World Academy of Science, Engineering and Technology
International Journal of Information and Communication Engineering
Vol:6, No:9, 2012

Elections Management Information Communication SystemVoterBallot

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Abstract—Abovepresented work deals with the new scope of application of information and communication technologies for the improvement of the election process in the biased environment.

We are introducing a new concept of construction of the information-communication system for the election participant. It consists of four main components: Software, Physical Infrastructure, Structured Information and the Trained Stuff.

The Structured Information is the bases of the whole system and is the collection of all possible events (irregularities among them) at the polling stations, which are structured in special templates, forms and integrated in mobile devices.The software represents a package of analytic modules, which operates with the dynamic database. The application of modern communication technologies facilities the immediate exchange of information and of relevant documents between the polling stations and the Server of the participant. No less important is the training of the staff for the proper functioning of the system. The e-training system with various modules should be applied in this respect.

The presented methodology is primarily focused on the election processes in the countries of emerging democracies.It can be regarded as the tool for the monitoring of elections process by the political organization(s) and as one of the instruments to foster the spread of democracy in these countries.

Keywords—ICT, elections, structured information, dynamic databases, e-training

I. INTRODUCTION

THERE are plenty of emerging democracies with biased pre-election environment. The bias as a rule favors the ruling governmental political organization, which takes part in the election. These political organizations often use the governmental and administrative resources. They control media and the central election committee.

International organizations do their best to help to introduce the fairer election environment. They take part in the process of creation of Election Law, they train political organizations and the staff of election committees, send their representatives as the observers to the elections; but these activities are not enough to stop the falsification.

In the tendentious election environment there is always one winner - governmental political organization. The rigged election loose legitimacy in the eyes of other participants as they feel that they have lost votes of their real supporters.

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There is no additional help from the international community.

Participants stand alone in front of the illegitimacy and violence. The attractiveness of democracy decreases and the sense of injustice increases. The tension can erupt into the street violence and instability, demonstrations, massive arrests and punishments; there is a probability even of the military confrontation, which means the failure and destruction of democracy (see e.g. [1], [2]).

We would like to suggest a new scope of application of ICT for the improvement of the election process in the biased environment – *VoterBallot*, the election management information communication system for the participant(s) of election. The system is oriented to: help the participant to manage its election staff and process effectively; prevent falsification; react to the irregularities during the elections. It includes four main components: Software, Physical Infrastructure, Structured Information and the Trained Stuff.

II. SOFTWARE

The software of the system contains: databases, forms (templates), and various analytical programming modules.The main database is a 3-dimensional Matrix with the elements of liner arrays. The lengths of the arrays are not defined in advance. On the Server of the participant and the mirrors there are installed the databases of VoterBallot and analytical programming modules. The Server is located at the office of the participant (mirrors can be installed in various places).

III. PHYSICAL INFRASTRUCTURE

At each polling station there is a trained person - the Representative of the participant, equipped with the set of a mobile device (e.g. Pocket PC) and a remote connection (e.g. Bluetooth) Printer.

All mobile devices are connected through the 3G Internet connection (free of any control) to the Server. Alternatively the Representative may be equipped with one set of satellite phone with extended media functions and a printer. All satellite phones are connected through the satellite Internet connection (free of any control) to the server (see e.g. [3], [4]).

It should be noted that the number of polling stations, denoted here and in the sequel as Q in some countries may reach tens of thousands, indicating the wideness of the physical infrastructure of VoterBallot. e.g. in Russia and UkraineQ $\approx$ 95.000 and Q $\approx$ 32.300 respectively, while in Georgia and Azerbaijan Q $\approx$ 3.000 and Q $\approx$ 6.000 respectively.

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In all mobile devices there are installed special templates, the forms of the Structured Information.

IV. STRUCTURED INFORMATION

Let us consider one of the new democracy countries, where the general elections (parliamentary, presidential, municipal) are planned to be held with Rparticipants– $P_1, P_2, \cdots, P_R$.VoterBallot provides the Structured Information to the participant. This is the collection of all possible events (including irregularities) – $\{E_1, E_2, \cdots, E_N\}$, which may happen at the polling stations. The number of events – N on average is about 300. The events and their quantity may differ in different countries.

Formally the element of the Structured Information is a linear array of the time-depended data related to the given event. The length of array is not defined in advance, and the elements, values of each array can be numbers or text, photo, audio or video filesetc:

$$E_i = [e_{i1}, e_{i2}, \cdots], i = 1, 2, \cdots, N.$$

The structure of each event is uniform with respect to the polling stations, though the actual data in different polling stations may be different. Thus the information related to the event E_i, sent to the Matrix from the q-th polling station as the element of the databaseis labeled additionally by q:

$$E_{iq} \ (i = 1, 2, \cdots, N, q = 1, 2, \cdots, Q).$$

Respectively the values are also labeled:

$$E_{iq} = [e_{iq1}, e_{iq2}, \cdots].$$

Note once more that for a fixed i the structure of E_{iq} is uniform for all q-s, though the actual values, i.e. the valuese$_{iqj}$ in different polling stations may be different.

