gazette of BiH, no: 4/97, 1/99, 9/99, 27/00, 32/00, 19/01, 47/04, 53/07, 15/08, 33/08, 39/08 and 60/13), Law on ID card of BiH Citizens (Official Gazette of BiH, no: 32/01, 16/02, 32/07, 53/07, 56/08 and 18/12), Law on temporary and permanent residence of BiH citizens (Official Gazette of BiH, no: 32/01, 56/08 and 58/15), Law on Personal Identification Number (Official Gazette of BiH, no: 32/01, 63/08, 103/11 and 87/13), Law on protection of personal data (Official Gazette of
1.1.1. **Registration of voters who exercise their voting right at the regular polling stations (regular voters)**

3. Registration of voters who vote at a regular polling station is done by the state authorities under the "passive registration" system, i.e., all persons who obtain a valid ID card of BiH are automatically registered in the Central Voters Register. Pursuant to the provisions of Article 3.5 of the Election Law of BiH, the competent body that keeps the register of citizens submits data for updating the Central Voters Register in accordance with the Central Register of Data and Data Exchange.\(^{41}\)

4. The status of the Central Voters Register and the number of voters and all other necessary data are determined based on the data, which in accordance with the **Uniform Methodology and Program for Processing and Keeping the Record of the Central Voters Register**\(^{42}\) or a document that stipulates cooperation between the BiH CEC and IDDEEA are uploaded every first Monday of the month or depending on the need\(^{43}\).

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\(^{41}\) For the purpose of downloading data under the "Passive Registration of Voters in BiH" project, an application software program has been developed, the main purpose of which is to facilitate the data transfer process, the designation of polling stations and the production of the excerpt from the Final CVR.

\(^{42}\) BiH CEC no. 05-02-2-2738/08 from 04.02.2009 and IDDEEA no. 15/1-30-4-3806/08 from 04.02.2009.

\(^{43}\) Pursuant to the Decision on the Conclusion and Confirmation of the Central Voters Register for the 2016 Local Elections in Bosnia and Herzegovina and the publication of the number of voters for each constituency, there were a total of 3,263,906 voters in the Central Voters Register for Local Elections in 2016 in Bosnia and Herzegovina. Out of the above number of voters, the number of regular voters is 3,177,557, the number of voters with the status of displaced persons voting in absentia is 8,946, the number of voters with the status of displaced person who vote in person is 12,005, the number of voters voting in diplomatic and consular missions of BiH is 287 and the number of voters voting by post is 65,111.
1.1.2. **Registration of refugees and persons temporarily residing abroad in the CVR**

5. The registration of refugees and persons temporarily residing abroad in the Central Voters Register is carried out through system of "active registration" system by submitting the PRP-1 application form with accompanying documentation to the Central Election Commission of BiH, by post, fax, electronic mail or personally at the premises of BiH CEC. Registration of refugees from BiH who have the right to vote is a continuous process that takes place throughout the year. All voters who were registered in the CVR for OCV at the previous elections are provided with personalized confirmation forms – PRP2.

6. For the purpose of implementing the 2016 Local Elections in BiH, procedures for the delivery of sensitive material have been modified in a way that it has been delivered by registered mail to foreign addresses, which had positive effects (deterring misuse of material by delivery to wrong addresses, online tracking of the shipment in countries where such services are available, etc.), but also negative (multiplied cost of delivery, delivery deadlines when the addressee is not found at the address etc.)

1.1.3. **Registration of displaced persons**

7. The provision of Article 3.9 paragraph (4) of the Election Law of BiH stipulates that a citizen of BiH who has the right to vote under this Law and who has a status of a displaced person is recorded in the Central Voters Register for the basic electoral unit on the basis of the expressed voting option, in accordance with the provisions of Article 20.8 of this Law. Displaced persons who have the right to vote are registered in the CVR. The registration of displaced persons is carried out through the system of active registration.

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44 Article 3.15 of the BiH Election Law
45 Rulebook on the process of conducting elections in BiH (consolidated version) (Official Gazette of BiH, no 32/16) and Rulebook amending the Rulebook on the process of conducting elections in BiH (Official Gazette of BiH, no. 43/16)
vote can by filling in PBO-1 form until a certain deadline express whether they want to vote in person in the 1991 municipality of residency or in the municipality where they currently reside. For the purpose of updating the Central Voters Register, the BiH Ministry of Human Rights and Refugees provides a record of voters who have the status of displaced person that is developed based on the data from the municipalities, cantonal ministries, the Brcko District of BiH and the Ministries of the Republika Srpska). According to this data, there are 98,765 persons in BiH who have the status of displaced person, and there is a total of 78,553 persons registered in the Central Voters Register, while 20,212 persons were not found in the CVR.

1.1.4. Voting in the diplomatic-consular representation offices of BiH abroad

8. Article 1.5 of the Election Law of Bosnia and Herzegovina stipulates that BiH citizens who temporarily reside abroad have the right to vote in person by coming to appropriate polling station in BiH or in a diplomatic and consular representation office of BiH (hereinafter: the BiH DCRO) abroad or they can vote by mail.

9. Regulations of the BiH Central Election Commission envisage the designation of polling stations for personal voting in the BiH DCRO, if at least 50 voters have been registered for voting there, or, exceptionally, and if there are justified reasons, the Central Election Commission of BiH can make a decision on voting in the DCRO BiH when there is a smaller number of registered voters, thereby assessing financial aspects and technical possibilities considered necessary for determining the polling station in each DCRO BiH.

47 Rulebook on maintaining and using CVR (Official Gazette of BiH, no. 32/16)
48 Ibid.
49 By the decision of the Central Election Commission of BiH on determining the polling stations in the diplomatic and consular missions of Bosnia and Herzegovina (consolidated text) of 25 August 2016, it was determined that BiH citizens who are temporarily residing abroad and have the right to vote in the 2016 Local Elections can vote in five (5) diplomatic and consular missions of BiH, as follows: BiH Embassies in Belgrade (126 voters), BiH Embassy in Vienna (35 voters), Honorary Consulate of BiH in Graz (32 voters), General Consulate of BiH in Stuttgart (61 voters) and the BiH Consulate General in Munich (33).
1.1.5. **Description of problems detected in this segment of electoral process**

10. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation regarding registration of voters in the Central Voters Register are:

   a) non-compliance of normative regulations on the basis of which the Central Voters Register is defined i.e. which define the quality of data in the Central Voters Register;
   b) definition of the right to access official data in electronic tabular form;
   c) the problem of citizens of Bosnia and Herzegovina who reside abroad for more than three months;
   d) monitoring the implications of changes to the regulations on the basis of which the original records are filled, and on which basis the Central Voters' Register is drawn up;
   e) exchange of information between competent institutions;
   f) the method of updating and improving the applications;
   g) passive voter registration software that is maintained and managed by IDDEEA requires a technical and functional update. This obsolete technology carries several security and operational risks that may endanger the entire voter registration process. Although passive voter registration software is crucial for the BiH electoral process, resources for necessary updates are not available, and parts of JIIS are outdated;
   h) The Central Election Commission of BiH does not have any up-to-date information on voters who have been removed from the CVR due to residence deregistration;
   i) updating the data in official records and defining how each data is individually corrected and in which records;
   j) faster and more efficient synchronization of data;
k) avoiding unnecessary copying of data that can be obtained from voters, which implies provision of electronic web forms that voters would fill in if they wish to exercise their special rights;
l) defining the methodology of data exchange with the relevant original bodies, as well as access to data for the purpose of analyzing the state of the Central Voters Register;
m) complicated and outdated procedures for OCV registration;
n) mistakes caused by inaccurate data in the application, i.e. by the work of data entry operator;
m) abuse of the voting right concerning OCV registration being done without voters’ knowledge, abusing ID documents which leads to abuse of the right to vote;
n) deceased persons on the excerpts from the CVR including the problem of deaths abroad;
o) the unequal position of BiH citizens residing abroad in relation to BiH citizens voting at regular polling stations in BiH;
p) polling stations abroad are located in the headquarters of the DCRO;
q) Displaced persons - the quality of information available to the competent institutions and the way of unification;
r) absence of official records of BiH citizens who reside abroad and have the right to vote;
s) The problem of recognizing foreign documents when registering in official records and issuing ID documents;
t) the problem of digital identification of voters using online services or email;
u) the problem of the occurrence of persons who have abused the identity of the person to extract personal documents and appear in the Central Voters' Register by automation.
1.2 Registration of political parties, application of political parties and independent candidates to participate in electoral process

11. Registration of political parties in BiH is done asymmetrically in 16 courts. The Law on Political Organizations (Official Gazette of SR BiH No. 27/91) is used in the Federation of Bosnia and Herzegovina and it was adopted at the time of the Socialist Republic of Bosnia and Herzegovina. In Republika Srpska, the Law on Political Organizations (Official Gazette RS, Nos. 15/96 and 17/02) is applied, and in the Brčko District of BiH the registration of political parties is carried out in accordance with the Law on Political Organizations ("Official Gazette of the Brčko District of BiH ", Nos. 12/02, 19/07 and 2/08). All three of these laws have solved the issue of political parties’ registration differently. In the practice so far, courts have differently registered parties, and in some courts even non-governmental organizations have been registered in the register of political parties.

12. The certification of political subjects for participation at all levels of direct elections in Bosnia and Herzegovina is carried out by the BiH Central Election Commission, as well as the validation and certification of candidates’ lists. The BiH Central Election Commission certifies political subjects in accordance with Article 2.9 and Chapter 4 of the Election Law of BiH. Collection and submission of signatures of support is governed by the provisions of Articles 4.4 and 4.11 of the Election Law of BiH and the Rulebook on the method of verification of signatures of support and forms for certification of political parties for participation in the direct elections in Bosnia and Herzegovina. 50 This activity in practice faces numerous administrative and technical problems.

13. At the last 2016 Local Elections in Bosnia and Herzegovina there were 451 political subjects participating whereof 102 political parties, 103 coalitions, 171 independent candidates, 17 lists of independent candidates, 52 independent

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50 Official Gazette of BiH, nos. 37/14 and 43/16
candidates on behalf of 52 citizens’ groups and 6 independent candidates on behalf of 6 citizens' associations\textsuperscript{51}.

14. Thus, there is a large number of applications from political subjects that are submitted on prescribed forms, accompanied by necessary documentation, and the political subjects must submit their applications personally, by coming to the premises of the Central Election Commission of BiH.

1.2.1. \textit{Description of problems detected in this segment of electoral process}

15. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

a) the absence of a single electronic court register of political parties at the state level, which would be electronically linked to the lower courts and used to enter all necessary changes when registration of new political subjects is done;

b) the absence of the obligation to have the BiH CEC providing opinion when registering a new political party;

c) the current procedure for application of political parties to participate in the elections is slow, ineffective and subject to mistakes, and implies significant engagement of the staff of the Central Election Commission of BiH and the time spent on entering the data upon receipt of the forms;

d) the difficulty of obtaining accurate statistical data that are needed in the shortest possible time;

e) processing speed and the quality of the delivered data;

f) signatures of support are given in a manner that is subject to abuses (the possibility for one voter to sign for more political subjects).

1.2.2. Application of coalitions and lists of independent candidates

16. The provisions of Article 4.12 of the Election Law of Bosnia and Herzegovina have established the procedure of application for the verification of the coalition, while the provision of Article 4.15 of the Election Law of BiH stipulates the procedure for submitting the list of independent candidates.

17. Coalitions and lists of independent candidates submit their application not later than 110 days before the Election Day. The BiH Central Election Commission certifies the applications no later than seven days after the date of receipt of the application.

18. Same as with the political parties’ applications to participate in the elections, the applications of coalitions i.e. lists of independent candidates must be certified, and they contain certain set of data and documents that must be submitted within the established deadline.

1.2.3. Description of problems detected in this segment of electoral process

19. The current application procedure for coalitions and lists of independent candidates is slow, ineffective and susceptible to mistakes, and implies a significant engagement on data entry upon receipt of the application forms.

1.2.4. Submission of candidates’ lists

20. Provisions of Article 4.19, 4.20, 4.21 of the Election Law of BiH establish the procedure for submitting and certifying the candidate lists. Certified political parties and coalitions submit a special candidate list for each constituency no later than 90 days prior to the Election Day. The BiH Central Election Commission certifies or refuses candidates on the list at least 25 days after the candidate list has been filed.

21. The provisions of Article 4.24 of the Election Law of Bosnia and Herzegovina have established the procedure for submitting candidate lists for compensation
mandates, which are submitted within five days of the date of candidates’ list was certified in accordance with Article 4.21 of the Election Law of BiH.

22. At the last 2016 Local Elections the Central Election Commission of BH has certified a total of **30,445 candidates**, out of which 418 candidates for municipal/city, 29,884 candidates for municipal councils/assemblies or city Assemblies and Brcko District Assembly of BiH, and 143 candidates for national minority representatives.52

23. Out of the above mentioned statistics comes a large volume of work and time and the engagement of a large number of staff of the Secretariat of the Central Election Commission of BiH, which is necessary to analyze and process all submitted candidates’ lists so that the Central Election Commission of BiH can verify and certify them for participation in the elections.

**1.3.1. Description of problems detected in this segment of electoral process**

24. The current procedure of submitting candidates’ list is slow, ineffective and susceptible to mistakes, and implies a significant engagement on data entry upon receipt of the application forms.

**1.3. Accreditation of observers of political subjects, NGOs and international observers**

25. In accordance with Chapter 17 of the Election Law of BiH - Election Observers and the Rulebook on conditions and procedures for accreditation of election observers in Bosnia and Herzegovina53, the BiH Central Election Commission accredits election observers of political subjects for observing the work of the Central Election Commission of BiH and the work of the Main Center for counting, international observers and observers of the associations. City / Municipal Election Commission accredits observers of political subjects for

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53 Official Gazette of BiH, no 37/14
observing the work of election commissions, Centers for Voters’ Register and work at polling stations.

26. Requests for accreditation are submitted from the date elections are announced until 15 days prior to the Election Day for political subjects and associations, or seven days prior to the date of the elections for international observers (exceptionally one day before the Election Day).

27. At the last local elections in 2016, the Central Election Commission of BiH accredited a total of 6,830 observers, while the municipal / city election commissions accredited a total of 61,775 observers.  

28. As in the previous stages of the electoral process, political subjects, citizens’ associations and international observers submit accreditation requests on a form to be submitted to the Central Election Commission of BiH, along with the prescribed supporting documentation.


1.3.1. Description of problems detected in this segment of electoral process

30. Current system for submitting applications for accreditation of election observers is slow, ineffective and susceptible to mistakes, and includes significant work on manual entry of data by the Secretariat of the Central Election Commission of BiH. Also, the system of checking the data on proposed observers conducted by the Central Election Commission of BiH is not electronically linked to the databases of the Ministries of Justice (cantonal, Brcko District of BiH, Entities and national) where non-governmental organizations and international organizations are registered to determine whether the founders and members of these organizations’ bodies are also members of the political parties’ bodies.

