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**THE FORESIGHT OF NATIONAL ECONOMY'S DIGITAL DEVELOPMENT**

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**Abstract**

The article is devoted to the study of digital society's development in developing economy, on the example of Ukraine. The aim of the article is to research the real situation and to identify further ways of digital development in Ukraine as a developing economy, on the basis of the Foresight technology and opportunities of the Foresight technology to optimize the interaction of public authorities with business and civil society in the digital society. The scientific originality of the article is in the fact that the opportunities of the Foresight use for analyzing and estimating the digital development in conditions of social transformation have been identified. The practical significance of the article is that specific mechanisms and methods for the implementation of the Foresight projects, which can be applied in Ukraine at the regional level, have been determined. The identification of main priorities for the development of digital society in Dnipropetrovsk region of Ukraine became the result of the study.

**Keywords**

Foresight – Digital – Information society – National economy – Development



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## Introduction

The transformation of the information society into the digital one is a common background to all social processes, taking place in the modern world. The expectations of the next world crisis, developing according to the cycles of Kondratiev's Long Waves, are becoming clear now. Digital technologies and artificial intelligence systems help to understand the changes in the technological base. Such changes will become the basis of a structural crisis that will bring humankind to a new level of development. As the history of the past Long Wave cycles shows, these processes are the most painful for countries that are currently in a state of transformation. That is, those countries that have not reached the level of the developed countries yet. In our opinion, Ukraine is in such condition now. On the one hand, the transition from the Soviet system to the free market continues, and, on the other hand, new and instable information technologies are being actively turned into the digital ones. Accordingly, there are "gaps" in one vector and in another. An outdated industrial and agricultural base must operate in a market environment, and this leads to the transformation of the economy into a world trade's commodity appendage. The newest digital technologies have some slight potential opportunity to be developed in main Ukrainian cities, but they stumble upon the lack of access to the high-speed Internet in rural areas. This sharpens both the already existing digital divide of the whole country in the world and influences the gap between regions inside the country.

That's why, it is actual for Ukraine, being a developing economy, to determine the latest innovative technologies and management systems that can address the new challenges of digital development adequately. The Foresight is one of such technologies of future digital design technologies, which can consider opportunities of digital development.

First, it should be noted that the understanding of future both for the individual and society is not less important than knowing the past. Investigation of the future took different forms in different historical eras, evolving from ancient prophecies to the futurology of the twentieth century and scientific prognostics of the twenty-first century. The Foresight, having combined the best ideas of the forecasting and strategic planning, has become one of the most effective technologies for designing the development of the society today. But the Foresight is based not on the past, it is based on the future. This is exactly that principle of thinking, which is used in the process of transformation of the information society into the digital one. The latest scientific and technological revolution has created all conditions for the transition to digital methods of society management, forming and designing its future.

The Foresight idea actively entered the scientific papers of researchers of problems of forecasting and social development planning in the late XX - early XXI century. Significant contributions to the development of the Foresight theory was made by Cuosa, Keenan, Popper, Miles, Butter, Habegger, Gainutdinova<sup>1</sup>.

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<sup>1</sup> T. Cuosa, Practicing strategic foresight in government. The cases of Finland, Singapore and European Union (Singapore: S. Rajaratnam Studies, 2011); R. Popper; M. Keenan; I. Miles; M. Butter and G. Sainz, Global Mapping Report 2007, European Foresight Monitoring Network report to the EC. 2007; B. Habegger, "Strategic foresight in public policy: reviewing the experiences of the UK, Singapore and the Netherlands", Futures num 42 (2010): 49-58 y L. Gainutdinova, "Global government and civil society", Public Administration Aspects num 6 (2018): 48-55.

It should be noted that there were not only European and North American scientists, but also representatives of Russia, Japan and other countries of Southeast Asia.

The Foresight technology is just beginning to be used in Ukraine, but it is becoming more and more popular every year. Researches in this sphere address both the "classic" Foresight problems of the methodology of the future's research and the issues of the Foresight application at the level of regions and communities<sup>2</sup>.

