

# Some up-to-date Scientific-Theoretical Problems and Solution Perspectives of Forming of Electronic Government

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## ABSTRACT

By considering the international practice, conceptual and architectural principles of forming of electronic government are researched and some suggestions were made. The assessment of monitoring of forming processes of electronic government, intellectual analysis of web-resources, provision of information security, electronic democracy and digital citizen problems were researched, conceptual approaches were suggested. By taking into consideration main principles of electronic government theory, important research directions were specified.

**Keywords:** *Electronic government, public administration, electronic democracy, information security, digital citizen, web-analytics, social networks, Data mining*

## 1. INTRODUCTION

Nowadays, the wide implication of information technologies in developed countries is affecting their social-economic development. The number of citizens, centers, organizations, institutes having access to and using internet for satisfying their needs, is being rapidly increased. In this situation, there is an increasing need for more mobility and interactivity in transparency principles of state services and neutrality principles from political point of view. It is worth to mention that the implication opportunities of political and social technologies in administration is being widened nowadays.

In some sources, 'electronic government' term is used during translation and different definition, especially in the developing countries. As 'electronic government' is currently under construction especially in the developing countries, it has not been fully formed as a definition. As shown in relevant documents, it does not only include the central executive authority, but also includes the three branches of government – executive, legislative and judicial [1-5].

The conducted research show that the definition of implication of electronic government (e-government) is expanded not only as application of information technologies, but also as a tool of administration of public services in the world. Sometimes, citizen relationship management (CRM) systems are considered as a key of success of e-government as indicted in [6, 7]

The forming of national e-governments in post-industrial countries is carried out based on reform of all public administration system. The main objective here is the compliance of public administration with Information society. New public administration contains its substantial clarity, transparency, competition environment, and responsibility for the outcomes of its actions, increase of the role of ethical requirements, and active mutual relationship with civil society. It is essential that, during the use of information-communication technologies (ICT) in public administration, also other factors affecting the

character of socio-political, economic, cultural, mental and government-society relationships are considered.

Nowadays, the governments invest big amounts of money to realisation of e-government projects for further upgrade of services supplied by the government to citizens and reduction of costs in whole world. The governments can increase the efficiency of actions and carry out administrative operations more easily by using ICT. By considering this important fact, the specification of researches in direction of e-government establishment and also the most successful applied models and their research are remarkably necessary.

## 2. THE CONCEPTUAL AND ARCHITECTURAL PRINCIPLES OF E-GOVERNMENT

It is known that e-government has started forming in the cross of two centuries. It is known from history that, each transition to new quality has been accompanied by several complications, sometimes by serious crisis. Following this practice, the government can prevent the possible social-economic crises by modernizing the administrative mechanisms. In this regard, the government is required to conduct some reforms for the transformation to a new phase in public administration. The transition to a new phase necessitates the conduction of important scientific-research works.

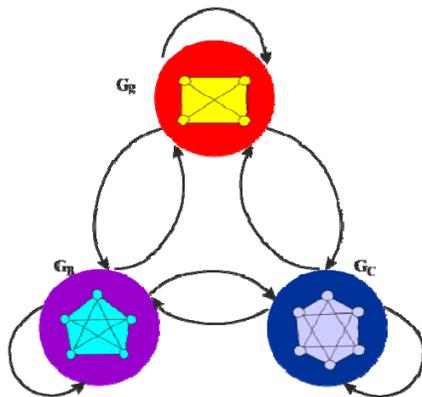
According to "E-government Act" of USA dated 2002, this term was accepted as an expansion of access to government information of agencies and government structures by means of Internet and other information technologies, also as an implication of information technologies and the use for the increase of efficiency [8, 9]. In official documents, electronic government (e-government) is comprehended as a mutual relationship system with information character of local public authorities and the society by using ICT. Gartner reckons that e-government is the concept of administration by incessant optimization of services process, participation of citizens in political processes, also by changing of

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internal and external relations with the help of technical tools, Internet and modern mass media [4, 10].