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54 Report of the BiH CEC on implementation of laws under the BiH CEC’s jurisdiction in 2016 adopted at 20th session of the BiH CEC held on 13.07.2017 and sent into parliamentary procedure
55 Thanks to the Council of Europe’s financial assistance Election Observation Manual was published for the 2016 Local Elections
1.4. **Election campaign**

31. Election campaign of political subjects is a period in which political subjects inform the voters and the public about their program and candidates for the upcoming election in the manner determined by the law and which, according to the provisions of Chapter 16 of the BiH Election Law, represents a period of 30 days prior to the election day. Precise date for the start and end of the election campaign is established in the Instruction on deadlines and sequence of electoral activities, which is adopted for each election. Rules of conduct of political subjects during the election campaign are set out in Chapter 7 of the Election Law of BiH, and representation of political subjects in electronic media is prescribed in Chapter 16 - Media in the Election Campaign. The Rulebook on Media Representation of political subjects in the period from the date elections are announced until the Election Day\(^{56}\) is used by the BiH CEC to more precisely regulate implementation of Chapter 16.

32. In cases where electronic media do not comply with the provisions of Chapter 16 of the Election Law of BiH and the Rulebook on Media Representation of political subjects in the period from the date elections are announced until the Election Day, the Regulatory Communication Agency, as the body responsible for monitoring the work of the electronic media, applies its Rulebook on the procedure for solving the violation of the license conditions and regulations of the Regulatory Communication Agency\(^{57}\), while solving of the complaints of political subjects for violation of the provisions of Chapter 16 of the Election Law of BiH and the Rulebook on Media Representation of political subjects in the period from the date

\(^{56}\) Official Gazette of BiH, no. 37/10

\(^{57}\) Official Gazette of BiH, no. 18/05
elections are announced until the Election Day is under the BiH CEC’s competence.

1.4.1. Description of problems detected in this segment of electoral process

33. Communication when solving complaints by political subjects for violations of the provisions of Chapter 16 of the Election Law is slow and complicated, as well as the delivery of evidence materials and their processing.

1.5. Designation of polling stations

34. Designation of polling stations is regulated by Chapter 5 of the BiH Election Law and the Instruction on types, manner and deadlines for designation of polling stations.59

35. Article 5.1, paragraph (2) of the Election Law sets forth that the Polling Stations are designated by the Municipal Election Commission no later than 65 days before the Election Day. The Municipal Election Commission, immediately after designating the Polling Stations, submits a list of the locations of the Polling Stations to the Central Election Commission of BiH. The Central Election Commission of BiH may change the location of a Polling Station if it determines that the location is not an appropriate location for polling. A Polling Station may not be located in a place of worship, a government building, a building which is owned by or is the seat of a political party, or a building that has been used as a place of torture or abuse, or premises in which alcohol is served and consumed.

36. Article 5.2, paragraph (1) of the BiH Election Law defines, inter alia, criteria for designation of polling station, that relate to the following: A Polling Station is designated in accordance with the number of voters, which should generally be up to 800 but not greater than 1000 taking into consideration the distance of voters from the Polling Station.

58 Official Gazette of BiH, no. 37/10
59 Official Gazette of BiH, no. 37/14
37. Instruction on the types, method and deadlines for designation of polling stations have established the types of polling stations that are formed, namely: regular polling stations, polling stations for voting in absentia and polling stations for voting with tendered ballots, as well as locations of polling stations, designation of PS in diplomatic-consular offices of BiH abroad, and provision of Article 9 in particular determines cases when election commission is unable to comply with the criteria set out in Article 8, paragraph (2), item a) of the Instruction due to technical reasons.

38. Pursuant to the provision of Article 3, paragraph (3) of the said Instruction, the polling stations shall be established through the computer program "Passive Registration", in accordance with Articles 8, 9 and 10 of the Instruction.

For the implementation of the last Local Elections in 2016, a total of 5,221 polling stations in BiH (5,202 regular and 19 for voting in person) and 5 polling stations in diplomatic and consular missions abroad were designated.\textsuperscript{60}

Out of 5221 polling stations a total of 3035 are located in the buildings of kindergartens, primary and secondary schools and faculties at 1928 locations.

From this number a total of 1456 locations have one polling station and 472 locations have two and more polling stations.

\textbf{1.5.1. Description of problems detected in this segment of electoral process}

39. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

a) Certain polling stations are located in private facilities. At the last Local Elections in 2016 there were a total of 289 polling stations located in private facilities;

\begin{flushright}
\textsuperscript{60} Report of the BiH CEC on implementation of laws under the BiH CEC's jurisdiction in 2016 adopted at 20th session held on 13.07.2017, paragraph 183.
\end{flushright}
b) Persons with disabilities have difficulty accessing or have no access at all to polling stations located on the upper floor or to polling stations located in facilities where persons with disabilities cannot access or the access is made difficult;

c) the absence of street names or numbered houses which leads to a problem related to the assigning addresses to a polling station and thus the requirement prescribed by the BiH Election Law cannot be met (800 to 1000 voters per polling station);

d) Polling station locations are not mapped by GPS system, there is no digital map of polling locations;

e) the absence of a single registry of polling stations on the BiH Central Election Commission’s website with instructions on how to get to the polling station and which addresses belong to a particular polling station or who are members of the polling station committee.

1.6. **Election Day**

40. Chapter 5 of the Election Law of BiH, the Rulebook on the manner of conducting the elections in Bosnia and Herzegovina\(^{61}\), and at 2016 Local Elections, the Rulebook on Organization of Work and Determination of the Results of Voting at the Main Center for Counting for Local Elections in 2016\(^{62}\), defines the procedure for conduct of elections in Bosnia and Herzegovina, which includes, inter alia, the designation of polling stations, the delivery of election material to municipal / city election commissions, the duties of the president and members of the polling stations, the contents of the minutes on the work of the polling station committee, the voting process, the valid ID, space for voting, the issue of valid and invalid ballot papers, voting of blind, illiterate or bodily incapacitated voters, counting of ballots, determination, publication and confirmation of voting results. Additionally, a Handbook for the work of polling station committees in Bosnia and

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\(^{61}\) Official Gazette of BiH no. 32/16 and 43/16  
\(^{62}\) Official Gazette of BiH no. 32/16
Herzegovina is issued for every elections, subject to approval of the Central Election Commission of BiH.

In a period commencing 24 hours prior to the opening of polling stations and until their closure, political parties, coalitions, lists of independent candidates and independent candidates and candidates on lists of national minorities’ representatives are prohibited from participating in public political activities (electoral silence)\textsuperscript{63}.

The polling stations are open on Sunday 07.00 and closed at 19.00 hrs, unless the voting process is interrupted up to three hours or less, when the voting period is extended for the duration of the interruption by the decision of municipal election commission.\textsuperscript{64}

\textbf{1.6.1. Identification of voters at the polling station}

41. The provision of Article 5.12 of the Election Law of BiH stipulates that the President or a member of the PSC shall determine the identity of the voter on the basis of a valid personal document, and the valid personal document with a photo in the sense of paragraph 3 of this Article is one of the following documents:

1. ID card,
2. Passport and
3. Driving license.

42. The provision of Article 5.13 of the Election Law of BiH stipulates, inter alia, that a member of the PSC is obliged to determine the identity of the voter, to indicate his / her name and surname on the excerpt from the Central Voters Register that voter will sign, and then the member of PSC issues the relevant ballot paper or papers.

43. The voter's identification shall be conducted in such a way that the member of the PSC in charge of identification visually verifies the identity of the voter;

\textsuperscript{63} Article 7.4 of the BiH Election Law
\textsuperscript{64} Article 5.9 of the BiH Election Law
the voter's name on the excerpt from the Central Voters Register; warns the voter that the signature must be identical to the signature on the valid identification document and makes sure that the voter signs the excerpt from the CVR next to his/her name after which he loudly reads the name and surname of the voter in such a way that all persons found at the polling station clearly hear. 65

Technologies for voter identification are not applied in BiH.

1.6.2. Description of problems detected in this segment of electoral process

Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

a) In some cases voter's identification at a polling station is not performed in a proper manner, which is sometimes result of insufficient training of members of the PSCs, and in certain situations it is also the question of misuse or manipulation at the polling station. Possible manipulations are reflected in the fact that individual members of the PSC, who identify voters without any supervision, accept voters with improper IDs and abuse names of the voters who are known to have died or are not currently living or residing in the place where they reported their place of residence;

b) Also, in some cases there are instances where other countries’ documents are used in the process of voter identification, which is unlawful.

1.6.3. Voting

44. The provision of Article 5.16 of the Election Law of BiH stipulates that a voter casts the ballot in a special space where secrecy of the vote is secured. The Rulebook on the manner of conducting the elections in Bosnia and Herzegovina has established voting procedures for voters who are blind, illiterate or bodily incapacitated, voting with tendered/enveloped ballot, voting of voters with special

65 Article 15 of the Rulebook on manner of conducting elections in BiH, Official Gazette of BiH, no. 32/16 and 43/16
needs, i.e. voter who are homebound due to age, illness or disability, prisoners, or persons confined to medical institutions. The voters outside of BiH vote as described above under item I-1, or by post, by submitting the enveloped ballots to the Central Election Commission of BiH or at the diplomatic and consular missions of BiH abroad.

45. The traditional way of voting is still applied in Bosnia and Herzegovina and it is reflected in the voters’ appearance at the polling station (exceptions apply to voting through a mobile team, i.e. voting of voters who need help from another person, i.e. bodily incapacitated voters and voting of persons who are homebound due to illness, age or disability, prisoners or voters confided to an institution where a mobile team comes to the site and allows them to vote outside the regular polling station), where the voter, after checking the identity, goes with the ballot to the space designated for voting (voting booth) and votes by marking the ballots in one of the ways prescribed by the law.

1.6.4. Description of problems detected in this segment of electoral process

46. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

   a) Complicated and large ballots may lead to having some of the voters take more time to decide for whom they will vote;

   b) blind or vision impaired voters find the ballot paper to be very complicated since it is not printed in Braille, which is often an obstacle to the exercise of electoral rights;

   c) the height of the present voting booth prevents detection of any cases of "family voting".
1.6.5. Determining the results of the vote at the polling station

47. Determining the voting results at the polling station is prescribed by the provisions of Articles 5.23, 5.24 and 5.25 of the Election Law of BiH. Rulebook on the manner of conducting the elections in Bosnia and Herzegovina (Chapter III) elaborates the procedures for counting ballot papers at regular polling stations by voting levels and systems (majority voting system and open list system). In accordance with Article 5.26 of the Election Law of BiH, after the determination of the results of the voting, PSC it is obliged to submit to the competent Municipal Election Commission the minutes on the work of the PSC (ZARBO), the excerpt from the Central Voters Register, all special forms referred to in Article 5.18 of the Election Law of BiH, all tendered ballots, valid ballot papers, invalid ballot papers, unused and destroyed ballot papers separately, as well as all other forms required by the BiH Central Election Commission.

1.6.5. Description of problems detected in this segment of electoral process

48. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

   a) There is a possibility of manipulation in counting of the votes at the polling station, especially with the "open lists" ballots where during the counting it is possible for a member of the PSC to mark additional preferences for candidates who did not get the preferences from the voters. Likewise, there is a possibility that a member of the PSC will damage the voter list or make it invalid by adding numbers, names or characters. Revision of counting votes, according to positive legislation, is only carried out in the case of officially filed complaints and appeals. So possible manipulators and law-abusers will most certainly not be detected.
b) Slowness in the counting of ballots, and lack of electronic processing (optical scanner or entry of polling results directly into the database via the laptop) casts doubt on the accuracy of the processed data and marks this part of the process as the weakest link in the election activity chain.

1.6.7. *Determining consolidated aggregated results of the voting for a municipality (detailed tabular overview for consolidation of aggregated results of the elections by political subjects and candidates)*

49. The provision of Article 5.27 of the Election Law of BiH stipulates that after obtaining all documentation and materials for elections from the polling station committees, the Municipal Election Commission establishes the consolidated aggregated results of the voting conducted in the territory of that municipality for the bodies at all levels of authority for which the elections were conducted and makes a minutes thereof, which it submits to the Central Election Commission within 24 hours after the polling stations closed. Consolidated summary of results for the municipality shall contain the same information under Article 25.5 of the Election Law of Bosnia and Herzegovina. Municipal Election Commission shall retain a copy of the consolidated summary of the voting results and distribute it to the other electoral bodies, in accordance with the regulations of the Central Election Commission. It is also stipulated that the Municipal Election Commission will publicly display a detailed tabulation of the consolidated aggregated results of the elections by political subjects and candidates to enable the public to have access to them, and copies of the consolidated voting results will be presented to accredited observers of the work of the Municipal Election Commission at their request.

The Election Law of Bosnia and Herzegovina stipulates that the PSC determines the election results at the polling station and enter the same on the prescribed forms.
50. Election results are transferred from the forms electronically to the seat of the election commission of basic constituency.

1.6.8. **Description of problems detected in this segment of electoral process**

51. Problems that are, in addition to those already highlighted, detected through the analysis of the existing situation are:

a) large number of polling stations (there are more than 250 polling stations in certain constituencies, e.g. Banja Luka 270 polling stations);

b) manual counting of the ballots and manual entering of the results by parties and candidates into forms, making the process unnecessarily long and subject to intentional or unintended mistakes;

c) Territorial decentralization of the municipality, meaning that the polling stations are far from the headquarters of the Municipal Election Commission and are poorly connected in terms of communications (e.g. in the municipality of Čajnice a polling station is reached through the territory of a neighboring state);

d) Poor spatial and material technical capacities of municipal election commissions, lack of adequate premises for accommodating a large number of computers for data entry in order to achieve speed at the time of election results are entered, and some municipalities do not have adequate computer equipment that would be used for the purpose of entering election results;

e) the accuracy of election results (only one entry without additional control);

f) Difficult communication of election commissions of basic constituency with the Central Election Commission of BiH (with the current systematization of the Secretariat of the Central Election Commission of BH there are only two coordinators for the work with the election commissions of basic constituencies in BiH and there are 143 election commissions in BiH).
1.6.9. *By-mail voting*

52. The provision of Article 5.21 of the Election Law of BiH stipulates that a BiH citizen who has the right to vote and resides abroad has the right to vote by-mail. The BiH Central Election Commission determines the manner and procedure for voting of BiH citizens by mail. In order to be eligible, each single envelope with a ballot paper shall have a postal stamp of the country from which voting is done carrying a date no later than the date of the election, as provided for in Article 5.28 (1) of the Election Law of BiH.

53. The procedures for counting ballot papers submitted by mail and determining election results are prescribed by the Rulebook on Organization of Work and Determination of the Results of Voting in Main Center for Counting for the 2016 Local Elections\(^66\) and Rulebook on the manner of conducting elections in Bosnia and Herzegovina.

Table 1 Overview of registered by-mail voters for 2016 Local Election with turnout

<table>
<thead>
<tr>
<th></th>
<th>Number of voters registered to vote outside BiH</th>
<th>Number of voters who voted</th>
<th>Turnout</th>
</tr>
</thead>
<tbody>
<tr>
<td>BiH Federation</td>
<td>25,400</td>
<td>15,574</td>
<td>61,31%</td>
</tr>
<tr>
<td>Republika Srpska</td>
<td>36,916</td>
<td>24,536</td>
<td>66,54%</td>
</tr>
<tr>
<td>Brčko District BiH</td>
<td>2,770</td>
<td>1,861</td>
<td>67,18%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65086</strong></td>
<td><strong>41,998</strong></td>
<td><strong>64,54%</strong></td>
</tr>
</tbody>
</table>

Note: Information presented in the table don't contain data for the city of Mostar

On 12 August 2016, the Central Election Commission of BiH issued a Decision on the determining and publishing voters registered in the excerpt from the CVR to vote outside BiH for the 2016 Local Elections, as well as the Decision on the Rejecting registration of applicants in the CVR by which a total of 6,718 voters were refused registration in the CVR for voting outside BiH. Reasons for

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\(^{66}\) Official Gazette of BiH, no. 32/16
refusal are contained in the fact that the conditions laid down in Article 3.15, paragraphs (1), (2) and (3) of the Election Law of BiH have not been fulfilled: identity proof missing (3.553), lack of proof of citizenship (9), lack of evidence of residence (1.279), missing form (177), form not signed (226), no voting rights (167), more deficiencies (290), a statement that voter was registered to vote by-mail without his/her knowledge (22), missing an address outside BiH (102), request for registration in BiH filed (14), applications of ten and more persons sent from the same address (408), filed after the deadline (427).