In 2018, the foreign professionals were engaged to this issue. The "Ukraine's Foresight. Four scenarios for Ukraine's development" was conducted by the F. Ebert Foundation. In the research foreign experts gave their vision on Ukraine's ways of development against the crisis of international dialogue with Russia. The executors of this Foresight project used the scenario approach for the identification of key factors that may affect Ukraine's future<sup>3</sup>. It should be noted that even then the development of digital technologies was identified as one of the key factors for Ukraine's successful future.

The aim of the article is to research the real situation and to identify further ways of digital development in Ukraine as a developing economy, on the basis of the Foresight technology. Also, the aim of the article is to outline the advantages and opportunities of the Foresight technology to optimize the interaction of public authorities with business and civil society in the digital society.

The sources of information for the study were:

- analysis of public information on the state of development of the digital economy and access to high-speed Internet in cities and communities of Dnipropetrovsk region of Ukraine
- the results of an expert survey on determination of the e-readiness of local executive authorities and local self-government bodies for the perspectives of digital development, also in Dnipropetrovsk region of Ukraine.

### **Analysis of recent research and publications**

For the first time, the term "foresight" was used in 1932 by Herbert Wells, the science fiction writer<sup>4</sup>. As a technology of the practical application of the reasoned forecasting and future designing, the Foresight was developed and applied firstly in the military sphere and only later became a technology in the sphere of social development. All leading countries in Europe, Southeast Asia, Japan and the USA show numerous examples of Foresights implementations<sup>5</sup>.

<sup>2</sup> P. Sukhorolskyi, I. and Sukhorolska, "Futures studies: main stages of development and tasks in the modern world", Grani num 21(2018): 116-123; T. Kravchenko, "Expediency of the use of foresight methods in the development of Unified complex strategy of agriculture and rural area development for the years 2015-2020", Public Administration Aspects num 3 (2015): 121-128 y M. Tsedik, "Perspectives of regional foresight implementation in the system of public administration of Ukraine", Public Administration Aspects num 4 (2016): 94-100

<sup>3</sup> S. Samuel, R. Krumm, and S. Weiss, Foresight Ukraine. Four scenarios for Ukraine's development (Vienna: Friedrich Ebert, 2018).

<sup>4</sup> H. G. Wells, Wanted – Professors of Foresight! Aired by the BBC on 19 November, 1932.

<sup>5</sup> L. Gokhberg, Indicators for Science, Technology and Innovation on the Crossroad to Foresight. In Science, Technology and Innovation Policy for the Future — Potentials and Limits of Foresight

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The Foresight has gradually become one of the most effective tools of the innovative formation of the society. Since the 1990s, the Foresight is being used actively in developed countries in the public administration as well as during the development of strategies, projects and programs for regional and local government<sup>6</sup>.

Paying attention to the number of the Foresight definitions and using them as a basis, we will try to outline our point of view. So, the Foresight is seen as a process aimed at defining a possible future, creating its desired image and building a "road map" for its achievement. It is a kind of combination of "product" (predictions, scenarios, priorities) and "process" (networking of all interested sides). The Foresight should contribute not only to studying the future, but also to achieving the consensus in the society through a constructive dialogue between politicians, the public, experts and business representatives.

The Foresight can also be defined as a special technology, which forms the development priorities for the different spheres of society. Its aim is to mobilize as many participants as possible in order to achieve a brand new results in the real future with the help of digital technologies. In this regard, there is nothing better for studying and solving issues of the digital development than the Foresight.

## Results And Discussion

The Foresight involves the participation of many interested sides (stakeholders) – representatives of different segments of society, not only in the formation of the picture of future, but also their engagement into active actions on implementation the changes they predict.

It should be highlighted that there are three participants in such social interaction – the government, business and civil society. Today's realities show that civil society on the territory of the republics of the former USSR is still rather weak, it is only in a state of development and formation. That's why, the civil society can't act as a full partner of the government and business yet. Meanwhile, the development of cooperation between the government and business, together with the influence of global civil society, contributes objectively to the emergence of the civil society<sup>7</sup>. Experts, being one of the most important components of the study, are involved directly in the Foresight implementation process. They have the necessary feeling on measures of preventative influence and are ready to use adequately the resources they have.