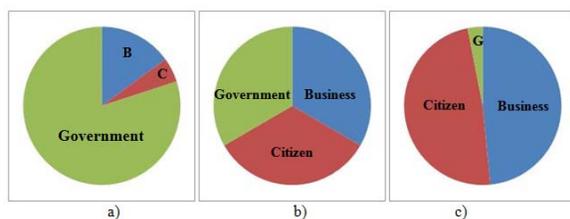
In some research works, “electronic government” term is defined as Internet-technologies providing the informative mutual relationship of public authorities with population and civil society institutions. E-government is specified as an integral, socially responsible enterprise having regular counter-relation and open to information.

In general, e-government is specified as a mutual relationship between specialized complex system of public authorities and citizens, civil society and business structures by means of Internet. As following steps of a mutual relationship, C2B (customer-to-business) – between citizen and business; B2B (business-to-business) – between private companies; G2C (government-to-citizen) – between government services (on government, departments and regions level) and citizens; G2B (government-to-business) – between government and business sectors; G2G (government-to-government) – between public authorities can be shown (Fig.1) [1-5, 11].



**Fig 1:** The conceptual model of E-government

It is worth to mention that the conceptual model of e-government is based on government structure existing in countries of democratic society and market economy (Fig. 2b). If to approach this problem conceptually, the reforms conducted in public administration in the beginning of 90-s showed the larger share of government in forming of e-government (Fig.2a).



**Fig 2:** Evolution model of E-government

Alongside, it must be considered that, the society not only obtains the access to information, but also gets the opportunity to affect the decision-making process of government and participate interactively in the process of preparation of decisions, as a result, the transparency of public sector performance increases.

In general, e-government creates new opportunities for development of democracy. It provides the mutual information relationship between population and civil society institution and public authorities by means of ICT. In other words, e-government comprises the mutual relations system of citizens, civil society and business-structures, and executive government structures by means of Internet. Implication of ICT in government performance, transparency and accessibility of government information, feedback principle between population and public authorities, government responsibility for the decisions made and etc. issues in different countries are the main characteristics specifying e-government.

It is essential that the transformation to Information society, e-government strategy based on democratic values necessitates the gradual change of government model, the increase of share of civil and business structures, minimization of government share (Fig.2c).

According to definition of European Committee, e-government - is the use of ICT in public structures and improvement of performance of government employees and public authorities in the background of realization of organizational reforms and forming of skills directed to the increase of level of services provided by them [12].

According to the concept of e-government, the whole system of public authorities performs as an integral service organization for the provision of services to citizens. The performance of e-government must be clear, transparent and accessible in terms of information for citizens. The specific attention is drawn to establishment of feedback mechanism, efficiency of services provision and execution period by using the centralized systems. These all enable to increase either the quality of provision of services provided by the government to citizens, or the performance efficiency of government.

### 3. THE ISSUES OF ASSESSMENT OF FORMING PROCESSES AND MANAGEMENT OF E-GOVERNMENT

One of the up-to-date issues regarding e-government is the assessment and monitoring of its forming processes. It can be justified with such fact that e-government is an online environment with the quite complicated structure. On the other hand, e-government is the sum of vertically and horizontally interrelated corporative information spaces.

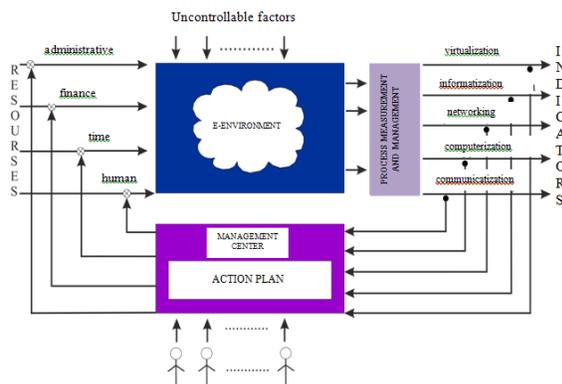
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The issue of establishment of complex indicators system for the monitoring of the efficiency of state governance and the use of ICT in different areas, the methodology of practical implication has been started to forming at the end of 1990's [3, 4, 13, 14]. Nowadays, the existing practical experience and methodical potential for the assessment of electronic readiness, the monitoring, potential analysis and comparative analysis of governments are present. As such methodologies, ICT development index (IDI) of International Telecommunication Union regarding the assessment of Information society, e-government development index of UN regarding the forming and the use of e-government, networked readiness index of World Economic Forum, digital opportunity index, indicators system for the assessment of development level of e-government of European Union countries (Capgemini company) can be shown [15-18].