54. The Central Election Commission of Bosnia and Herzegovina changed the procedures for delivery of sensitive election material for the 2016 Local Elections in order to carry out the legal obligation of personal vote, which is one of the principles of the Election Law of BiH and the delivery of sensitive election material to the voters, and in accordance with the recommendations of the OSCE / ODIHR and the Agency for protection of personal data. The election material was delivered by registered mail without proof of receipt and for delivery area outside Europe (overseas and other countries) a total of 3.678 consignments were sent, for delivery region Europe 25.268 consignments and 36.165 consignments for the delivery region of Europe - neighboring countries. The total number of returned undelivered consignments is 7.410.

1.6.10. **Description of problems detected in this segment of electoral process:**

55. Description of problems observed in this segment of electoral process:

   a) abuses in the process of registering voters to vote outside BiH, the delay in delivery of polling package by competent post office, change of residence abroad, etc. may result in the fact that voters will not receive their polling package in time, or will not at all receive the polling package at the address where they live, so they will not be able to exercise their voting rights;
b) the current active registration of voters for by-mail voting by completion of PRP-1 and PRP-2 forms is outdated, bureaucratized and compels voters to deliver documents already owned by the state (copy of passport, residence certificate, citizenship certificate, etc.); In addition, these voters are discriminated in relation to voters who vote in BiH because they must actively register as voters, while voters in BiH do it passively i.e. automatically;

c) there is no active role of the DCRO of BiH in this process;

d) voters from abroad pay all postage costs for the delivery of PRP-1 and PRP-2 forms and polling materials;

e) the registration process for by-mail voting is subject to abuses for which there are already identified, detected and indicted cases;

f) there is no adequate mechanism for controlling the postal service by the Central Election Commission of BiH with regard to the correct delivery of individual envelopes to registered voters abroad;

g) It is not possible to ensure the complete secrecy of the voting (family voting segment etc.);

h) There is no web application for online registration for by-mail voting.

1.7. **Determining election results**

56. The BiH Central Election Commission determines and confirms the results of all direct and indirect elections covered by the Election Law of BiH, verifies that these elections were conducted in accordance with the said Law and publishes the results of all direct and indirect elections covered by this Law.\(^{68}\)

57. The provision of Article 5.29 of the Election Law of BiH stipulates that the Central Election Commission of BiH determines the results of all direct and

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\(^{68}\) Article 2.9, paragraph (1), point 9 of the BiH Election Law
indirect elections covered by this Law by expiry of the deadline for filing complaints, appeals i.e. after decisions become valid, and the regulations of the Central Election Commission of BiH set the order of determining the election results for bodies at all levels of government, the way in which a detailed table of voting results is made available to the public and the manner of publishing election results. A detailed table of the results of the voting includes the results at the polling station level by political subjects and candidates, without endangering the secrecy of the vote determined in Article 5.10 of this Law.

1.7.1. Description of problems detected in this segment of electoral process

58. Description of problems detected in this segment of electoral process is the following:

a) long period for determining the election results;

b) media not connected to the database of the Central Election Commission of BiH to enable them to independently present graphically the information contained on the website of the BiH Central Election Commission;

c) Too many legal and natural persons who can file requests for recount (e.g. a municipal election commission which is required to determine the exact aggregated results files a request for recount in its own constituency in which the commission has determined the results).

1.8. Appeal procedure and requests for recount

59. Chapter 6 of the Election Law of BiH - Protection of electoral rights regulates the procedure for the protection of electoral rights, bodies responsible for the protection of electoral rights, deadlines for filing complaints and appeals, and the decision to be taken, as well as the authorization of the Central Election Commission of BiH to issue measures for remedying the irregularities identified and the power to impose sanctions.
60. The instruction on procedures for adjudicating complaints and appeals submitted to election commissions\(^{69}\) regulates procedures for resolving complaints filed with election commissions, sets forth the content of the complaint form and regulates other important issues for the protection of electoral rights.

61. The provision of Article 6.2 paragraph (1) of the Election Law of BiH stipulates that a voter and a political subject whose right established by this Law is violated may appeal to the election commission no later than 48 hours, or within 24 hours in the electoral period, following occurrence of the violation, unless otherwise stipulated by this Law.

1.8.1. **Description of problems detected in this segment of electoral process**

62. Description of problems detected in this segment of electoral process is the following:

a) The formal complaint filing process is based on manual filling of the forms and is very unsafe and slow. No photos, statements, and documents can be uploaded electronically. This makes it difficult for the Central Election Commission of BiH to obtain updated information that can be easily analyzed, referring to issues that arise during the Election Day that have to be adequately addressed.

b) Non-governmental organizations' observers are not in a position to file complaints to the work of the polling station committees.

1.9. **Confirmation and publication of the election results**

63. Election Law of BiH sets forth that after completion of a recount of ballots and after the expiry of the time for filing of the appeal, namely after the decisions have become final and binding, the Central Election Commission of BiH

\(^{69}\) Official Gazette of BiH, no. 37/14
confirms the election results for the bodies of authority at all levels, within 30 days after the elections are held.\textsuperscript{70}

64. The assessments of this phase of the electoral process in BiH has largely come to the conclusion that results publication process is too slow, which is why the recommendations in this regard were aimed at the automation of the relevant procedures.

65. In this regard, one of the recommendations of the Final Report of the OSCE / ODIHR Mission in BiH following the 2014 General Elections\textsuperscript{71} is that the Central Election Commission of BiH should publish results by polling stations as soon as possible after the Election Day, including partial and provisional results.

\textbf{1.9.1 Description of problems detected in this segment of electoral process}

66. Description of problems detected in this segment of electoral process is the following:

a) Impossibility to present the vote results in the media and availability of information about the results in a machine readable format.

\textbf{1.10 Election management bodies}

67. Chapter 2 of the BiH Election Law sets forth that the competent authorities responsible for the conduct of elections are the election commissions and the Polling Station Committees. Those are bodies that are independent and impartial in their work. Members of the polling station committees are appointed for every elections, while the members of the election commission are appointed/dismissed by the Municipal Council/Assembly, subject to approval of the BiH CEC.

\textsuperscript{70} Article 5.32 of the BiH Election Law
\textsuperscript{71} http://www.osce.org/odihr/elections/bih/133511
1.10.1. Polling station committees

68. Article 2.2, paragraph (2) of the BiH Election Law sets forth that a member the polling station committee is a person with appropriate qualifications. The BiH CEC defines qualifications necessary for a member of election commission and PSC in terms of paragraph (2) of this Article. Article 2.3 of the BiH Election Law stipulates cases of illegibility of persons to be working as members of election commission or PSC.

69. President and members of PSC, as well as their deputies, are appointed by the municipal election commission no later than 30 days prior to the Election Day. The Central Election Commission of BiH appoints the polling station committees for voting in the diplomatic and consular representation offices of BiH by ensuring the representation of members from among each constituent people in each polling station committee.\(^{72}\)

70. The provision of Article 2.19 of the Election Law of BiH stipulates, inter alia, the procedures for participation of political subjects holding a certified candidates’ list or candidates for participation in elections in the procedure for the allocation of seats in the polling station committee, as well as procedures if the political subject does not submit candidate names for members of the PSC when the Municipal Election Commission appoints members of the PSC, taking into account, where possible, the multiethnic composition of the PSC.

71. The instruction on determining the qualifications and the procedure for appointing members of the PSCs\(^{73}\) has established a procedure concerning the qualifications, the number of members, the procedure for the allocation of seats and the appointment of members of the PSCs, i.e. the mobile teams, and the procedure of training, assessment of knowledge and certification of members of the PSC’s member i.e. members of mobile teams. The instruction on the implementation of Article 11 of the Instruction on determining the qualifications and the procedure for appointing members of the PSCs has established a procedure concerning the qualifications, the number of members, the procedure for the allocation of seats and the appointment of members of the PSCs, i.e. the mobile teams, and the procedure of training, assessment of knowledge and certification of members of the PSC’s member i.e. members of mobile teams. The instruction on the implementation of Article 11 of the Instruction on determining the qualifications and the procedure for appointing members of the PSCs

\(^{72}\) Article 1.5, paragraph 5 of the BiH Election Law
\(^{73}\) Official Gazette of BiH, no. 32/16
qualifications and the procedure for appointing members of the PSCs additionally determines the procedure for awarding seats in PSCs.

1.10.2 Description of problems detected in this segment of electoral process

72. Description of problems detected in this segment of electoral process is the following:

a) unsatisfactory training of members of the polling boards, which leads to mistakes in filling in the appropriate forms at the polling station;

b) The PSCs are in the function of certain parties and candidates and thus preferring their entry into assemblies and parliaments they commit illegal acts by adding preferences;

c) mass unlawful trade in seats on polling station committees resulting in political imbalance in the PSCs and diminishing confidence in their ability to conduct elections without any irregularities.

1.10.3 Municipal and city election commissions

73. Election commissions of basic constituencies (hereinafter: municipal/city election commissions) are appointed in line with provisions of Chapter 2 of the BiH Election Law and the Instruction on determining qualifications, number and procedure for appointment of members of election commission of basic constituency in BiH,\textsuperscript{74} and are appointed by the Municipal Councils/Assemblies subject to BiH CEC’s approval.

74. Article 2.4 of the BiH Election Law sets forth that the election commission member is appointed for a period of seven years.

75. Article 2.13 of the BiH Election Law sets forth the competences of the municipal/city election commission.

\textsuperscript{74} Official Gazette of BiH, no. 6716 and 13/16
76. The composition of an election commission shall be multiethnic, reflecting representation of the constituent peoples including the others, in the electoral unit for which the competent election management body is established, bearing in mind the most recent national Census.

Composition of an election commission shall reflect gender representation in line with the Law on gender equality in Bosnia and Herzegovina\textsuperscript{75}. When giving its consent to the decisions on appointment of the election commission members, the Central Election Commission of Bosnia and Herzegovina, inter alia, checks if the conditions pertaining to gender representation are met, in accordance with the Gender Equality Law, as prescribed by the provisions of the Election Law of Bosnia And Herzegovina, and in that regard, it consents or not the documents on appointment of the election commission members, depending on whether the above condition is fulfilled.

1.10.4 Description of problems detected in this segment of electoral process

77. Description of problems detected in this segment of electoral process is the following:

a) Communication between the BiH CEC and municipal councils/assemblies in the process of approving appointment of members of basic constituencies in BiH is slow, complex and outdated, since it is based on submission of voluminous documentation by mail.

1.10.5 Central Election Commission of BiH

78. The BiH Central Election Commission is an independent body composed of 7 members appointed by the House of Representatives of the Parliamentary Assembly of Bosnia and Herzegovina in accordance with the procedure laid down in Article 2.5 of the Election Law of BiH.

\textsuperscript{75} Article 2.14, paragraph (1) of the BiH Election Law
79. The competence of the BiH Central Election Commission is determined by the provision of Article 2.9 of the Election Law of BiH.

80. As derived from the content of this Analysis, the BiH Central Election Commission is the regulator of the electoral process in BiH in accordance with the law and plays a key role in ensuring legality in the work of election administration in BiH, the adoption of administrative regulations necessary for the application of the Election Law of BiH, is responsible for accuracy, timeliness and overall integrity of the Central Voters Register for the territory of BiH, i.e. for obtaining and exercising the suffrage by BiH citizens etc.

81. The BiH Central Election Commission in exercising its responsibilities in everyday work, relying on the application of new technologies in the electoral process in BiH, implements three key applications that are important for the successful implementation of the elections in BiH, namely: a system of passive voter registration, established in cooperation with the Agency for Identification Documents, Registers and Data Exchange (IDDEEA); the Integrated Election Information System (JIIS) and the public website, www.izbori.ba, which contains a variety of information about the different segments of the election process.

1.10.6 Description of problems detected in this segment of electoral process

82. Description of problems detected in this segment of electoral process is the following:

a) The BiH Central Election Commission is not significantly present in the media, especially on social networks. Web page, fax, phone and email are the main means of communication with interested legal and natural persons;

b) Sessions of the Central Election Commission of BiH cannot yet be viewed in live streams, thereby reducing the transparency of the work of the Central Election Commission of BiH;
c) The BiH Central Election Commission faces difficulties in retaining key expertise, staff, development capacities and analytical skills, particularly in the field of ICT. As a result, even available technology cannot be used as much as possible, and important institutional knowledge is constantly lost. This makes it difficult to introduce, manage and maintain new technologies efficiently.

d) The Central Election Commission of BiH is not present at all on social networks such as Facebook, LinkedIn, Twitter, Instagram, etc.

### 1.10.7 Secretariat of the BiH CEC Central Election Commission

83. In line with Article 2.11 of the BiH Election Law the BiH CEC’s Secretariat conducts the administrative, technical and professional duties for the Central Election Commission of BiH.

84. The BiH Central Election Commission adopts the Rulebook on internal organization of the BiH CEC’s Secretariat upon proposal of the Secretary General, subject to prior approval by the BiH Council of Ministers.

### 1.10.8 Description of problems detected in this segment of electoral process

85. Description of problems detected in this segment of electoral process is the following:

   a) Qualification structure of employees (more employees with high school diploma than with university diploma);
   b) The process of appointing Secretary General is slow;
   c) Fluctuation of qualified staff, especially in ICT and legal department;
   d) There is no adequate and continuous education on electoral process and there is no knowledge test.
1.10.9 **Main center for counting**

86. All ballots are counted at polling stations unless the Central Election Commission of BiH determines that ballots will be counted in one or more counting centers. The BiH Central Election Commission issues regulations for counting votes and determining results at the Main Center for counting.

87. The Central Election Commission of Bosnia and Herzegovina appoints a director and three deputy directors of the Main center for counting and they are appointed amongst different constituent peoples, i.e. one is elected amongst “Others”.

88. The Rulebook on Organization of Work and Determination of the Results of Voting in the Main Center for counting adopted for each election determines the competence, organization and measures of the security of the Main Center for Counting, procedures and manner of counting ballots and determining the results of voting with tendered ballots, ballots casted in absentia, voting of prisoners or voters who are confined to institution or unable to come to the polling station due to age, illness or disability, by-mail votes, votes in diplomatic and consular representation of BiH abroad, the procedure of recounting ballots and observation of the work of the Main Center for counting.

1.10.10 **Description of problems detected in this segment of electoral process**

89. Description of problems detected in this segment of electoral process is the following:

   a) Temporary character of the Main Center for Counting (shortly before the Election Day);

   b) Lack of constant physical location of the Main Center for counting which hinders its work, use of documentation, analysis, archiving, etc.;
c) Short period for selection and training of the staff of Main Center for Counting.