The Foresight is not a method, but a technology that incorporates methods, developed within various scientific spheres. It is a set of tools that allow predicting actively the problems of future and influencing it through reconciling the particular interests of different segments of society.

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Studies, Ed. D. Meissner, L. Gokhberg, A. Sokolov, 257-288. Heidelberg (New York: Dordrecht / London: Springer, 2013).

<sup>6</sup> T. Cuosa, Practicing strategic foresight in government. The cases of Finland, Singapore and European Union (Singapore: S. Rajaratnam Studies, 2011).

<sup>7</sup> L. Gainutdinova, "Global government and civil society", Public Administration Aspects num 6 (2018): 48-55.

Predictions are usually made by a narrow range of experts and in most cases are associated with the forecasting of unmanaged events. But the Foresight is about assessing the possible perspectives of the innovative development, which are connected with the science and technology progress. Together with this, the possible technological horizons are outlined. These horizons can be reached by investments of certain funds by the authorities and business in order to get possible effects in the socio-economic development of the country, region, community, and business structures<sup>8</sup>.

Unlike forecasts, the Foresight always means intensive mutual discussions and surveys of certain populations groups, which are interested directly in addressing issues that need to be solved during the Foresight project. This means that the difference of the Foresight from traditional forecasts and programs of socio-economic development is in its focus on the development of practical steps, aimed at the achievement of the selected strategic guidelines. At the same time, the special attention is paid to reaching consensus among the main "players" on the most important strategic directions of development by organizing their constant dialogue.

That is why, finally, not only the result but also the process of its obtaining is important in the Foresight. The predictions become active elements of the future's formation only together with the concentration of efforts of the transformation process's participants and the coherence of their actions<sup>9</sup>.

### **The Foresight's methodology**

The methodology of each particular Foresight is determined always on the basis of the objectives of the project and its scope. The sets of methods and tools, used in the Foresight, are numerous and various. On the one hand, we have methods of quantitative estimation of existing trends and their consequences, using the specially designed models and computers usually. On the other hand, and it is the largest group, these are methods, based on expert knowledge, on the formation of special procedures and techniques of work with experts. By its essence, the Foresight is a system of methods for expert assessment of strategic directions of socio-economic and innovative development, the identification of technological breakthroughs that can influence the development of society in the medium- and long-term perspective<sup>10</sup>.

Among the most commonly used Foresight methods are: Delphi method, critical technology definition, scenario development, expert panels.

#### *Delphi Method*

The Delphi Method was developed in the 1950s-60s by the RAND Corporation during the research of perspectives of the military complex development, and in the 70s it was used already in technological forecasting and corporate strategic planning.

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<sup>8</sup> K. Nazarova, V.; Hordopolov; T. Kopotiienko; V. Miniallo; V. Koval and Y. Diachenko, "Audit in the state economic security system", Management Theory and Studies for Rural Business and Infrastructure Development num 41 (2019): 419-430.

<sup>9</sup> S. Kvitka, "Foresight in Public Administration: Methods and Perspectives..."

<sup>10</sup> R. Popper, M. Keenan, I. Miles, M. Butter, and G. Sainz, Global Mapping Report 2007, European Foresight Monitoring Network report to the EC. 2007.

The main difference between this method and the usual expert surveys is that the feedback should be provided back to experts. The Delphi method requires not a single one-on-one polling, but at least two iterations of a survey for the same group of experts (the classic Delphi variant is characterized by 3 to 8 iterations). In the following rounds, in addition to the same set of questions, respondents get the generalized survey results, which were obtained in the previous stages. Ideally, experts should be informed about the validity of certain judgments, especially if opinions are extreme or extraordinary. Thus, feedback and empowerment of respondents to adjust their estimates accordingly to others is aimed at encouraging information sharing and showing each individual expert how different their estimates and expectations are from others. In addition, surveys anonymity aims to reduce the impact of the most active or reputable experts on the individual ratings of other panel members<sup>11</sup>.