As mentioned above the data is time-depended that generates the 3-rd dimension of the Matrix.Some events may be adjusted or repeated in time and sent to the Matrix later, at the certain moment of time t. This information should contain a new time label, the index t:

$$E_{iqt} = [e_{iqt1}, e_{iqt2}, \cdots].$$

The system is loaded during the pre-election and post-election periods too, though the main part of information comes on the day of elections.

V.EXAMPLES

For the illustration let us consider some possible events of the Structured Information:

Example 1.Let E_m be the event connected with the count of voters who voted up to 12^{00} o'clock.

In this case E_m is a liner array having only one numerical element:

$$E_m = [e_{m1} = number\ of\ voters].$$

Likewise E_{mq} - the quantity of voters who voted at the q-th polling station up to 12^{00} is also a liner array having only one numerical element:

$$[e_{mq1} = number\ of\ voters\ at q - th\ polling\ station].$$

Example 2.Now, let us consider the event E_k- related to the selection of the group of representatives of the parties, which has to go out of the polling station and collect the votes of disabled people at their living places. This event is conducted during the day of elections simultaneously at every polling station, the number of the representatives and the procedure of selection in this group is defined by the elections law of the given country.

Let us assume that there are l_{rq} $(r = 1, 2, \cdots, R, q = 1, 2, \cdots, Q)$ representatives of P_r at the q-th polling station. Let's assume that according to the local law the total number of the representatives of the "go out" group is defined as l (usually $l = 3, 4$) and the maximum possible number of representatives of each party in this group is 1. Then

$$E_{kq} = [e_{kq1}, e_{kq2}, \cdots, e_{kqR}],$$

where each e_{kqr}equals 0 or 1 and$\sum_{r=1}^{R} e_{kqr} = l$.

Remark. This kind of information may be very important for P_r. As the quantities Q and l_{rq} in the above example are known in advance, the probability estimations of average of total presence of its representatives in these groups can be calculated in forward and compared with the actual trend (see e.g. [5]).Large deviations would mean the possible fraud or the lack of organization of its representatives at the polling stations. Of course statistical analysis should be combined with sociological research as in this example also in any other case as well and the conclusions should be drawn carefully.

As mentioned above, the events, the elements of the Structured Information are sampled and integrated in the forms. These forms are installed in all mobile devices of the VoterBallot staff of the participant. According to these forms the information, collected at the polling stations is sent to the Server.

The content of the Structured Information depends on the Election Law, character of the tendency, population, number of participants etc. It should be designed in collaboration with the participant and the lawyers.

VI. VOTERBALLOT IN WORK

Representatives of VoterBallot collect the Structured Information according to the special forms from all polling stations and send them using the mobile devices to the server through the Internet connection. Information is automatically analyzed. The part becomes public online – database of the server is connected to a special web site of the party.

VoterBallot reacts to some part of information and sends directives or prepared complaints with testimonies back to the mobile device. Complaints are printed and delivered to the committees or are brought to the courts later.

The advantage of the party using VoterBallot:

- Reacts on every event immediately;
- Collected large information data enables to perform various analytic researches (statistical, sociological etc.) as during the elections day in live, which is most important, also before and after the end of the process. In this respect it should be noted that VoterBallot can be additionally equipped with relevant software packages (e.g. statistical, visualization facilities etc.) and the participant is highly recommended to have a scientific personnel for this purpose also.

VII. IMPLEMENTATION OF VOTERBALLOT AND TRAINING OF THE REPRESENTATIVES

The one of the important parts of the project is the trained observers, Representatives equipped with the relevant theoretic and practical knowledge. They should be oriented to the optimal application of the capacities of VoterBallot for the adequate real time decision-making.

The process of implementation of VoterBallot should start several months in advance to the elections day. Large number of the staff, exceeding the quantity of polling stations should be trained and, in addition the training process is limited in time. Thus the application of modern technologies is necessary. In this respect the following *Technology-Enhanced Learning* system is suggested:

1. *Representative's Manual* - containing textual, graphical and video materials
2. *Exam tests*
3. *Web Portal* for the Representatives
4. *Publishing* of Representative's Manual, Exam Tests and other materials on the Web Portal
5. *Registration* of the persons selected by P_r in the database having the status of students
6. *Study* Representative's Manual
7. *Webinars* - every day on the Web Portal; questions to the lecturer
8. *Examination Centers* - established at each regional office
9. *Exams* – assessment of theoretical knowledge and the tests in near to real life situations; the students, who pass the Exam gets the status of Representative

For this purpose the *e-training* system is appropriate. This issue, being wide and important, requires additional research and investigation.

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