1.11. Coordination of work and cooperation between BiH CEC and competent bodies

90. In exercising its competencies set forth in the Election Law of BiH, which, as described above, refer to the voters’ registration in the Central Voters Register, i.e. the making of an excerpt from the Central Voters Register, registration of political subjects for participation in the elections in BiH, accreditation of observers, appointment of election commissions, voting, establishment and confirmation of election results, etc., the BiH Central Election Commission coordinates the work and cooperates with a number of key stakeholders such as Agency for identification documents, registers and data exchange (IDDEEA), Entity Ministries of Interior, Public Register of Brčko District of BiH, Registry Offices, Entity Ministries of Displaced Persons, Ministry of Human Rights and Refugees of BiH and Ministry of Civil Affairs of BiH. The basic characteristics of the cooperation of the BiH Central Election Commission, as well as the problems and difficulties that arise in this regard, are as follows:

1.11.1 Cooperation with the Agency for identification documents, registers and data exchange (IDDEEA)

91. The Central Election Commission of BiH maintains the Central Voters Register for the territory of BiH on the basis of records of a competent State authority that maintains the records of citizens of BiH in accordance with the Law on Central Registers and Data Exchange, unless otherwise prescribed by this Law. It is Agency for identification documents, registers and data exchange (IDDEEA) that maintains and is responsible for

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76 Article 3.5 of the BiH Election Law
the overall technical processing of all data of relevance for the records of
the Central Voters Register.\textsuperscript{77}

92. IDDEEA, which was previously called CIPS project Implementation
Directorate, supports the electoral process in BiH since 2006, and the CEC
and the MECs have been linked to a single system via the communication
network. The original methodology and program for processing and
keeping records of the Central Voters Register was signed in February 2009
(v2). The unique methodology among others contains::

- Defines and contains competences and obligations of the Agency and the
  CEC
- The manner of developing CVR
- Passive voter registration – 144 locations in BiH have been networked
  through this project (CEC + 143 MECs)

93. IDDEEA technically supports electoral process in Bosnia and Herzegovina,
and the Central and Municipal Election Commissions are linked through the
network administered by IDDEEA to a unique system, which greatly facilitates
the implementation of the elections. By 2006, we had active voter registration. Since
2009, the IDDEEA and CEC cooperate and their cooperation was improved by
signing the document "Uniform Methodology and Program for Processing and
Keeping the Record of the Central Voters' Register", which clearly specifies the
competences, obligations and deadlines for these Institutions related to the passive
registration of voters for the elections. Agency for Identification Documents,
Registers and Data Exchange (IDDEEA) is not responsible for entering data in the
records based on which the actual cross section of the Central Voters' Register is
done. IDDEEA is only responsible for the technical management of the Central
Voters' Register, i.e. it is not responsible for data processing, but only for the
proper functioning of the server, applications, and data transfer network. MoIs i.e.

\textsuperscript{77} Article 3.5, paragraph (3) of the BiH Election Law
Register Offices are competent for the data, their processing and accuracy are, because the Central Voters' Register is created on the basis of the data from the register of Personal Identification Number, temporary and permanent place of residence, and ID cards, which are only and exclusively submitted by competent MoIs.

1.11.2 Description of problems detected in this segment of electoral process

94. Description of problems detected in this segment of electoral process is the following:

a) It is necessary to improve the day-to-day communication and cooperation between the IDDEEA and the BiH Central Election Commission on a technical level;

b) it is necessary to improve the communication between the competent bodies for the submission of data to the Central Voters Register;

c) change the mode of work so that it is possible to check whether the data in the Central Voters Register have been updated in accordance with the regulations;

d) form a working group of representatives of IDDEEA and the BiH Central Election Commission with the aim to provide:

1. Analysis of the current situation of technical conditions – ICT infrastructure of the BiH CEC and IDDEEA for conduct of elections;

2. Proposals of changes to the Unified methodology and program for processing and keeping records of the Central Voters’ Register;

3. Analysis of the application “Passive voter registration” and proposals for its improvement;

4. Proposal of amendments to by-laws;

5. Proposal for building ICT capacities of the BiH CEC and IDDEEA, with special focus on human resources aimed at high-quality conduct of electoral process.
1.11.3 *Cooperation with the Ministries of interior*

95. The competent authority in charge of technical maintenance of the Central Voter Register shall receive the data pursuant to the Law on Central Registers and Data Exchange as well as the provisions of the Law on Personal Identification Number, the Law on Permanent and Temporary Residence of BiH Citizens, and the Law on ID Cards, from a competent authority in charge of maintaining the records on any change of permanent and temporary residence.  

96. The Ministries of the Interior are responsible for processing the data and their accuracy because the Central Voters Register is created based on the data from the register of the Personal Identification Number, permanent and temporary residence, and ID cards.

1.11.4 *Description of problems detected in this segment of electoral process*

97. Description of problems detected in this segment of electoral process is the following:

a) Improving communication between the competent ministries and the BiH CEC in case of verification of certain data from the official records.

1.11.5 *Cooperation with the BiH Ministry for human rights and refugees*

98. With a view to updating the data on displaced persons in the Central Voters Register, every election year the BiH Central Election Commission submits to the BiH Ministry for Human Rights and Refugees a request for the submission of records of voters with the status of displaced person for the purpose of updating the CVR in electronic form.

99. Data for this category of voters for the 2016 Local Elections the BiH Ministry of Human Rights and Refugees submitted after several letters on 9 June 2016 because they needed to be collected from the municipalities,

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78 Article 3.5, paragraph (5) of the BiH Election Law
cantonal ministries, Brcko District of BiH as well as from the ministries of Republika Srpska. Data for 98,765 persons with the status of displaced persons in the records of the relevant ministries were provided. After the analysis of the submitted data, it was determined that the right to vote have 78,553 persons registered in the CVR, while 20,212 persons were not found in the Central Voters Register, i.e. no complete data was provided or incorrect information was provided for that number of persons.

1.11.6 Description of problems detected in this segment of electoral process

100. Description of problems detected in this segment of electoral process is the following:

a) Not updated and incomplete records of the competent authorities make it difficult to identify the displaced persons in the Central Voters’ Register and to draw up an excerpt for that voters’ category so that they can exercise their rights under Article 20.8 of the Election Law of BiH. It is therefore necessary to establish a system of electronic exchange of accurate data on displaced persons between the bodies responsible for issuing the decisions, keeping records of voters who have the status of displaced person and the Central Election Commission of BiH or IDDEEA and that activity should be completed in a non-election year.

1.11.7 Cooperation with the BiH Ministry of civil affairs

101. In accordance with Article 3.5 paragraph (4) of the Election Law of BiH, the Ministry of Civil Affairs of BiH submits data on renunciation of the BiH citizenship.

102. The Ministry of Civil Affairs of BiH regularly submits to the Central Election Commission of Bosnia and Herzegovina data on persons who renounced the BiH citizenship.
103. The Ministry of Civil Affairs of BiH submits data on these persons in the form of a decision on the cessation/loss of citizenship of BiH, on the basis of which the Secretariat’s employees enter data into electronic records.

104. It is recommended to establish a system of electronic data exchange between the Ministry of Civil Affairs of BiH and the Central Election Commission of BiH in order to have accurate and up-to-date information on the mentioned category of persons.

1.11.8 Cooperation with the authorities of Brčko District of BiH

105. Article 18.2 of the BiH Election Law sets forth that a citizen of BiH who is registered to vote for the Brčko District has the right to vote:

1. for the Members of the Presidency of BiH and the House of Representatives of the Parliamentary Assembly of BiH by casting the appropriate ballot in the Entity for which the voter is a citizen;

2. in the elections of the Entity of which the voter is a citizen; and

3. in District elections for the District Assembly and any other District electoral offices.

106. Department for public register of the Brčko District Government is competent for the citizenship affairs of the citizens of Brčko District of BiH.

1.11.9 Description of problems detected in this segment of electoral process

107. There is a problem of exercising electoral rights of persons who do not have Entity Citizenship registered in the CVR when the General Elections in BiH are held, as this is a condition for the exercise of electoral right.
108. The Inter-departmental Working Group had on 02.03.2017 published a public call to political parties, non-governmental organizations, the academic community, media, citizens and companies to actively engage in the analysis of the situation and proposing modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina. Written suggestions, proposals and ideas related to the application of new technologies at all stages of the electoral process could be submitted by interested parties by March 24, 2017. Public call also invited domestic and foreign companies and individuals who wanted to present their innovative products, devices and software for application in the electoral process to contact the Inter-departmental Working Group so they could present their products.

Table 2. List of political parties, companies, NGOs and citizens who submitted proposals upon the public call

<table>
<thead>
<tr>
<th>Public call</th>
<th>Registered entities</th>
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<tbody>
<tr>
<td>Political parties</td>
<td>SDP BiH – Social Democratic Party of BiH</td>
</tr>
<tr>
<td>Companies</td>
<td>1. Clever Collaboration Group Europe AB, Sweden</td>
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<td></td>
<td>2. Smartmatic</td>
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<td></td>
<td>3. S&amp;T Montenegro</td>
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<td>4. BiATM Ltd. UK</td>
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<td>5. Agency INSERT</td>
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<td></td>
<td>6. Knowledge Agency Europe AB</td>
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</tbody>
</table>
2.1 Political parties

109. Only SDP – the Social Democratic Party of BiH responded to the public call and presented its ideas. In its proposal, which supports the introduction of new technologies in the BiH electoral process, with the aim of increasing the transparency of the electoral process, faster determination of election results, reduction of the number of invalid ballots and a greater degree of protection of electoral rights of voters, this party proposes the following:

a) Introduction of electronic voting with means for optical scanning of ballots to keep the existing traditional voting system while the ballots would be counted by an optical scanner. This voting system would produce results faster, the possibility of malversation i.e. of adding marks to the ballots would be reduced, and mistakes would be avoided when counting the votes, while other ballots could be manually counted in case of doubt in election results;
b) It is very important to introduce a safer way of identifying voters when registering at a polling station (Montenegro is listed as an example);
c) take into account the accessibility of new technologies and the location of polling stations for persons with disabilities;
d) it is necessary to update the voter lists and to remove the names of the deceased persons and persons who don’t have the right to vote in BiH.

2.2 Non-governmental organizations

110. The Coalition for free and fair elections “Pod Lupom” responded to the public call and presented the following ideas:

   a) the introduction of electronic scanners for scanning ballots before they are put into the ballot box by voters at the polling station,
   b) the introduction of a bar code for the identification of voters at the polling station, i.e. a manual scanner for scanning single bar codes located on all identification documents valid for the voter identification at the polling station (identity card, passport and / or driver's license) and represent a unique characteristic of every citizen's identity.

2.3 Companies

111. The following companies applied to the public call of the Inter-departmental working group:

   1. Clever Collaboration Group Europe AB which in the company's presentation featured examples of business projects in which it played a key role, and how its knowledge and experience can be adapted to
the needs of the public call. This company offers support to the advancement of the electoral process in BiH in the area of its expertise, which is conducting the process of analysis, inclusion and engagement of all interested parties, and finding appropriate solutions.

2. **Smartmatic** has offered solutions for the secure and controlled automation of the electoral process in Bosnia and Herzegovina, according to the electoral process stages: voter registration in the Central Voters Register (proposal of the Smartmatic VIU-800 biometric registration station), voter identification at the polling station (proposal: VIU-800 with VIU-500 stations for voters’ verification), voting (proposal: Smartmatic ePen Voting Electronic Pencil, Smartmatic SAES-1800 plus Optical Scanner with Integrated Voting Box and Smartmatic A4-500 Voting Machine with Direct electronic record of votes), electronic counting of votes and consolidation of results at the Main center for counting by polling stations (proposal: voting machines that allow vote counting and transfer of data to a centralized server), **constituency and in total for the body that is elected** (suggestion: linking with the Smartmatic Results Management Module aimed at visualization and verification of results), registration and voting by voters outside BiH (proposal to implement the same VIU-800 system to be installed in the DCRO BiH abroad), live stream of EMBs’ sessions (proposal: Smartmatic Election management system), and use of social network (proposal Smartmatic Election management system, module for publication of results). Presentation of the Smartmatic devices was held at the session of the Inter-departmental Working Group held on 10.04.2017.
3. **Company S&T Montenegro** which in Montenegro developed of electronic identification of voters at the polling stations and which presents a unique hardware-software solution (presentation of the work method of device for electronic identification of voters was done at the session of the Inter-departmental Working Group held on March 28, 2017 by representatives of the Montenegrin National Election Commission.

4. **BiATM Ltd. UK** submitted a description on how system of biometric self-serving hotel reception works together with a proposal to develop a device for biometric self-serving voting.

5. **Agency INSERT, a specialized agency for development of software for blind computer users**, submitted a short description of the software and the keyboard, which can be used in the voting process by all people, and most attention was paid to adjusting the software to blind, vision impaired, illiterate, old and invalid persons. Presentation was held at the roundtable discussion on March 15, 2017.

6. **Knowledge Agency Europe AB** didn’t offer a concrete solution, but it sent company’s profile highlighting that it plays important role in ensuring independent, fraud-free electoral processes of high quality and that it can contribute to development of sustainable technologies necessary for implementation of electoral process in BiH.

7. **Universal design, Sarajevo** submitted the concept of the proposal of a telephone system for voting that is intended for persons with disabilities in BiH by stages: voting process, voter authentication, counting, allowing anonymity and protection against abuse.

8. **Smart System Solution, East Sarajevo** (the work of the device for electronic identification of voters and voting was done at the session
of the Inter-departmental working group held on April 19, 2017). The company presented electronic voting system DVS-3s that is based on hi-end hardware and a sophisticated software and represents a reliable solution for conduct of elections for all levels (local, general). Modular architecture and dynamic applications enable the system to swiftly and easily adapt to specific needs of election authorities.

9. **Dominion voting, offices in Denver (Colorado USA) and Toronto (Canada).** This company presented DEMOCRACY SUITE® EMS. The presentation of the device was held at the session of the inter-departmental working group held on April 24, 2017.

2.4 **Citizens**

112. Two citizens, Anis Borčak and Asmir Avdičević, computer science engineers suggest the introduction of technology into the current system based on the principle of paper ballots being filled by voters (introduction of an OCR scanner or barcode scanner for voter identification and inclusion in the database as well as in the voting process). The second approach is more innovative and is based on a software solution and redesigning the current voting process, from voter registration to social networks.

113. Radomir Trivić, a citizen, suggests that after the voting at the polling station is done and upon the closing of the ballot box, the polling station committee should only process the remaining ballot papers and record the status in minutes and the ballot boxes, accompanied by the observer and the President of the PSC to be transferred to the municipal / city counting centers, to be established, where ballot papers would be counted by rested and responsible teams.
114. Darko Paspalj delivered an email that did not contain concrete proposals regarding a public call.

3. Proposing modalities for introduction of new technologies into electoral process in BiH

115. An analysis of the current state of affairs, the description of problems in certain parts of the electoral process and the recommendation of an international expert\(^{79}\) as well as the presentation and discussion about each individual part of the electoral process dealt with in the work of the Inter-departmental working group were used for proposing modality for introduction of new technologies into the electoral process in BiH.

116. The following key issues related to the introduction of technology in the electoral process in Bosnia and Herzegovina were identified:

- Institutional capacities for introduction of new technologies;
- Normative alignments of relevant laws and by-laws, and
- Identification of technology that will be used for each individual part of electoral process.