### *Critical technologies.*

The term “critical technologies” originates from the so-called critical materials. In the mid-twentieth century, there was the term for the equipment and raw materials that were not manufactured in the United States but were necessary for the effective functioning of the armed forces. It was believed that the country should have a five-year reserve of such critically important materials in the event of possible military conflicts. In this context, the literal translation from the English word "critical" is "badly needed, deficit". Due to some translation peculiarities, the term "key technologies" is used in some countries. Nowadays this term refers clearly the digital technologies and, as an example, the mobile internet 5G.

### *Method of scenario development*

The method of scenario development is effective as an addition to researches done by other methods. The most common is the practice of creation of “top-to-down” scenarios. It is based on an analysis of future opportunities and alternative development trajectories of their achievement. In the context of the Foresight conduction, this is a way of presenting a possible future in the form of a "dramatic" scenario.

Scenarios may include a diachronic element, that is, to use a description of the factors that have influenced the development of the situation in the past. They may also be synchronous: in this case the future way of events' development is connected only with the description of the current situation. In this case, having a schematic representation of the future situation as a starting material, the starting situation is restored, and the ways of its development are constructed retrospectively.

It is worth emphasizing that in the process of the transformation of informational society into the digital one, the Foresight technology is developing also. It is being constantly updated with new tools, especially those related to the development of digital technologies. This includes the conduction of Delphi expert surveys using the latest Google Form platforms and tools.

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<sup>11</sup> V Kryvoshein, “Delphi as the basic foresight technology of the science of socio-political risks”, Grani num 20 (2017): 57-64.



### *Road maps*

Roadmaps are the result of the Foresight. They are an official document, where the ways of object's development are outlined and the appropriate steps to achieve the necessary parameters in the future are described. On their basis, the development strategies are formed, and long-term priorities are identified. In fact, roadmaps suggest an already set future with a detailed description of main stages and practically possible mechanisms (ways) of achieving it. Thus, they are the one of the key tools for the purposeful activity of stakeholders that represent power and business.

In such case, roadmaps perform several functions:

1. Allow forming a unified and coherent orientation space according to the future of the country (industry, region, city, etc.).
2. Serve as a basis for creating strategies and development goals.
3. Are the basis for making important decisions in problematic and conflict situations of the interaction between government and business.
4. Allow coordinating the political activities and, accordingly, encouraging different actions of different players of political and economic space.

Technologically, road maps are also designed to develop a visual representation of the medium-term development strategy. So, to speak, if we know where we want to go or what we want to achieve - our job is to answer the question – what is the best way to get it?

### **The Foresight at local and regional level**

In Ukraine the situation with the introduction of the Foresight at the national level is significantly complicated by the existence of established "oligarchic" relations of the authorities with big business. The big business is interested in keeping the maximum possible status quo in order to ensure its monopoly control in the relevant fields of production and services. The situation here can change only in the conditions of "liberation" of the state from the "support" of oligarchic capital and transition of "virtual" economy into the real existence.

Meanwhile, though the above-mentioned problems exist both at the local and regional levels, they still provide some space for the initiative and implementation of the latest digital forms of the cross-sectoral interaction. This includes the opportunities for conducting Foresights of the territorial development.

Also, the important factor is that the united territorial communities are being formed (UTC) within the framework of the decentralization reform in Ukraine. They start their work from scratch, from blank paper. In these circumstances, the parties, interested in the development of UTC, can determine the guidelines for the further development of the community. By the experience of attempts to use the fast Foresight in Zelenodolsk and Peschansky UTCs of Dnipropetrovsk region, such stakeholders were, first of all, representatives of local business, employees of local educational and health institutions,

active members of sports and cultural public organizations<sup>12</sup>. The initiator and active promoter of the Foresight is the top management of executive bodies of local government, and the brake, oddly enough, is the deputy corps.

According to the results of the study described below, the same communities have the highest level of progress in digital development and the highest activity of local self-government bodies in the implementation of the e-government.