The implication of international indexes for the development of methods of the assessment and monitoring of e-government forming processes can be considered as an important factor. Also, it can be mentioned that the position of the country in international ratings has a great importance in terms of the position of the country attained in the region. These indicators exhibit the carrying out of development strategy of Information society of the country.

It is worth to mention that, alongside with the assessment and monitoring of digital differences either at national, corporate or at enterprise level; these are the important information for carrying out of expedient management of the forming process of aimed electronic environment (e-environment).

Taking into consideration the necessity of realization of 5 sequential phases (communication, computerization, networking, information, and virtualization) of e-environment forming, the balanced relation must be provided among the separate phases of it. Management centers are the intellectual systems enabling the efficient decision-making bases on the indicators characterizing the progress of the process (Fig.3).



**Fig 3:** The assessment and management scheme of forming process of e-environment

The following can be shown as the indicators characterizing the virtualization, socialization phase in e-environment:

- The indicators characterizing the social networks created in considered e-environment;
- The indicators characterizing the classification and activeness (age, specialty, gender, space, time, etc.) of users;
- Classification and rating indicators of used contents;
- The indicators characterizing the transparency, accessibility and sequences of information in e-environment;
- The indicators characterizing the virtual relations established and contents turning over in e-environment, etc.

It is essential that the solution of several problems (technological, normative-legal base, cadres' education, scientific, etc.) is an important condition. By taking the leading practice into consideration, e-government must be formed based on both horizontal and vertical management principles. From this point of view, each institution included in e-government must have an action plan, the indicators characterizing its plan must be specified the management of this process must be executed and the continuing (or on specific cycles) monitoring must be carried out.

It must be mentioned that, nowadays monitoring and assessment issues has a timely importance for the realization of e-government projects, programs specifically. From this point of view, there is a need for establishment of complex system of assessment and monitoring. The indicators accepted at international level and parameters meeting the local needs must be included in the system itself.

#### 4. INTELLECTUAL ANALYSIS ISSUES OF WEB-RESOURCES PERFORMING IN E-GOVERNMENT ENVIRONMENT

While considering the e-government programs carried out in different countries of the world, it becomes clear that e-government will be more accessible and efficient under the "single window" principle in the near future. This is mainly related to rapid development of content mining methods, web technologies, social networks [18-22]. From this point of view, the analysis of web-resources and development of management mechanisms is of great importance in carrying out the e-government projects.

The implication of web content mining, web-analytics and social networks are strong tools in improvement of e-government management effectiveness and establishment of feedback mechanism. If to consider that one of the main issues in realization of e-government programs are the analysis of web-resources and establishment of the effective management policy, then

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the implication of innovations, new technologies widens the communication capacity significantly. This, in turn, enables to achieve new integration forms between business sector and citizens.

It is clear that web-resource of each institution performing in government sector is created. As a result, web-infrastructure of e-government is formed. Established web-resources creates online interactive social communication environment between public authorities and citizens. More information is gathered in this environment eventually. Thus, new opportunities are created for the intellectual analysis of web-infrastructure and more efficient management of the society.

The internal structure of electronic sodium's existing inside each online environment in disguise can be revealed by applying the social networks theory. The analysis of e-government web-infrastructures, web mining technology can be implied for obtaining the following information [19-21]:

- Which issues are mostly discussed by the citizens;
- The monitoring whether the discussions are related to public sector;
- The classification based on different criteria's (space, time, age, specialty, activeness, etc) of citizens applying mostly to which institutions;
- The online monitoring of realisation status of requirements claimed against web-resources;
- The classification based on different criteria's (countries, institutions, issues, time, etc) of inquiries to web-resources from foreign countries performing in e-government environment, etc.