117. Institutional capacity for the introduction of new technologies should be strengthened and maintained. Most institutions participating in the electoral process do not have the necessary human resources to independently introduce new technologies. The first institutional measure should be the urgent adoption of the Strategy and Action Plan for the use of new technologies in the BiH electoral process.

\(^{79}\) The Council of Europe hired Peter Wolf as an expert to assist the work of the Inter-departmental working group
118. Normative harmonization of relevant legislative and subordinate regulations implies the harmonization of existing regulations. It is necessary to create legal preconditions for the use of new technologies and the implementation of pilot projects in the electoral process.

119. Identification of the technology to be used in each individual part of the electoral process implies the implementation of various presentations, education and implementation of pilot projects with the aim of final identification and selection of appropriate technology.

120. The key elements of the electoral process that require the introduction of new technologies and the regular maintenance of the already applied technologies are:

1) Registration of voters in CVR and preparation of the excerpt from CVR;
2) Registration of political parties, application of political parties and independent candidates to participate in electoral process;
3) Designation of polling stations;
4) Election Day;
5) Accrediting observers of political subjects, NGOs and international observers;
6) Election campaign;
7) Identification of voters at the polling station;
8) Voting;
9) Determining voting results at the polling station;
10) Determining consolidated results of the vote for a municipality (detailed tabular overview for consolidation of aggregated results of the elections by political subjects and candidates);

11) EMBs;

12) Coordination of work and cooperation between the BiH CEC and other competent national bodies, and

13) BiH CEC’s communication with the public.

Below you can find stages of the electoral process and modalities of new technologies that can be applied in the electoral process in BiH:

### 3.1. Registration of voters in CVR and preparation of excerpt from the CVR

121. Registration of voters into the Central Voters Register is an important part of the electoral process which, as a rule, should be the responsibility of the state, which means that it should be exercised ex officio. In this respect, it is primarily normative and then technically necessary to improve the registration of voters in the Central Voters Register so that only in exceptional cases the voters submit registration applications through the active registration system. This applies primarily to BiH citizens who live outside of BiH, who, without exception, are still required to apply for elections if they wish to vote outside BiH in accordance with the positive regulations. For this purpose, it is necessary to link the records of the Central Voters Register, so that in addition to the records listed in Article 45 of the Rulebook on Content and Record Keeping (“Official Gazette of BiH”, No. 55/15), which are records on Personal Identification number, temporary and permanent residence of BiH citizens and the
records on ID cards, the Central Voters Register is linked to the passport records.

122. It is necessary to improve the existing system of passive voter registration and to technologically improve and develop new functionalities. Parts of active registration (voters outside BiH and displaced persons) could be integrated into the passive registration after the harmonization of regulations. Most of the technology presented is based on e-services and online systems.

123. Modalities for introduction of new technologies in registration of voters into the CVR are following:

a) Single web portal for elections as part of national e-services;

b) Adequate phone applications; and

c) info kiosk.

124. The basis for the introduction of these technologies is online identification, which should be unique and based on an electronic signature issued by certified and accredited electronic signature verifiers (public administration or business sector).

125. The unique web portal for the elections should be part of the state e-service, i.e. part of the e-citizen service. Through these online services all categories of voters or interested parties could check the status of the Central Voters Register or update necessary information for the realization of special rights (registration of voter outside BiH, displaced persons, mobile teams ...). Existing Centers for voters register should have a service function for users who are unfamiliar with new technologies, and would be also responsible for checking and updating of the registers.
126. The system of active registration should be minimized and prescribed only as an exception. It should be applied in such a way as to enable online submission of applications by voters outside BiH, which should fully replace the existing, outdated and overdue registration system for voting outside BiH.

127. It is necessary to electronically link the database of the Republika Srpska and FBiH Register Offices with the database of the IDDEEA Agency, i.e. of the Central Election Commission of BiH, in order to enable the electronic delivery of the data in real time to all key bodies that influence the formation of the correct CVR on registered deaths by the Register Offices.

128. It is recommended that the Central Election Commission of BiH, from the domain of its competence, establishes web forms for the registration of voters outside BiH.

129. It is recommended to the Central Election Commission of BiH to carry out technical upgrade of the passive voters’ registration system in accordance with the latest versions of the database and software.

130. In order to increase the accuracy of the CVR, it is necessary to establish and harmonize additional mechanisms for the exchange of data between all relevant state and entity institutions.

131. It is recommended that local self-government units install a special application for registration of deaths, which would be electronically taken over by the competent ministry of interior.

132. It is necessary to form a working group for the preparation of by-laws and instructional documents for the application of Article 9 of the Law on permanent and temporary residence of BiH, which
stipulates the obligation to keep records of BiH citizens’ stay abroad (the working group should include representatives of the Ministry of Foreign Affairs of BiH, Agency for identification documents, registers and data exchange of BiH and BiH Ministry of Civil Affairs). When establishing a working group for the elaboration of by-laws and instructional documents for the purpose of applying Article 9 of the Law on permanent and temporary residence of BiH, equal representation of genders will be taken into account.

133. It is necessary for the Ministry of Foreign Affairs of BiH to coordinate activities aimed at exchanging data and experiences with the aim of registering Roma who live abroad in the records of births and records of citizens.

134. It is necessary that the Register Offices, through the Ministry of Foreign Affairs of BiH, request the obtaining of extracts from foreign birth registers for persons born abroad who are unable to obtain them themselves.

135. Certain amendments and clarifications in the law are needed as well as in the Rulebooks that regulate not only the issue of refugees’ acquisition of the citizenship, but also the procedure for their stay in BiH.

136. Death records shall be made according to the existing ID card that the person had until time of his/her death, and any discrepancies between the birth register and the citizenship register may be subsequently harmonized if there is a legal basis;

137. Perform the correction of the lists of municipal election commissions and Register offices by territorial jurisdiction in order to delete from the records persons who are death, and apply the same to the persons
for whom death reports were not submitted to the personal documents’ records;

138. In order to ensure more efficient updating of data on death, administrative and inspection supervision in the area in question has to be more frequent;

139. Regarding the recording of deaths in the official records of BiH citizens, it is necessary to carry out investigations involving all relevant authorities (register offices, MoIs) in order to carry out an analysis and to find the best solutions to overcome the problems encountered.

140. The register offices should previously exchange registers in a number of municipalities in order to enter the data from the registers and after which the data would have been verified. This is one of the preconditions for the exchange of data from the registers.

141. Organize a special meeting with municipal representatives to point out to the participants the significance of the accuracy of the settlements and streets names, with an emphasis on determining house numbers, as there is a problem when delivering letters in daily legal businesses.

Note: All entries related to voter registration in the Central Voters Register will be sorted by sex to allow for gender representation analysis.

3.2. Registration of political parties, application of political parties and independent candidates to participate in electoral process

142. The following modalities may be applied in the electoral process relating to the registration of political entities, their certification for the elections and the application of candidates.
143. It is necessary to upgrade the existing JIIS so that political subjects can electronically submit applications for certification of participation in the elections and candidates' lists via a web form / create a web portal where political subjects would enter their data and keep up-to-date forms Reports that are printed, signed and submitted. Political subjects would be able to fill out an online application and later create a candidate list for certified constituencies, create database on application and candidates' list for information tracking of the further course of the election and printing of the application and the candidates' list to be signed and verified by the responsible person in the Central Election Commission of Bosnia and Herzegovina until the last deadline for the submission.

144. For political subjects that do not have access to the website for submitting applications, it is necessary to provide an adequate space with computers in the building of the BiH Central Election Commission. This would speed up and facilitate the process of processing applications, data accuracy, and make savings on forms printing. This way of application would provide very fast and accurate statistical data in real time.

145. When submitting signatures of support via an e-service, make possible for the persons who provide support to political subjects to enter their personal information and to identify themselves electronically. Also, provide for the possibility to check that their data have not been misused by checking on the web portal whether they have provided support.
146. Adoption of the Law on Political Organizations at the national level and the establishment of a single register or improvement of the legal framework for the establishment, registration and operation of political organizations in a single and harmonized manner or through "framework" legislation or through several, complementary laws at different levels, with identical criteria for the establishment and entry of political organizations into a single register at the BiH Ministry of Justice and / or the BiH Central Election Commission.

147. In application process for coalitions and lists of independent candidates provide an application for a new online application process for coalitions and list of independent candidates thus enabling political subjects and independent candidates to submit most of the required documentation online.

148. In the process of submitting candidates’ lists to enable a new way of submitting candidates’ lists via the web portal, as well as to enable a greater number of users within one political subject.

3.3. Accreditation of observers of political subjects, NGOs and international observers

149. New technologies should, due to short deadlines, enable new online process of observers’ registration through an adequate application that would enable observation missions/organizations to submit most of the required documentation online.

3.4. Election Campaign

150. The introduction of new technologies in this part of the electoral process needs to enable better communication between the interested parties in a way that would allow submission of complaints and
evidence online. Also this part of the electoral process should be web-based.

151. Create a system for reporting violation of election campaign rules with electronic submission of evidence. In this part, social networks could play a key role, because images and video material that prove e.g. hate speech, covering of posters, etc. can be easily delivered.

3.5. Designating polling stations

152. To base designation of polling stations based on Application for address register and Register of housing units with the breakdown of number of persons registered in the housing units.

Picture 1. Address register application

80 Presentation of the Republic Authority for Geodetic and Real Property Affairs “Capacity Building for Improvement of Land Administration and Procedures in Bosnia and Herzegovina” – CILAP ESTABLISHMENT OF ADDRESS REGISTER IN REPUBLIKA SRPSKA” – held on expert discussion on April 12, 2017
153. Using GPS devices (smart phones, etc.) digitally map polling stations’ locations. Establish a polling station register in a way that it also includes a location image and directions to the polling station. Also describe polling station in more detail and collect information about the availability of the Internet (Wi-Fi, 3G, Ethernet etc.) at polling stations.

154. Using existing technologies: Google Earth, GPS system, etc., to locate these polling stations and to form a digital map with a geographic location that will at any moment be available to the Central Electoral Commission of BiH and other relevant authorities.

155. Assign numbers to homes or upgrade an application in the sense that municipal election commissions can independently subdivide polling stations for settlements where there are no names for certain streets or a specific home numbering.

156. When determining the polling stations, it is imperative to prescribe that the location of the polling station must be determined in a way that makes it accessible to all voters.

157. Extension of an online system that provides information on polling stations for citizens with new data that will be available one month before the election. Additional information should include the location and voter names on the voter list and the image of the ballot that the voter will receive. This can help speed up the identification process and voting at the polling station.

3.6. Election Day

158. The modalities for the introduction of new technologies on the Election Day should be considered in their entirety. The ultimate
long-term goal should be the introduction of different technologies that would be networked into a unified system.

159. The long-term goal is to introduce online voting technology.

160. Some of the modalities to speed up the voting process on the election day are reflected in the improvement of the existing SMS center, so the voter knows the exact number under which he/she can be found, providing insight into the ballot paper through an online based application so that when the voters comes to the polling station he/she can easier find the desired candidate. Redesigning ballots so that next to the candidates there is an option empty ballot as to avoid its abuse.

161. Introduce a mandatory notice for voters on the date and time of elections, location of the polling station, i.e. on contacts of municipal / city election commissions.

3.6.1. Identification of voters at the polling station

162. An electronic voter identification system should be introduced at the polling station. In order to explore different identification technologies, it is necessary to carry out field tests of different systems in the short term. Based on the results of these tests, it is necessary to make a decision on the most favorable process of electronic voter identification.

163. In the evaluation phase, it is necessary to consider legal and technical aspects of data protection as well as backup procedures in the case that voters cannot be identified electronically.

164. One of the possible options should be selected:
a) Equipping polling stations with laptops with electronic voters’ registers, ideally with online access, through the implementation of the "5000 polling stations -5000 Laptops" initiative;

b) Equipping polling stations with voter identification devices based on ID card readers and OCR MRZ technology, bar code etc.;

c) Equipping polling stations with biometric fingerprint identification systems based on automatic fingerprint identification and biometric data from IDDEEA records, as well as the use of identification devices to photograph the person who votes.

165. Necessary technical-technological features of voter identification devices:

   a) Clear reading of individual documents (passport, identity card) by OCR, barcode, smart card or similar technology;
   b) Possible operation of the system without electricity, i.e. the device must offer backup power supply;
   c) Voter identification should be complete with all personal data and a photo;
   d) The data (results) are to be transmitted and the device must be connected to the Center for vote counting;
   e) The existing voter identification process accelerated.

166. Examples of devices that can be used:
Picture 2. Electronic voter identification device (Montenegro)\textsuperscript{81}

Picture 3. Voter registration station VIU-800\textsuperscript{82}

\textsuperscript{81} Presentation of the device for electronic voter identification done at the session of the Inter-departmental working group held on March 28, 2017 by the representatives of Montenegrin State Election Commission

\textsuperscript{82} Presentation of Smartmatic device held on the session of Inter-departmental WG on 10.04.2017.
3.6.2. Voting

167. Bearing in mind the complexity of the ballot paper, language and electoral system in BiH, it is necessary to investigate all the above-mentioned technologies from different suppliers:

a) ballot paper scanners, including necessary changes in the ballot format (e.g., modeled after the one in Kyrgyzstan and the Philippines),

b) Direct Recording Electronic (DRE) touch screen devices with a paper trail for voter verification (such as USA and Canada),

83 Ibid
84 Report on exhibit of advanced technologies 09.02. 2016
c) Electronic Ballot Printers (EBP) (in Belgium) where voters vote by pressing the screen, after which a ballot paper with their vote is printed. The vote is then scanned on a special device, d) Digital Pen (ePen).

168. In the previous presentations in BiH, DRE with the paper trace and EBP were not considered. One advantage of such systems, in comparison to scanning and digital pencils, is that complex ballot papers in multiple languages or writings can be more easily displayed on the screen than printed on paper. This means there is no need for ballots and logistics related to them.

169. Decisions about any future large scale implementation of voting machines should be informed by the findings of such tests and pilots. Trials should be evaluated and compared in terms achievable improvements of the electoral process, efficiency, impact on polling station procedures, polling staff, voters, voter throughput, costs, reliability and overall stakeholder acceptance in the BiH context.\(^85\)

170. Similar to other European EMBs, the CEC should closely follow and study global and European developments in the field of internet voting, participate in Council of Europe e-voting initiatives, follow the ongoing development and application of required domestic infrastructure (including online identification and signatures) and strengthen related expertise and capacity. For now, any implementation of internet voting should be a long-term goal for BiH, similar to most other European countries.\(^86\)

\(^{86}\) See report of CoE’s Expert Peter Wolf, Annex 2, recommendation no. 2015/10
171. The registration and identification of voters based on IDDEEA records is the basis for the introduction of new technologies in the electoral process in BiH.

172. Bosnia and Herzegovina is ready to improve the electoral process by applying new technologies, knowledge, people, ideas, with the help of public administration, the business sector, the academic community and all relevant stakeholder actors in this process.