Also, the access to the network is considered by experts to become more and more important as an indicator of “civilization” of the place of residence. More and more modern young people are becoming “network” people. For them, mostly, there is no difference where they live if they have full access to the World Wide Web.

### **The determination of the perspectives of the digital society development in Dnipropetrovsk region**

The investigation was conducted by the professionals of Dnipropetrovsk Regional Institute of Public Administration of the National Academy of Public Administration under the President of Ukraine under the creation of the regional program “Electronic Dnipropetrovsk region” for 2020 - 2022 years by a remote method. This investigation included an expert survey of 554 persons who represented the authorities, business, science and the public.

The Foresight results given below, made it possible to include significant aspects of public administration digitization to Dnipropetrovsk Region Electronic Informatization Program for 2020 - 2022<sup>13</sup>. In fact, the draft program of Dnipropetrovsk Regional Council, which was submitted for approval in October 2019, is a roadmap for the implementation of the idea of digital society in the region. This program will correspond to world standards, and it takes into account the interaction of government, business and educational institutions<sup>14</sup>.

The following digital development indices, defined by the International Telecommunication Union and other specialized UN units, were taken as the basis of the research:

- ICT development index (2017) - Internet access, digital inequality issues<sup>15</sup>.

- E-Government Development Index (2018) - Information and Communication Structure and Document Management<sup>16</sup>.

<sup>12</sup> S. Bodnar; I. Mirkovich and V. Koval, “Human capital development in Ukrainian education system by means of language integrated teaching”, *Dilemas contemporaneos-educacion politica y valores* num 7 (2019).

<sup>13</sup> Dnipropetrovsk Region Council, Regional program of informatization, <https://oblrada.dp.gov.ua> (accessed November 21, 2019).

<sup>14</sup> S. Kvitka; G. Starushenko; V. Koval; H. Deforz and O. Prokopenko, “Marketing of Ukrainian higher educational institutions representation based on modeling of Webometrics Ranking”, *Marketing and Management of Innovations* num 3 (2019): 60-72

<sup>15</sup> ICT development index, <https://www.itu.int/net4/ITU-D/idi/2017/index.html> (accessed November 21, 2019).

<sup>16</sup> E-Government Development Index, <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2018> (accessed November 18, 2019).

- E-Participation Index (2018)<sup>17</sup>.

The Delphi survey questionnaire was designed based on the results of a preliminary analysis of the condition of "informatization" in the region. The experts were asked to answer questions about the level of development of the digital society of Dnipropetrovsk region by the following estimates:

1 - not important / not possible / very low level

2 - little important / little likely / low level

3 - important to some extent / possible to some extent / medium level

4 - important / possible / high level

5 - very important / very likely / very high level

0 - difficult to answer

The generalized results of the study are given in table 1.

LEVEL OF DEVELOPMENT OF INFORMATION AND COMMUNICATIVE STRUCTURE						
Score						
Quality of the Internet access	0,6%	0,6%	4,5%	21,2%	35,8%	37,4%
Quality of Internet-providers' services	0,0%	1,7%	6,2%	31,3%	43,6%	17,3%
Quality of 3G/4G mobile internet services	0,0%	1,7%	8,4%	38,0%	36,3%	13,4%
Degree of informational systems' protection	7,8%	8,4%	15,6%	43,6%	18,4%	6,2%
Degree of cyber-threats	7,3%	3,4%	15,6%	24,0%	28,5%	21,2%
Degree of software piracy	7,8%	3,9%	8,9%	22,9%	25,1%	31,3%
Degree of enterprises and organizations' innovation activity in the sphere of digital technologies	5,0%	7,3%	20,7%	43,6%	19,6%	3,9%
Necessity to implement the "cloud" technologies	3,4%	2,2%	6,1%	16,8%	27,4%	44,1%
THE LEVEL OF THE E-DEMOCRACY						
Degree of use of information technologies by the population	0,6%	6,1%	13,4%	43,6%	29,1%	7,3%
Readiness of the population to get electronic services	1,1%	7,8%	16,2%	46,9%	21,8%	6,1%
Readiness of the authorities for electronic communication with the public	2,8%	10,1%	21,2%	36,9%	20,1%	8,9%
Degree of awareness and readiness of the population to use elements of e-democracy and governmental information resources	3,4%	10,6%	28,5%	43,6%	11,7%	2,2%
Transparency and accessibility of information on the activities of public authorities	1,1%	11,2%	16,2%	33,0%	29,1%	9,5%
Need for school training for young people on the use of the e-democracy tools	0,6%	0,0%	2,8%	7,3%	14,5%	74,9%