An effective web analytics of sites, portals and also, sites providing online services to citizens – is revealing existing program, technical, content related errors and adjustment to requests of citizens, and users. By using web-analytics, the reasons for leaving the site by users, their actions, behaviors at web-site regarding a site or particular service can be revealed. It is clear that web-analytics is not limited with particular statistics and enables to obtain more detailed information for analysis. The analysis log-files gathered in servers, information gathered in e-mails play a prominent role in effective decision-making by e-government parties in the process of establishment of online relations between citizens and public authorities [19-22]. This, in turn, enables the development of feedback mechanisms for e-government management.

For the provision of citizen access to public authorities countrywide, the forming of social Internet centers and points infrastructure in settlements is one of the important issues in e-government building. So that, e-government must perform sustainably, be reliable and secured against threats. Namely, information, energy and

etc. security of e-government must be provided and be prepared for information war.

## 5. INFORMATION SECURITY PROVISION ISSUES OF E-GOVERNMENT

As the society is getting informized, the people became more dependent on information. Non-provision of information security can cause major consequences for the society. The priorities of information security in a particular country is specified based on the balanced ratio of government, society and citizens interests. As one of the main components of the safety of society, the duties of information security are the confidentiality of information, information integrity, information accessibility and the fight with harmful computers [23, 24].

The several issues with technical and administrative-legal characters must be solved for carrying out the e-government program. The preparation of mutual relationship regulations, the creation of government services classification, also integral technical architecture, realization of program platform and the provision of information security can be indicated among them.

For the provision of normal performance of e-government, it is necessary to provide the security of each level constituting e-government (Fig.4).

In general, the up-to-date issues in the framework of provision of information security of e-government can be classified as following:

- Development of conceptual-architectural models for provision and management of e-government information security and sustainable performance;
- Development of models for the analysis of information security risks and management;
- Development of cybercrime defenses technologies;
- Revealing the disguised criminal social networks creating threats for e-government environment and development of analysis methods;

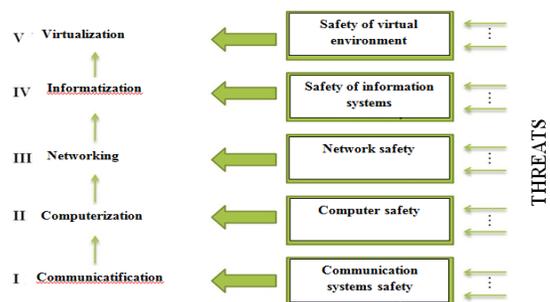


Fig 4: The conceptual model of information security provision of e-government

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- Development of intellectual monitoring system of corporative network environment;
- Development of spam busters methods and algorithms by means of data intellectual analysis technologies;
- Protection of individual information in e-government environment and development of user-oriented security mechanisms;
- The creation of Computer Emergency Response Team (CERT) in e-government;
- Investigation of information war, information attack and information attack defenses technologies and development of new methods and algorithms.
- Electronic voting (voting with mobile phone, Internet-elections, etc);
- Online collective discussion mechanisms of subjects with social-political content and socially important issues;
- The forming mechanisms of online communities, groups, social networks;
- The mechanisms of realisation of citizens' incentives;
- Citizens' control mechanisms on public authorities' performance, etc.

It is worth to mention that complex and systematic approach is required to information security provision issues of e-government. With the development of information society, the necessity of establishment of integral and multilevel nation-wide information security system appears in the process of e-government forming. In general, the forming of Information society perplexes the provision of information security of countries, the increase of immunity, the sole fight against threats of different nature and scale and thus, the forming of global information security environment must be of interest of all countries, civil societies, companies and people.