173. Advantages of e-voting are inter alia:

   a) Access to everyone and everywhere, if the option of i-voting is used,
   b) The speed of obtaining election results,
   c) The great advantage of electronic voting systems in relation to other voting techniques is that the electronic voting system can be included in any of the seven stages of the electoral process, in the preparation, distribution, voting, collection and counting of ballots, and thus can bring advantages to any of these steps,
   d) By using advanced technical solutions that support the improvement of the electoral process, e.g. cloud services, which is a very near future, the response and speed of the system increases, increasing the availability of election results, and there are no so-called „server crashes“ because now a large number of data is located on a secure and protected „cloud server“  

87 For example, there is a service portal in the United States that allows US citizens living abroad to access their ballot papers from the cloud computing environment - clouds, 45 days before the election, on the Microsoft Azzure platform, where no security breach was detected. This platform was used in the last US presidential elections in 2016.
e) Electronic voting allows every individual to have the same rights and opportunities regardless of individual differences, especially the so-called e-inclusion of persons with disabilities. For example, DRE devices can be customized and used in combination with the audio interface with the use of headphones to ensure secrecy of the vote, assisting blind and vision impaired persons or, for example, using a visual interface for people who do not speak BH languages so that they can independently vote in secret and without help. For the introduction of such technology the extra costs are low, and the opportunities are great and very important for the inclusion of all marginalized people.

174. Disadvantages of electronic voting are inter alia:

a) Price and cost of system maintenance;
b) Resistance of voters due to new technologies,
c) People do not give up on the traditional way of voting,
d) Based on the study conducted on "Remote Electronic Voting in Estonia's 2007 Parliamentary Elections", it has been shown that instead of eliminating inequalities, i-voting has somewhat increased the digital gap between higher and lower socio-economic classes. At the Estonian elections in 2007, there was a greater response of voters with higher social status, income and higher level of education than those with lower incomes and who had primary and secondary education.

e) Political parties that have more support from people who are more familiar with Internet voting can for that reason be more successful in the elections, due to i-voting, which tends to increase voter turnout of the high and middle class citizens.
One of the problems that arises is that not everybody has access to the Internet, so there should be so-called hybrid voting model, where some people vote online, and others in a classical manner. This additionally complicates the implementation and the protection measures, and the possibility of overcoming the problem is that "classic" voting sites are equipped with online voting computers instead of the classic ballot boxes. "Online“ voting would be feasible with biometric documents (e-ID card i ePASSPORT) and smart card readers. The problem is that not all people with the right to vote in BiH have this document.

Table 3. Overview of biometric documents (by March 2017)

<table>
<thead>
<tr>
<th>Type of document</th>
<th>Number of documents</th>
<th>Percentage from total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of valid ID cards:</td>
<td>3.150.909</td>
<td>100,00%</td>
</tr>
<tr>
<td>Total number of biometric ID cards:</td>
<td>2.056.449</td>
<td>65,27%</td>
</tr>
<tr>
<td>Total number of valid old ID cards:</td>
<td>1.094.460</td>
<td>34,73%</td>
</tr>
<tr>
<td>Total number of permanent ID cards:</td>
<td>724.042</td>
<td>22,98%</td>
</tr>
<tr>
<td>Total number of biometric permanent ID cards:</td>
<td>363.987</td>
<td>11,55%</td>
</tr>
<tr>
<td>Total number of valid old ID cards:</td>
<td>360.055</td>
<td>11,43%</td>
</tr>
</tbody>
</table>

Table 4. Number of ID cards on old form with expiry by years (OLD IDs)

<table>
<thead>
<tr>
<th>Year of expiry</th>
<th>Number of documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>121.517</td>
</tr>
<tr>
<td>2019</td>
<td>109.842</td>
</tr>
<tr>
<td>2020</td>
<td>121.681</td>
</tr>
<tr>
<td>2021</td>
<td>124.880</td>
</tr>
<tr>
<td>2022</td>
<td>128.583</td>
</tr>
<tr>
<td>2023</td>
<td>14.803</td>
</tr>
<tr>
<td>Total</td>
<td>621.306</td>
</tr>
</tbody>
</table>

It is important to note that the number of persons who have a valid biometric PI, but old ID card is 473.564, so the number of persons with at least one biometric document is much higher. By March 1, 2023, all citizens will have a biometric ID card, except those with "old" permanent ID card (currently about 360,000 persons).

176. Examples of devices that can be used:

a) **Optical scanner**

[Picture 6. Optical scanner](#)

[Picture 7. Scanning](#)

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89 Presentation of Smartmatic device held on the session of Inter-departmental WG on 10.04.2017.
90 Presentation of Dominition voting device held on the session of Inter-departmental WG on 24.04.2017.
Picture 8. Optical scanner

Picture 9. Optical scanner

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91 Ibid
92 Ibid
b) Centralized scanning on fact optical scanners

Picture 10. Centralized scanning on commercial scanners

93 Presentation of Dominition voting device held on the session of Inter-departmental WG on 24.04.2017.

94 Presentation of Smartmatic device held on the session of Inter-departmental WG on 10.04.2017

c) Voting machine with direct electronic vote recording

Picture 11. Voting machine with direct electronic vote recording
Picture 12. Sequence of voting on the ballot for the Parliament\textsuperscript{95}

Picture 13. Voting machine with direct electronic vote recording and card reader\textsuperscript{96}

\textsuperscript{95} Ibid
\textsuperscript{96} Presentation of Dominition voting device held on the session of Inter-departmental WG on 24.04.2017.
Picture 14. Electronic voting system\textsuperscript{97}

\textsuperscript{97} Presentation of device of Smart System Solution from East Sarajevo for electronic voter identification and voting held on the session of Inter-departmental WG on 19.04.2017.
d) Electronic pen

Picture 15. Electronic pen

Picture 16. Electronic pen (ePen)

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98 Presentation of Smartmatic device held on the session of Inter-departmental WG on 10.04.2017.
Determining consolidated aggregate results of the vote for a municipality
(detailed tabular overview for consolidation of aggregate results of elections by political subjects and candidates)

177. Apply Viber application or some similar application that would enable faster and more economical communication of the BiH Central Election Commission with election commissions of basic constituencies in BiH via mobile phones or tablets;

178. Improving the application for the entry of election results from the Integrated Information Election System of BiH in such a way that the application is available on a cell phone or tablet with an authorized user at the polling station, which would result in the election results being entered directly at the polling station immediately after counting ballots for a certain level. This would speed up data entry in electronic form, and at the same time the Polling Station Committee would immediately have available information on whether the election results were mathematically correct, comparing all relevant parameters.

3.6.3. **By-mail voting**

179. In the existing system allow online monitoring of pre-registered shipments. Collection of mail in the DCROs to reduce the cost of sending voting packages and delivering by diplomatic mail as soon as possible.

180. By-mail voting system should be enabled through online services, i.e. Internet and mobile applications.

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Ibid
3.7. Determining election results

181. Aimed at solving aforementioned problems, the following solutions are possible:

The BiH Central Election Commission should consider further improvements in order to speed up the counting process, including:

a) Updating and consolidating existing tables with results;
b) Additionally prioritizing counting of votes and entering data between the various election runs;
c) Encouraging the use of all available communication channels for exchange between the polling stations and the municipal election commission for the purpose of preliminary transfer of results. Share experiences with and between municipal election commissions that have already used different mobile applications for this purpose;
d) to explore the possibilities of introducing a secure online access of the Central Election Commission of BiH to this system of aggregating results in all polling stations, either through an existing mobile device or through the implementation of the “5000 polling stations - 5000 Laptops” initiative.

3.8. Appeal procedure and requests for recount

182. The introduction of new technologies in this part of the electoral process should be enabled by a new online system for filing complaints and appeals: This system would provide the Central Election Commission of BiH with a quick and efficient approach to complaints and appeals, especially those filed during the Election Day. The system could consist of two parts: one for official complaints that can only be accessed by the municipal election
commission, and one for informal citizen complaints that can be filed directly through the web site.

183. On the basis of the foregoing, it is recommended to the Central Election Commission of BiH to supplement existing complaints and appeals procedures by creating an online system.

3.8.1. Polling station Committees

184. In order to address the above-mentioned problems, and in order to introduce new technologies in this part of the electoral process, it is necessary to:

a) Create a web form that will allow certified political subjects to submit names of persons nominated for the members of the polling station, as well as a reserve list formed by the municipal / city election commission.

b) to provide insight into the list of appointed members of the polling station members on the web site, and any changes made by the municipal/city election commission should be made electronically in order to prevent abuses.

c) To form reserve lists (also on the web portal), so that at any moment there is information about substitute members of the Polling Station Committee.

d) Ensure that key persons in the polling station committee possess knowledge of the electoral process and to create electronic databases of certified election administration representatives in order to create the conditions for the semi-professionalization of the election administration and provide resources for the next electoral cycles.
3.8.2 Municipal and city election commissions

185. New technologies in the work of election administration should ensure faster communication and exchange of data. Some of the modalities are:

a) the use of social networks as informal communication,

b) Creating appropriate mobile applications for delivery of results from polling stations,

c) Creating a system of rapid notification of the president and members of the PSCs in crisis situations,

d) create an application that will enable municipal councils / assemblies of the municipality to submit all documentation necessary for obtaining consent to the Central Election Commission of BiH in electronic form, and at the same time, the application would provide all necessary checks of nominated candidates.

3.8.3 BiH Central Election Commission

186. For the purpose of efficient use of new technologies, it is necessary to increase the capacities of the BiH Central Election Commission and the Secretariat staff. The Central Election Commission of BiH is particularly lacking capacities in IT project management, data analysis, software development and databases, and social media management. Although this is already a well-known long-term challenge for this institution, it is necessary to work as much as
possible to address the issue of lack of professional staff and frequent changes of employees, e.g. through staff training, training, etc.\textsuperscript{100}

187. New technologies need to be applied in all segments of the Central Election Commission of Bosnia and Herzegovina and especially in public relations (social networking: Facebook, Twitter, LinkedIn, Instagram, YouTube etc.) in the work of the Central Election Commission of BiH (e.g. live stream, or online transmission of sessions of the BiH Central Election Commission, skype conference, internal and external, etc.), as well as in other parts of the electoral process management in Bosnia and Herzegovina.

188. Various options for broadcasting live sessions of the Central Election Commission of BiH and important election events should be explored through various programs for direct content transmission.

3.9. \textit{Work coordination and cooperation of the BIH CEC with competent bodies}

189. The provision of Article 2.1 paragraph (2) of the Election Law of BiH stipulates that all the authorities at all levels and officials in Bosnia and Herzegovina and diplomatic and consular missions of BiH are obliged to assist the bodies responsible for the implementation of the elections. In this context, it is necessary that all relevant state, entity and Brcko District Bodies be fully involved in all the work processes under the competence of the Central Election Commission of Bosnia and Herzegovina upon the request of

\textsuperscript{100} In the case of major technological innovations in the future, ICT expertise might have to be increased even beyond the staff of the CEC Secretariat. Some of the election management bodies with high degree of automatization such as COMELEC in the Philippines are even more inclined to involve technology experts in the commission's membership.
that commission. It is therefore necessary to fully respect the legal provision on the position of the Central Election Commission of BiH as an independent body whose powers stem from the authority of the BiH Parliamentary Assembly.

4. **Conclusions with proposal of measures**

190. Urgent measures need to be taken to strengthen institutional capacities for the management of new technologies in the electoral process, in particular with regard to institutional strengthening through staffing, which implies the additional vocational education, specialization education for the existing staff, and in particular the engagement of new professional staff in this field.

191. There are three main elements that the state of BiH must immediately initiate and consistently implement in order to catch up with the countries that have a long democratic tradition as well as the so-called new democracies, which greatly enjoy the benefits of using modern IT equipment in the electoral process. These elements are: electronic voting machine, registration and voter identification, and new ballot design. These elements are the icons of practical "electronic" voting, which some countries have been practicing for many years.

192. The electronic voting machine (e.g. PCOS used in the parliamentary elections in the Philippines, South Korea or Kyrgyzstan) represents essential tool for a drastic acceleration of the electoral process. Based on the optical scanner, it allows for automatic countrywide data capture after the closing of the polling station, providing information on: the total number of votes for each party; the total number of votes per candidate; the total number of blank ballots; the total number of
registered voters; the total number of those who voted; the total number of invalid ballot papers; identification of the polling station and the municipality; the time of closing the polling station; and give the opportunity to obtain a variety of validation reports; internal codes of electronic voting machines, etc.

Note: All data will be sorted by gender in order to enable gender representation analysis.

193. The registration and identification of voters established on biometric voter data is also an essential element for introducing “electronic” voting in BiH. The key agency for this job, as I have already pointed out, is IDDEEA, which has a long time ago established technical infrastructure that can be applied for the electronic identification of citizens and is technically and personally qualified to fulfil all the necessary measures do that registered voters could be identified at the polling station.

194. Finally, the new ballot paper design that would be electronically processed would greatly accelerate the counting process and compilation of the results. A system of closed unblocked lists is in force in Bosnia and Herzegovina. Eventual introduction of a new technology would mean e.g. a touchscreen or a machine that could recognize a political party to which the voter gave the vote and within that candidate list of a candidate to whom the voter would give the vote. The solution can be, for example, that each party has its own number and that each candidate of that party has his/her own number. The voter would have the option, besides the choice of the party, to nominate a single candidate preferred on the list of that selected party.
195. The following improvements would be achieved with computerization of the electoral process in BiH: First and foremost, the highest possible speed in obtaining, processing and announcing election results, approximately two to three hours after closing of the polling stations. Secondly, the highest possible accuracy of the results and the third, maximum transparency of the electoral process, eliminating the possibility of violations of the electoral process such as registration and "voting" of the dead, multiple voting, carousel voting, etc.

196. The application of modern technologies in the electoral process in BiH is inevitable and a necessity. Keeping the electoral process in the 21st century without the application of the most up-to-date information and communication technologies is not only stagnation i.e. maintaining the status quo status but it is also a drastic decline;

197. However, technologies throughout the electoral process still do not enjoy the degree of trust in the world as expected and how much it would be necessary. Therefore, their application in BiH must be the result of a consensus or at least of a majority opinion of all actors in the political process in BiH. For this reason, it is necessary to initiate a public discussion on this issue as soon as possible, whereat discussion in the Parliamentary Assembly of BiH must be both the initial and the final stage of the process;

198. The final choice between the modalities offered in this analysis should meet three essential requirements: (1) that each solution selected is technically feasible and compatible with the existing IT and communications infrastructure of the BiH Central Election Commission and IDDEEA, where compatibility is reflected in
relying on biometrics, SDH communication and JIIS; (2) that solutions selected are in a functional sense adequate with the stat of the society in terms of the general social standard, the budgetary possibilities and the level of general IT literacy; (3) to have unambiguous political support from the public, political subjects and especially from the highest legislative authorities in BiH.

199. The BiH Council of Ministers will make a decision on forming a permanent Coordinating Body for monitoring the application of new technologies in the BiH electoral process, which will be made by experts from the ministries, bodies, agencies and other bodies that have prepared this analysis and that will report on progress in this area twice a year to the CoM of BiH and propose taking of necessary measures and activities. This Coordinating Body should start work no later than 15 June 2017.

200. Regular budget allocations are required to maintain and upgrade the existing election technology applied in BiH as well as regular training of staff applying this technology.