<sup>17</sup> E-Participation Index, <https://publicadministration.un.org/egovkb/en-us/About/Overview/E-Participation-Index> (accessed November 21, 2019).

LEVEL OF THE E-GOVERNMENT DEVELOPMENT						
Degree of e-government development in general	2,2%	6,1%	19,0%	43,0%	26,3%	3,4%
Quality of the site of the authority	2,8%	3,4%	10,1%	30,2%	39,1%	14,5%
Quality of provision of electronic administrative services	5,0%	6,1%	15,1%	35,2%	30,7%	7,8%
Quality of e-procurement system	8,9%	5,0%	11,7%	35,2%	29,1%	10,1%
Degree of use of electronic document flow (including electronic signature)	2,2%	11,2%	15,6%	36,3%	25,7%	8,9%

Table 1

Estimation of the e-readiness of districts, cities and UTCs of Dnipropetrovsk region

## Conclusions

The Foresight research allowed suggesting a number of conclusions regarding the digital development of one of the most industrial regions of Ukraine<sup>18</sup>. The peculiarity of the research became the fact that there were more than 29% of business representatives and 30% of representatives of civil society institutions among the experts. Other experts were representatives of public authorities and budgetary institutions. This provided a qualitative presentation of different opinions and, accordingly, a synergistic effect of the intersectoral interaction.

According to data of Table 1. by experts' opinions, the level of Internet access in Dnipropetrovsk region is at a rather low level, although it is a bit higher than the index of the International Telecommunication Union for the whole country. At the same time, the level of the information security is poor. One can even say that cyber threats are an urgent problem in Ukraine. The same applies to assessing the level of the digital piracy. Too high figures indicate a clear shortcoming on the part of the authorities to end such criminal practice.

The level of the e-democracy in any country is linked closely to the characteristics of traditional democracy and, above all, to the peculiarities of the rule of law and civil society. Taking into account the development of these two factors, Ukraine keeps a very middle place in the world ranking. These is reflected also by the results of the research. At the same time, the great demand and willingness for the e-democracy from the population side should be mentioned.

E-Government in Ukraine is developing actively during the last 4 years. It happened mostly thank to international grants. Meanwhile, during 2 years from 2016 to 2018, Ukraine's international rating dropped by 20 points. No clear explanation for this situation has been given yet. According to all expectations of specialists, counting the high volume of advancement of digital technologies, it should be the opposite. Perhaps this is correlated somehow with the general assessment of country's public authority corruption and it influences directly the attitude to the e-gov. The results of this study have rather raised a number of questions, which need further research, than gave a clear vision of ways to solve the described problems. It can be said that the Foresight as a modern technology for designing and programming the future has necessary methods and tools for creating strategies and projects of the socio-economic development in conditions of digital society development. Such examples are shown by countries with the developed democracy.

<sup>18</sup> Electronic Dnipropetrovsk region 2020-2022, Retrieved from <https://rpi2020-22.dp.gov.ua/storage/app/sites/70/dridu/result%20ex.pdf> (accessed November 21, 2019).

The Foresight's core is based on the powerful potential of a synergistic model of the cross-sectoral engagement and the combination of efforts of various political and economic players, aimed at the achievement of clearly defined and really possible parameters of the social development<sup>19</sup>.

The use of the Foresight technology opens for public administration new opportunities to reach political consensus and cross-sectoral consent in Ukrainian society.

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