## 6. ELECTRONIC DEMOCRACY AND DIGITAL CITIZEN ISSUES

Electronic democracy (e-democracy) is considered such organization form of citizens' social-political activity that the wide use of ICT provides the establishment of more effective relations at new level either among citizens, or between citizens and public authorities, civil society and business sector [25, 26]. In other words, for the strengthening of democratic institutions, the expansion of participation of citizens in political activity, the use of ICT constitutes the essence of e-democracy. E-democracy term means the consideration of citizens' thoughts and the engagement of citizens and organizations to political relations and processes. In this phase, the issue of how close the citizens are engaged in social-political processes is characterized with digital citizen problems.

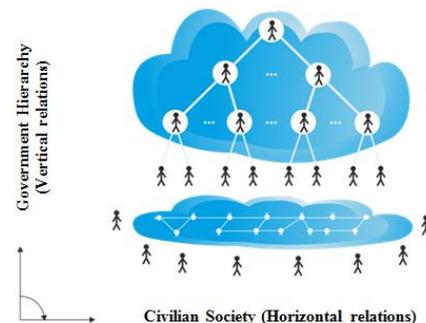
Starting from initial phases of awakening of e-democracy, the provision of access opportunities to socially important information of public authorities by the citizens was constrained by creating of voting opportunities regarding particular decisions of the government [25-27]. The further development has widened the opportunities of both sides, the citizen and the government and close participation of citizens in social-political processes was provided. This meant the establishment of the opportunity of expressing the thoughts by citizens in any level of decision-making and the noteworthy increase of transparency.

The following are related to e-democracy mechanisms [25, 26]:

While the organization of election process in agricultural, industrial societies encounters the major organizational, financial and other problems, there was no alternative of democracy based on quantity for the reasons of information distribution, the difficulty of operative interactive relations between electorate and candidates. In the democracy based on the quantity, the age and the living address of elector was mainly considered, that is, his intellect, the parameters characterizing his way of thinking were not considered. In other words, the votes of electors were not distinguished.

In knowledge society the result of election can be calculated by considering the general intellect (IQ) of electorate and candidates. Hence, the application of privilege of votes of elector with higher intellect coefficient over the elector with lower intellect coefficient is a possible alternative.

It is worth to mention that the government is a bottom-up, multistage superstructure consisting of legal relations system among people (vertical relations system). The civil society a relations system unlimitedly build among people (horizontal relations system). On the assumption of this principle, the internal relations system of the society is described in fig.5.



**Fig 5:** Internal relationships system of the society

Figuratively speaking, the main currency of the democracy is information and communication. In the presence of those, the citizens are self-organized, start to govern themselves and digital citizen is formed. Social networks, blogs and etc. plays a prominent role in forming of civil society. As the civil society, that is, horizontal relations system is being shaped, self-

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governance opportunities (municipalities, NGO's, etc.) are created, that is, it takes some functions of the government. Other functions are carried out by business sector.

Alongside with mentioned above, the transition to Information process does not requires only an automatisation of existing processes in government management, but also their re-building based on particular interests of citizens and a group of interests of the society. Considering those principles, nowadays, the direct e-democracy principles are not sufficiently supported by business sector. E-democracy concept has several inconsistencies and is reasonably criticized. Hence, recently-government concept is dominant in socio-political and scientific literature, which is the basis for carrying out the reforms in government management sphere by means of ICT.

## 7. CONCLUSION

During review of practice of leading countries it is revealed that, existing e-government projects have different objectives and different models, conceptual approaches are suggested by executive institutions, organizations for the development of e-government. By considering this fact, the inspection of research conducted in direction of e-government establishment in international practice is remarkably necessary.

It is clear that, having covered all spheres of the society, the scientific-research works on e-government are timely for several scientific spheres. From this point of view, development of scientific-theoretical principles of forming of e-government is of great importance. By considering the international practice in research, some up-to-date scientific-theoretical problems of forming of e-government has been researched. Some conceptual and architectural principles of e-government shaping were inspected and some suggestions were made. The assessment and monitoring of forming of e-government, intellectual analysis of web-resources and the provision of information security, e-democracy and digital citizen issues were researched, conceptual approaches and solutions were suggested. Important research directions were specified by considering the main principles of e-government theory.