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7. Peter Wolf’s report, Council of Europe expert
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10. Unique methodology and program of processing and keeping records of the Central Voters Register
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12. Document of the Ministry of Civil Affairs of BiH No. 06-30-2-511/16 from 19.04.2017
PART III
Recommendation CM/Rec(2017)5[1]
of the Committee of Ministers to member States
on standards for e-voting

(Adopted by the Committee of Ministers on 14 June 2017
at the 1289th meeting of the Ministers' Deputies)

Preamble

The Committee of Ministers, under the terms of Article 15.b of the Statute of the Council of Europe,

Considering that the aim of the Council of Europe is to achieve a greater unity between its members for the purpose of safeguarding and promoting the ideals and principles which are their common heritage;

Reaffirming its belief that representative and direct democracy is part of that common heritage and is the basis of the participation of citizens in political life at the level of the European Union and at national, regional and local levels;

Having regard to the obligations and commitments as undertaken within existing international instruments and documents, such as:

- the Universal Declaration on Human Rights;
- the International Covenant on Civil and Political Rights;
- the United Nations Convention on the Elimination of All Forms of Racial Discrimination;
- the United Nations Convention against Corruption;
- the Convention for the Protection of Human Rights and Fundamental Freedoms (ETS No. 5), in particular the Protocol thereto (ETS No. 9);
- the European Charter of Local Self-Government (ETS No. 122);
- the Convention on Cybercrime (ETS No. 185);
- the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data (ETS No. 108);
- the Additional Protocol to the Convention for the Protection of Individuals with Regard to Automatic Processing of Personal Data, regarding supervisory authorities and transborder data flows (ETS No. 181);
- Recommendation Rec(99)5 of the Committee of Ministers to member States on the protection of privacy on the Internet;
- Recommendation Rec(2004)15 of the Committee of Ministers to member States on electronic governance (e-governance);
- Recommendation CM/Rec(2009)1 of the Committee of Ministers to member States on electronic democracy (e-democracy);
- the document of the Copenhagen Meeting of the Conference on the Human Dimension of the OSCE;
- the Charter of Fundamental Rights of the European Union;
- the Code of Good Practice in Electoral Matters, adopted by the Council for Democratic Elections of the Council of Europe and the European Commission for Democracy through Law (Venice Commission) and supported by the Committee of Ministers, the Parliamentary Assembly and the Congress of Local and Regional Authorities of the Council of Europe;
Bearing in mind that the right to vote lies at the foundations of democracy, and that, consequently, all voting channels, including e-voting, shall comply with the principles of democratic elections and referendums;

Recognising that the use of information and communication technologies by member States in elections has increased considerably in recent years;

Noting that some member States already use, or are considering using e-voting for a number of purposes, including:

- enabling voters to cast their votes from a place other than the polling station in their voting district;
- facilitating the casting of the vote by the voter;
- facilitating the participation in elections and referendums of citizens entitled to vote and residing or staying abroad;
- widening access to the voting process for voters with disabilities or those having other difficulties in being physically present at a polling station and using the devices available there;
- increasing voter turnout by providing additional voting channels;
- bringing voting in line with new developments in society and the increasing use of new technologies as a medium for communication and civic engagement in pursuit of democracy;
- reducing, over time, the overall cost to the electoral authorities of conducting an election or referendum;
- delivering voting results reliably and more quickly;
- providing the electorate with a better service, by offering a variety of voting channels;

Valuing the experience gathered by the member States that have used e-voting in recent years and of the lessons learned through such experience;

Aware also of the experience resulting from the application of Recommendation Rec(2004)11 of the Committee of Ministers to member States on legal, operational and technical standards for e-voting, the Guidelines for developing processes that confirm compliance with prescribed requirements and standards (Certification of e-voting systems) and the Guidelines on transparency of e-enabled elections;
Reaffirming its belief that public trust in the authorities in charge of managing elections is a precondition to the introduction of e-voting;

Aware of concerns about potential security, reliability or transparency problems of e-voting systems;

Conscious, therefore, that only those e-voting systems which are secure, reliable, efficient, technically robust, open to independent verification and easily accessible to voters will build public confidence, which is a prerequisite for holding e-elections;

Aware of the need for the member States to take into account the environment in which e-voting is implemented;

Aware that, in the light of recent technical and legal developments on e-enabled elections in Council of Europe member States, the provisions of Recommendation Rec(2004)11 need to be thoroughly revised and brought up to date;

Having regard to the work of the Ad hoc Committee of Experts on Legal, Operational and Technical Standards for e-voting (CAHVE), set up by the Committee of Ministers with the task of updating Recommendation Rec(2004)11,

1. Recommends that the governments of member States when introducing, revising or updating, as the case may be, domestic legislation and practice in the field of e-voting:

i. respect all the principles of democratic elections and referendums;

ii. assess and counter risks by appropriate measures, in particular as regards those risks which are specific to the e-voting channel;

iii. be guided in their legislation, policies and practice by the standards included in Appendix I to this recommendation. The interconnection between the above-mentioned standards and those included in the accompanying Guidelines on the implementation of this recommendation should be taken into account;

iv. keep under review their policy on, and experience of, e-voting, and in particular how and to what extent the provisions of this recommendation are being implemented in order to provide the Council of Europe with a basis for holding review meetings on the implementation of this recommendation at least every two years following its adoption;
5. share their experience in this field;

vi. ensure that this recommendation, its accompanying Explanatory Memorandum and Guidelines are translated and disseminated as widely as possible, and more specifically among electoral management bodies, election officials, citizens, political parties, domestic and international observers, NGOs, media, academics, providers of e-voting solutions and e-voting specific controlling bodies;

2. Agrees to regularly update the provisions of the Guidelines accompanying this recommendation;


Appendix i – e-voting standards

I. Universal suffrage

1. The voter interface of an e-voting system shall be easy to understand and use by all voters.

2. The e-voting system shall be designed, as far as is practicable, to enable persons with disabilities and special needs to vote independently.

3. Unless channels of remote e-voting are universally accessible, they shall be only an additional and optional means of voting.

4. Before casting a vote using a remote e-voting system, voters’ attention shall be explicitly drawn to the fact that the e-election in which they are submitting their decision by electronic means is a real election or referendum.

II. Equal suffrage

5. All official voting information shall be presented in an equal way, within and across voting channels.

6. Where electronic and non-electronic voting channels are used in the same election or referendum, there shall be a secure and reliable method to aggregate all votes and to calculate the result.

7. Unique identification of voters in a way that they can unmistakably be distinguished from other persons shall be ensured.
8. The e-voting system shall only grant a user access after authenticating her/him as a person with the right to vote.

9. The e-voting system shall ensure that only the appropriate number of votes per voter is cast, stored in the electronic ballot box and included in the election result.

III. Free suffrage

10. The voter’s intention shall not be affected by the voting system, or by any undue influence.

11. It shall be ensured that the e-voting system presents an authentic ballot and authentic information to the voter.

12. The way in which voters are guided through the e-voting process shall not lead them to vote precipitately or without confirmation.

13. The e-voting system shall provide the voter with a means of participating in an election or referendum without the voter exercising a preference for any of the voting options.

14. The e-voting system shall advise the voter if he or she casts an invalid e-vote.

15. The voter shall be able to verify that his or her intention is accurately represented in the vote and that the sealed vote has entered the electronic ballot box without being altered. Any undue influence that has modified the vote shall be detectable.

16. The voter shall receive confirmation by the system that the vote has been cast successfully and that the whole voting procedure has been completed.

17. The e-voting system shall provide sound evidence that each authentic vote is accurately included in the respective election results. The evidence should be verifiable by means that are independent from the e-voting system.

18. The system shall provide sound evidence that only eligible voters’ votes have been included in the respective final result. The evidence should be verifiable by means that are independent from the e-voting system.
IV. Secret suffrage

19. E-voting shall be organised in such a way as to ensure that the secrecy of the vote is respected at all stages of the voting procedure.

20. The e-voting system shall process and store, as long as necessary, only the personal data needed for the conduct of the e-election.

21. The e-voting system and any authorised party shall protect authentication data so that unauthorised parties cannot misuse, intercept, modify, or otherwise gain knowledge of this data.

22. Voters’ registers stored in or communicated by the e-voting system shall be accessible only to authorised parties.

23. An e-voting system shall not provide the voter with proof of the content of the vote cast for use by third parties.

24. The e-voting system shall not allow the disclosure to anyone of the number of votes cast for any voting option until after the closure of the electronic ballot box. This information shall not be disclosed to the public until after the end of the voting period.

25. E-voting shall ensure that the secrecy of previous choices recorded and erased by the voter before issuing his or her final vote is respected.

26. The e-voting process, in particular the counting stage, shall be organised in such a way that it is not possible to reconstruct a link between the unsealed vote and the voter. Votes are, and remain, anonymous.

V. Regulatory and organisational requirements

27. Member States that introduce e-voting shall do so in a gradual and progressive manner.

28. Before introducing e-voting, member States shall introduce the required changes to the relevant legislation.

29. The relevant legislation shall regulate the responsibilities for the functioning of e-voting systems and ensure that the electoral management body has control over them.

30. Any observer shall be able to observe the count of the votes. The electoral management body shall be responsible for the counting process.
VI. Transparency and observation

31. Member States shall be transparent in all aspects of e-voting.

32. The public, in particular voters, shall be informed, well in advance of the start of voting, in clear and simple language, about:
   - any steps a voter may have to take in order to participate and vote;
   - the correct use and functioning of an e-voting system;
   - the e-voting timetable, including all stages.

33. The components of the e-voting system shall be disclosed for verification and certification purposes.

34. Any observer, to the extent permitted by law, shall be enabled to observe and comment on the e-elections, including the compilation of the results.

35. Open standards shall be used to enable various technical components or services, possibly derived from a variety of sources, to interoperate.

VII. Accountability

36. Member States shall develop technical, evaluation and certification requirements and shall ascertain that they fully reflect the relevant legal and democratic principles. Member States shall keep the requirements up to date.

37. Before an e-voting system is introduced and at appropriate intervals thereafter, and in particular after any significant changes are made to the system, an independent and competent body shall evaluate the compliance of the e-voting system and of any information and communication technology (ICT) component with the technical requirements. This may take the form of formal certification or other appropriate control.

38. The certificate, or any other appropriate document issued, shall clearly identify the subject of evaluation and shall include safeguards to prevent its being secretly or inadvertently modified.

39. The e-voting system shall be auditable. The audit system shall be open and comprehensive, and actively report on potential issues and threats.

VIII. Reliability and security of the system
40. The electoral management body shall be responsible for the respect for and compliance with all requirements even in the case of failures and attacks. The electoral management body shall be responsible for the availability, reliability, usability and security of the e-voting system.

41. Only persons authorised by the electoral management body shall have access to the central infrastructure, the servers and the election data. Appointments of persons authorised to deal with e-voting shall be clearly regulated.

42. Before any e-election takes place, the electoral management body shall satisfy itself that the e-voting system is genuine and operates correctly.

43. A procedure shall be established for regularly installing updated versions and corrections of all relevant software.

44. If stored or communicated outside controlled environments, the votes shall be encrypted.

45. Votes and voter information shall be kept sealed until the counting process commences.

46. The electoral management body shall handle all cryptographic material securely.

47. Where incidents that could threaten the integrity of the system occur, those responsible for operating the equipment shall immediately inform the electoral management body.

48. The authenticity, availability and integrity of the voters’ registers and lists of candidates shall be maintained. The source of the data shall be authenticated. Provisions on data protection shall be respected.

49. The e-voting system shall identify votes that are affected by an irregularity.

Appendix i – glossary of terms

In this recommendation and Explanatory Memorandum, the following terms are used with the following meanings:

- access control: the prevention of unauthorised use of a resource;

- assessment: an evaluation of persons, hardware, software and procedures to verify if they are suitable for the fulfilment of certain tasks;
- audit: an independent pre- or post-election evaluation of a person, organisation, system, process, entity, project or product which includes quantitative and qualitative analysis;

- authentication: the provision of assurance of the claimed identity of a person or data;

- availability: the state of being accessible and usable upon demand;

- ballot: the legally recognised means by which the voter can express his or her vote;

- candidate: a voting option consisting of a person, a group of persons and/or a political party;

- casting of the vote: entering the vote in the ballot box;

- certificate: a document which is the result of a formal certification wherein a fact is certified or attested;

- certification: a process of confirmation that an e-voting system is in compliance with prescribed requirements and standards and that it includes, at the minimum, provisions to ascertain the correct functioning of the system. This can be done through measures ranging from testing and auditing through to formal certification. The end result is a report and/or a certificate;

- certification body (or certifier): an organisation entitled to conduct a certification process and to issue a certificate upon completion of the process;

- certification report: a document which explains what a certificate has certified and how it is certified;

- chain of trust: a process in computer security which is established by validating each component of hardware and software from the bottom up. It is intended to ensure that only trusted software and hardware can be used while still remaining flexible;

- component testing: a method by which individual units of the system code are tested to determine if they are fit for use;

- confidentiality: the state characterising information that should not be made available or disclosed to unauthorised individuals, entities or processes;
- controlled environment: premises supervised by election officials, e.g. polling stations, embassies or consulates;
- e-election: a political election or referendum where e-voting is used;
- electoral management body (EMB): institution in charge of managing elections in a given country at national or lower level;
- electronic ballot box: the electronic means by which the votes are stored pending being counted;
- e-vote: electronically cast vote;
- e-voting: the use of electronic means to cast and/or count the vote;
- e-voting system: the hardware, software and processes which allow voters to vote by electronic means in an election or referendum;
- formal certification: certification carried out by official authorities, only before election day and leading to the issuance of a certificate;
- guidelines: any document that aims to streamline particular processes according to a set routine. By definition, guidelines are not legally binding;
- non-disclosure agreement (NDA): a legal contract between two or more parties that outlines confidential material, knowledge, or information that the parties wish to share with one another for certain purposes, but wish to restrict access to by parties not bound by the contract;
- open access: access online to material that is free for all to read, and possibly to use (or reuse) within certain limits;
- protection profile: an implementation-independent set of security requirements for a category of products that meet the specific security needs of consumers;
- requirement: a singular documented need of what a particular product or service should be or perform;
- remote e-voting: the use of electronic means to cast the vote outside the premises where voting takes place in general;
- sealing: protecting information so that it cannot be used or interpreted without the help of other information or means available only to specific persons or authorities, including through encryption;

- stakeholder: a person, group, organisation, or system that has an impact on, or can be affected by, a government’s or organisation’s actions. These include citizens, election officials, political parties, governments, domestic and international observers, media, academics, (I)NGOs, anti-e-voting organisations and specific e-voting certification bodies;

- standard (legal): refers to provisions contained in Appendix I to Recommendation CM/Rec(2017)5;

- standard (technical): an established norm usually in the form of a formal document that establishes uniform engineering or technical criteria, methods, processes and practices;

- testing: the process of verifying that the system works as expected;

- vote: the expression of the choice of voting option;

- voter: a person who is entitled to cast a vote in a particular election or referendum;

- voting channel: the way by which the voter can cast a vote;

- voting options: the range of possibilities from which a choice can be made through the casting of the vote in an election or referendum;

- voters’ register: a list of persons entitled to vote (electors).

[1] When adopting this recommendation, the Permanent Representative of the Russian Federation indicated that, in accordance with Article 10.2c of the Rules of Procedure for the meetings of the Ministers’ Deputies, he reserved the right of his government to comply or not with the recommendation.
Several countries are already using, or are preparing to introduce mechanical and electronic voting methods. The advantage of these methods becomes apparent when a number of elections are taking place at the same time, even though certain precautions are needed to minimise the risk of fraud, for example by enabling the voter to check his or her vote immediately after casting it. Clearly, with this kind of voting, it is important to ensure that ballot papers are designed in such a way as to avoid confusion. In order to facilitate verification and a recount of votes in the event of an appeal, it may also be provided that a machine could print votes onto ballot papers; these would be placed in a sealed container where they cannot be viewed. Whatever means used should ensure the confidentiality of voting.