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## REFERENCES

- [1] S.M. Alhomod and M.M. Shafi, Best Practices in E government: A review of Some Innovative Models Proposed in Different Countries, International Journal of Electrical & Computer Sciences, Vol. 12, No 01, 2012, pp. 1-6
- [2] Definition of E-Government, World Bank, 2002, [www.worldbank.org](http://www.worldbank.org)
- [3] M. Yildiz, E-government research: Reviewing the literature, limitations, and ways forward, Government Information Quarterly, 24, 2007, pp. 646-665
- [4] Z. Fang, E-Government in Digital Era: Concept, Practice, and Development, International Journal of The Computer, The Internet and Management, vol. 10, No.2, 2002, pp. 1-22
- [5] R. Heeks, S. Bailur, Analyzing e-government research: Perspectives, philosophies, theories, methods, and practice, Government Information Quarterly, No 24, 2007, pp. 243-265
- [6] M. Vulić, J. Dadić, K. Simić, and et al. CRM e-government services in the cloud, [www.fos.unm.si](http://www.fos.unm.si)
- [7] L.M. Lowery, Developing a Successful E-Government Strategy, <http://unpan1.un.org>
- [8] J.T. Snead, E. Wright, E-government research in the United States, Government Information Quarterly, No 31, 2014, pp. 129-136
- [9] E-Government Act of 2002, USA, [www.gpo.gov](http://www.gpo.gov)
- [10] Gartner company, [www.gartner.com](http://www.gartner.com)
- [11] J. Nograšek, Change Management as a Critical Success Factor in e-Government Implementation, Business systems research journal, Vol.2, No.2, 2011, pp. 1-56
- [12] ICT for Government and Public Services, European Commission, <http://ec.europa.eu>
- [13] D.D. Potnis, Measuring e-Governance as an innovation in the public sector, Government Information Quarterly, 27, 2010, pp. 41-48
- [14] C.E. Koh, V.R. Prybutok, X. Zhang, Measuring e-government readiness, Information & Management, 45, 2008, pp. 540-546
- [15] The United Nations E-Government Survey 2014: E-Government for the Future We Want, [www.unpan.org](http://www.unpan.org)
- [16] Global Information Technology Report 2014, [www.weforum.org](http://www.weforum.org)
- [17] Measuring the Information Society 2012, [www.itu.int](http://www.itu.int)
- [18] eGovernment Benchmark Framework 2012-2015, <http://ec.europa.eu>

<http://www.cisjournal.org>

- [19] A. Kaushik, *Web Analytics 2.0 - The Art of Online Accountability and Science of Customer Centricity*, Wiley Publishing, Inc. 2010, 447 p.
- [20] R.M. Alguliyev, R.M. Aliguliyev, F.F. Yusifov, *Automatic Identification of the Interests of Web Users*, *Automatic Control and Computer Sciences*, 2007, vol. 41, No 6, pp. 320-331
- [21] H. Liu, V. Keselj, *Combined mining of web server logs and web contents for classifying user navigation patterns and predicting users' future requests*. In: *Data and Knowledge Engineering*, vol. 61, No 2, 2007, p. 304-330
- [22] J. Vosecky, Dan Hong, V.Y. Shen, *User identification across multiple social networks*, *Proceedings of First International Conference on Networked Digital Technologies*, 2009, pp. 360 – 365
- [23] *Creation of a global culture of cyber security*, 2002, [www.un.org](http://www.un.org)
- [24] *Global Cyber security Agenda*, 2008, [www.itu.int](http://www.itu.int)
- [25] A.-V. Anttiroiko, *Building Strong E-Democracy - The Role of Technology in Developing Democracy for the Information Age*, *Communications of the ACM* September, vol. 46, No. 9, 2003, pp. 121-128
- [26] A. Meier, *eDemocracy & eGovernment*. Springer-Verlag, Berlin, Heidelberg, 2012
- [27] M. Hilbert, *The Maturing Concept of E-Democracy: From E-Voting and Online Consultations to Democratic Value Out of Jumbled Online Chatter*. In: *Journal of Information Technology & Politics*, vol. 6, 2009, pp. 87–110

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