Electronic voting methods must be secure and reliable. They are secure if the system can withstand deliberate attack; they are reliable if they can function on their own, irrespective of any shortcomings in the hardware or software. Furthermore, the elector must be able to obtain confirmation of his or her vote and, if necessary, correct it without the secrecy of the ballot being in any way violated.

Furthermore, the system’s transparency must be guaranteed in the sense that it must be possible to check that it is functioning properly.

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Emerging Electronic Voting Standards

National democratic institute

Electoral standards based on public international law are well-elaborated in documents issued by intergovernmental organizations such as the United Nations; the African Union; the Commonwealth; the Council of Europe; including its European Commission for Democracy through Law (the Venice Commission); the European Union; the Organization of American States (OAS); the Organization for Security and Cooperation in Europe (OSCE); and other bodies. These sources illustrate a common understanding of the content of international electoral standards, drawing directly from the wording of Article 21 of the Universal Declaration of Human Rights, Article 25 of the International Covenant on Civil and Political Rights (ICCPR), other articles in those documents related to the exercise of rights that are essential to democratic elections, and other human rights treaties, declarations and instruments. A number of rulings by international tribunals concerning genuine elections and writings of highly-qualified legal experts advance electoral standards in harmony with those sources of law, and the generally-accepted practices of states conducting elections reflect them as well.

The core of these international electoral standards can be defined as the right of citizens, without discrimination, to take part in government and public affairs, directly or indirectly through freely chosen representatives, by exercising their right to vote and to be elected at genuine periodic elections, which shall be by universal and equal suffrage, held by secret ballot and guaranteeing the free expression of the will of the electors. This combines with the right to seek, receive and impart information (i.e., the freedom of expression) about the nature of electoral processes, forming the basis for electoral transparency.

These international electoral standards frame the conditions for using any tools to secure genuine elections, including electronic voting and counting. Because these new technologies for voting and counting fundamentally change the way many components of the electoral process are conducted, the standards demand corresponding new techniques to safeguard electoral integrity and earn public trust in their use. As a result, there have been initiatives in recent years to evolve these international electoral standards in order to cope with the challenges of using voting and counting technologies.

The Council of Europe’s 2004 Recommendation on Legal, Operational and Technical Standards for E-voting did much to set the agenda for this adoption of existing standards for electronic voting and counting technologies. The Council of Europe followed up this document with several other publications, including documents on transparency and certification of e-voting systems. The OSCE’s Office for Democratic Institutions and Human Rights, the OAS, the Carter Center and NDI have approached the issue of standards for electronic voting and counting technologies from the perspective of observing or monitoring elections in which these technologies are used. IFES and International IDEA have also sought to provide guidelines and standards for the implementation of electronic voting and counting technologies by EMBs.

In analyzing the publications by the organizations listed above, it is clear that some trends are emerging in the recommendations about the conduct of elections using electronic voting and counting technologies. Common themes can be seen in the following areas:

**Transparency** – as much of the process as possible should be transparent and verifiable. Effective access should be provided for party/candidate agents and observers in a manner that does not obstruct the electoral process.

**Public Confidence** – closely related to and relying heavily upon transparency is the requirement that voters understand and have confidence in the electronic voting or counting technology being used. Public confidence requires that stakeholders are: involved in the processes of deciding whether to introduce electronic voting and counting technologies and considering the type of system to be introduced; provided information so they understand the technologies being used; given the opportunity to take part in simulations of the systems that take place; allowed to monitor testing, certification and auditing and review findings; and informed well in advance about the introduction, timeline and how to participate.

**Usability** – electronic voting and counting technologies must be easy to understand and use. Stakeholders should be involved in the design of electronic voting and counting technologies and in public testing. Further, electronic voting and counting technologies should endeavor to maximize the accessibility of the voting system for persons with disabilities and minority language groups, and must not disenfranchise others. They must also afford voters the possibility to review and amend their vote before confirmation of their choice.
**System Certification** – electronic voting and counting technologies must be certified by a qualified, independent body before their use and periodically thereafter. This ensures the use of such electronic technologies continues to meet the requirements of the electoral jurisdiction as well as the technical specifications for the system. Further, the certification process should be conducted in a transparent manner providing electoral stakeholders access to information on the process and earning public confidence.

**System Testing** – any electronic voting or counting system should be subjected to a comprehensive range of testing before it is approved for use by an EMB. This testing should take place transparently and with access for electoral competitors and observers.

**System Security** – the opportunities for systematic manipulation of the results mean that system security needs to be taken seriously. Security measures need to ensure that data cannot be lost in the event of a breakdown; only authorized voters can use an electronic voting or counting system; system configuration and results generated can be authenticated; and, only authorized persons are allowed to access electronic voting, counting and results management functionality, although party/candidate agents and observers should be able to monitor the integrity of that functionality. Any intervention that affects the system while electronic voting and/or counting is taking place should be carried out in teams of two, be reported on and be monitored by the electoral authority, party/candidate agents and observers. Attempts to hack into electronic voting and counting machines or the election management system into which results are received need to be detected, reported and protected against.

**Auditability and Recount** – electronic voting and counting technologies must be auditable so it is possible to determine whether they operated correctly. It must be possible to conduct a recount. Such recounts must involve accurate and monitored manual recounts of votes cast electronically (e.g., with the paper record representing the basis for legal determination of the vote cast) and not merely be a repetition of the electronic result already provided.

**Verifiability** – it must also be possible to assure voters their votes are being counted as cast while also ensuring that secrecy of the vote is not compromised. This requires that electronic voting systems create an audit trail which is verifiable. It should provide the voter with a token or code with which to perform the verification. However, the token or code must not allow
the voter to prove to others how they have cast their vote. The most common solution to this for in-person electronic voting machines is through the production of a VVPAT, and this solution is emerging as a standard in this regard. It should be noted that a VVPAT is not appropriate for unsupervised remote electronic voting (e.g. Internet voting, text message voting etc.) as there would be nothing to stop a voter from removing the paper record of the vote, and making vote buying and voter coercion possible.

**Mandatory Audit of Results** – the existence of an audit trail for electronic voting and counting systems achieves little if it is not used to verify that electronic results and the audit trail deliver the same result. A mandatory audit of the results generated by electronic voting or counting technologies should be required by law and take place for a statistically significant random sample of ballots whether or not results are subject to a dispute.

**Secrecy of the Ballot** – the use of electronic voting and counting technologies must comply with the need for secrecy of the ballot. This requirement is not a new standard, but it is one that is made more difficult by electronic voting and counting technologies. This is especially the case for remote electronic voting systems, where voters have to first identify themselves and vote electronically using the same interface.

**Accountability in Vendor Relations** – the EMB needs to remain in control of the relationship with the vendor and ensure the relationship does not violate its own responsibility to be in charge of implementing the electoral process. Any role for the vendor must be clearly defined so the EMB remains in control of the process at all times and remains accountable, should a problem arise.

**Incremental Implementation** – whenever electronic voting and counting technologies are introduced, they should be done so in an incremental manner and should start with less important elections. This will allow public understanding and trust to develop in the new system, and provide time to deal with problems and resistance.

It is too early to say international standards are fully evolved concerning the use of electronic voting and counting technologies. Nevertheless, trends can be seen in emerging electoral standards concerning their adoption. As a means to maintain electoral integrity, these trends in emerging standards should be carefully considered when the adoption of any new technology is deliberated and employed.
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Term Index

A
access control
analysis

B
ballot
ballot box
ballot machine
ballot scanner

C
candidate
central voters’ list
certificate
certification
certification body
code
communication
cooperation

E
e-pen
e-voting
education
election administration
election board
election day
election results
elections
electoral process
electoral standards
electronic data delivery
electronic literacy
electronic signature
electronic voting

I
identification of voters
independent voting
international standards
Internet

M
municipal election commissions

N
network
new technologies

O
optical scanner

R
records
registration of voters
report
revision

S
software

T
technical assistance
training

V
voter
voter's option
voters' list
voting
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was first appointed to the position of Member of the BiH Central Election Commission in 2004. He was re-appointed in 2011. During Local Elections 2008 he was elected President of the BiH Central Election Commission. In 2017, he was the Chairman of the interdepartmental working group for analysis of situation and proposal of modalities for introduction of new technologies into the electoral process in Bosnia and Herzegovina. He participated in several international observation missions for OSCE/ODIHR. As an author or co-author, he published a number of articles, reviews and commentaries in daily and weekly print media.

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is a member of the Electoral process International IDEA Program with focus on trust, transparency and sustainability of electoral ICT and is author of several publications on that topic. He worked for the Council of Europe as an expert for electoral technology on several assignments. Peter Wolf worked on several election assistance programs in different countries, such as Albania, Afghanistan, Bosna and Herzegovina, Democratic Republic of Congo, Iraq and Myanmar. He observed usage of electoral technology as a member of international observation missions for Carter Centre, European Union and OSCE/ODIHR in France, Kazakhstan, Kyrgyzstan, Philippines and Venezuela. He got his master's degree at the University of Technology in Graz.

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a key person in the information technology and information systems security sector in Estonia for many years. He graduated from the Technical University of Tallinn with a master's degree. Since 2013, he has been the Chairman of the Estonian Electronic Polling Commission and from 2002 to 2015 he has worked as a development director for Sertifitseerimiskeskus AS and was responsible for developing applications for personal identity cards in Estonia and other PKI-based services. He is one of the innovators of the "Estonian Identity Card" project (1996), and since 2003 has started work on the e-voting project whose focus was on introducing Internet voting in the Estonian electoral system, which was used throughout the country at 2005 local elections and in the 2007 parliamentary elections. He is a lecturer on European manifestations on information technology system security and a representative of the Estonian government in the various working groups of the European Union.
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graduated at the Faculty of electrical engineering at Sarajevo University (department for automation and electronics) and holds a master's degree. She is currently employed at the BiH Ministry of Communications and Transport as the head of the Department of Informatisation. Previous experience includes: programming of electronic and automated devices, working with databases, working on a telemetry system, programming SCADA software and hardware systems, developing applications for data analysis of civil service, establishing and securing data confidentiality of the FBiH Central Registry of Civil Servants Database, drafting legal and strategic documents in the field of information society etc. She has certificates in the field of programming, security management of electronic information and information systems, managerial skills, e-government, etc.

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Graduated at the Faculty of natural sciences and mathematics in Sarajevo. Currently employed in the Authority Partners Inc. She was employed in IDDEEA agency as a Manager of Department for communications, administration and support from 2007 till 2017, and was working on different projects including the projects on telecommunications networks and implementation of ISO standards. From 2004 to 2007, she worked as a team leader in the State protection and investigation agency SIPA on tasks of network and server infrastructure, administration of LINUX and VoIP servers and other fields of information technologies.

Aleksandar Kapikul

graduated at Faculty of electrical engineering in Podgorica in 2005, and is there on electrical engineering postgraduate studies now. For one period, he worked as an engineer on development of static devices in «Energoinvest» RAOP Istočno Sarajevo. At the moment, he lives in Sarajevo and works in IDDEEA Agency as a WAN network administrator.

Stela Misilo-Šunjić

graduated at Faculty of electrical engineering in Sarajevo, department for automation and electronics, in 1988. She gained her previous experience in Energoinvest company, department for telecommunications techniques, where she worked on development of applicative software for real-time systems. As of 1998, she works in the Ministry of Foreign Affairs BiH, as a Chief of Department for information. As of 2012, she is the Chief of Department for communications and informatics, in the same Ministry.
**Hamdo Kentra**

graduated Military Academy in Bileća. War Disabled Veteran, group I (blind), former officer of Army of RBiH, lieutenant. Owner of Insert Agency, software development agency. One of authors of the following applications: Audio keyboard, Insert translator, speech program *Glas*, Viber accessible to blind persons, etc.

**Mirza Imamović**

is law graduate. Longtime associate of the Municipal election commission Stari Grad Sarajevo, and since 2011 member of the Municipal election commission Stari Grad Sarajevo. As a member of that commission, he participated in a number of projects. Was elected President of the Municipal election commission Stari Grad Sarajevo in 2015. Works as deputy public attorney in the Municipality.

**Sanja Stanimirović Ostojić**

graduated at Law Faculty in Belgrade, worked in the Republic administration for geodetic and property-legal affairs, and later as Chief of Department for administrative-legal affairs in the Ministry of administration and local self-governance in Republika Srpska. She is chairwoman of Vlasenica election commission since 2012. Interested in: elections, democratic standards in elections, normative-legal improvement of electoral system in BiH and introduction of new technologies into the electoral process.

**Fljorina Nulleshi**

graduated at Business economy faculty in Bijeljina. Previous working experience includes working as an interpreter for UN (IPTF), working in NGO sector, on different local and international projects and in *Bobar Autosemberija* d.o.o. company in Bijeljina as an economist. She is a member of Bijeljina City election commission since 12th January 2011.

**Zoran Ranilović**


**Jovičić Darjana**

Degree in information engineering. As of 2006, she works in municipal administration in Rogatica as system administrator. She is a member of Rogatica election commission.
Željko Ćorić

graduated at Faculty of mechanical engineering in Mostar in 1998, title mechanical engineer. Currently works as director of Institute of education in Herzegovina-Neretva Canton. As of 2006, he is a member of the Mostar City municipal election commission. Participated in many trainings and seminars on electoral process, not just like an attendee but as a lecturer as well.

Antonio Vrljić

graduated at Faculty of economy in Mostar in 1982, degree in economics. as of 2010, he is a member of the Mostar City municipal election commission. works in Agency for education and technical improvement of staff within Ministry of security BiH.

Marijan Živković

graduated law at Osijek Law Faculty and passed judicial exam. Currently works as municipal public attorney in Orašje. he was a member of the municipal election commission Orašje at the first democratic elections, and as of 2010 he is the Chairman of the Orašje municipal election commission.

Sadija Subašić

graduated at Law Faculty in Sarajevo. Currently works in Orašje Municipality in the Service for general administration, veterans and social activities. as of 2015, she is a member of the Orašje municipal election commission.

Safet Zahirović

graduated business law. Involved in electoral process since 1996 as a member of Breza municipal election commission until 2008, was chairman of municipal election commission in two election terms. Holds a certificate on successful completion of training of trainers for election committees’ chairman and members.

Hajrudin Huseinović

graduated at Law Faculty in Travnik in 20016, master of law – field of public law. Works as secretary of municipal council in Kalesija since 2000, and as of 2014 he is chairman of the Kalesija municipal election commission.
The primary goal of publishing the publication New technologies in electoral process – challenges and possibilities of application in Bosnia and Herzegovina is to make a contribution to public discussion on necessary need of modernization and digitalization of electoral process in Bosnia and Herzegovina. The development of information and communication technologies significantly affects all areas of life and work and these technologies undoubtedly have significant impact on the elections as well.

Concerning the contents of the publication, I do hope that all interested in application of new information and communication technologies in electoral process in Bosnia and Herzegovina will have something that will intrigue them to more deeply analyze proposed modalities or at least presented ideas and suggestions will serve to them as political leaders, public opinion leaders, and especially as legislators and decision makers to launch necessary processes within decision-making bodies, which should ultimately result in introduction of some of the most advanced technological solutions into the electoral process in Bosnia and Herzegovina.

Dr. Suad Arnautović