# CONDITION OF APPLICATION OF INFORMATION TECHNOLOGY IN SCIENTIFIC ACTIVITY

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In current conditions, transition to information society (IS) based on knowledge economy alongside with other fields, sets important missions and purposes in scientific activity. In ANAS Institute of Information Technology under relevant "electron science" (e – science) program researches are conducted in this direction [1, 2]. The purposes of "e – science" is to develop science in accordance with modern requirements, to improve scientific administration, large application of information technologies (IT) in scientific institutes of the Republic, formation of a single national scientific information space, provision of information security and in such a manner to achieve close relations among scientific organizations, collectives and scientists, to raise efficiency of scientific administration and researches, develop all fields of science in accordance with the modern world standards level and integrate to world science space.

Formation of IS, knowledge economy, application of IT to different fields of human activity requires the assessment of quality and quantity of its development level and dynamics. Therefore, for development and realization of "e – science" program project, it's required to conduct monitoring of conditions related to IT application in activity of scientific institutes of the Republic.

The article is dedicated to organization and realization problems of monitoring for the purpose of researching of modern IT application in activity of scientific institutes of the Republic. Monitoring of IT application includes observation, assessment, and analysis of current situation, suggestions of development forecasting and development of alternatives. Application situation and development indicators of ICT are determined based on initial data obtained from statistical information. Monitoring results reflect a set of numbers obtained from indicators processing that adequately illustrates application conditions and development of ICT. The suggestions are prepared in relevance with monitoring results for informatization of a scientific field.

From the end of 1990's, in different countries scientific researches related to issues of creation and application of indicators system that allows identifying the development level of IT are conducted. As a result of those researches, the following requirements can be formed for indicators systems that assess ICT application from different aspects:

- the main requirement is consideration of factors and conditions, which IC formation depends on;
- indicators should be transparent and accessible for conduction of reports and estimation of values;
- it is important that indicators are relevant and comparable to different measure conditions and application to different fields.

Only collective realization of these requirements allows creating a universal indicators system, which can be used in international scale and provide the quantitative characterization of IC development for specialists. Using this, it is possible to objectively assess and compare current situation in every country in the world independently from the level of development [3].

In 2002, UNESCO Statistics Institute and its Science and Politics Analysis Department jointly conducted an international consulting regarding determination of requirement for statistical information about use of IT in priority preparation issues and scientific – research activity while conducting policy in science and mechanics field. It was admitted that despite the efforts of international organizations, there are no worldwide statistic data that can be compared in ICT use in science and technology. The importance of broadening of researches in this direction was mentioned [4].

In modern world, several indicators and index systems are developed for realization of comparable analysis in IS, knowledge economy and IT application direction in different countries. Usually, three important indicators systems such as technological provision, communication transparency indicators and IC index are indicated in the literature [3].

The purpose of technological provision indicator is to estimate the development conditions of IT in different countries. That indicator covers special five widespread indicators which cover widely used technological tools: personal computers, mobile phones, Internet, faxes and television sets. With the help of special statistic methods the general variation source existing in every indicator is determined.

Communication transparency indicator is appointed to estimate ICT use level in interrelation processes among population, business, enterprisers and government categories, as well as in every category sphere. This indicators system can be used for estimation of progression direction in transition of country to electronic state; therefore it's sometimes named as administration transparency indicator.

IS index estimates national information capacity and information capital. The main goals of IS index is to assist to the countries to estimate their situation in comparison with other countries and transit to perspective markets. This index is used in different countries and economy fields while analyzing IT development. 23 variables are considered in Index and they are divided into four groups such as computer, information, Internet and social infrastructures.

As a rule, in several countries of the world, monitoring of readiness for IS is realized with the support of international programs, especially with support of "Information for Development (InfoDev)" program of World Bank. In these projects, the methods which can provide obtaining of comparable results and are known internationally are used. One of these methods is "Readiness for the Networked world: Guide for developing countries" project suggested by International Development Center of Harvard University. Based on this method, 19 indicators are chosen and grouped in five groups such as information infrastructure, training by using IT, network economy, network society, government informatization policy.

In 2000, Institute of IS Development (IISD, Moscow) conducted "Readiness of Russia for Information Society" research based on Harvard method. In this method 8 fields were chosen, which were divided into groups such as electron development factors (access to IT, human capital, business sphere and environmental regulation) and fields of IT use (education, electron business, electron state and culture). Human capital, business – climate and IT use in culture fields were added to five basic fields indicated in Harvard method [5]. In 2003, ICII repeated this research and as a result prepared and published an analytic report [6]. With several changes, this method is used for realization of several analytic projects under "Electronic Moscow in 2003 – 2007" program by IISD.

Within the framework of "Knowledge for Development – K4D" program conducted by World Bank in 2004, an interesting approach to assessment of economy based on knowledge was proposed [7]. The Knowledge Assessment Methodology of the Program assess the preparation for transfer to a development model based on knowledge of one or another country 76 indicators allowing to compare individual indicators of different countries, as well as average indicators characterizing country groups are proposed.

"World Telecommunication/ICT Development Report 2006: Measuring ICT for social and economic development" prepared for World Telecommunications Development Conference – 2006 has reviewed specific issues for measuring and assessment of effect of ICT [8]. It has been emphasized in the report that, lack of comprehensive, operative and useful data are the main obstacles for comparison during IS status and development analysis for determination of objectives and making political decisions. For this objective, it has been determined to continue the progress and structuralized approach to IT indicators in global, developed countries. In order to solve these problems ITU, OESD, UNSTAD, UIS, 4 committees of UN (ECA, ECLAC, ESCAP, and ESCWA), International Bank and other national statistics offices have jointly developed "Cooperation for assessment of ICT for development" for serving open international base [9]. This versatile initiative has set an objective of development, accumulation and

distribution of indicators relevant on a global scale. One of main achievements of the cooperation is determination of key list of IT indicators. This list was accepted in 2005 and approved by UN Statistics committee and its long-term improvement is considered. This list covers indicators regarding IT access and use of infrastructure, population, housekeeping and institutions, as well as some economical and business indicators in ICT sector.

Alongside with reviewed indicator systems, there are several existing indicators developed by different international institutions (UNESCO, European Council, Economical Cooperation and Development Organization etc) within the framework of statistic research program in education, culture, communications fields. As a rule, these indicator systems are developed for certain objectives of one or another project.

Taking the above mentioned as a basis, initial monitoring of IT application conditions in activity of scientific institutions within the framework of "e-science" program are carried out based on three groups of indicators covering computer and network infrastructures, internet infrastructure, electronic information resources and their functional directions. First group covers indicators such as the number of computers, employees capable of working on computers, existence of inter-organizational networks (local, corporate, Intranet etc), second group covers number of computers connected to Internet, Internet indicators, number of Internet users, number of employee with e-mail addresses and web-sites, existence of e-mail addresses and web-sites of individual organizations etc, and third group covers use of IT in scientific-research processes, existence of e-libraries, e-magazines and other electronic resources.

Within the framework of "e-science" program, including institutes of ANAS of the Republic of Azerbaijan, 150 scientific organizations have conducted monitoring for researching and assessment of existing condition of IT application conditions. For this purpose, a special questionnaire based on special indicators characterizing ICT application condition in scientific institutions and covering abovementioned three groups was prepared and sent to those institutions. It is considered to perform functions such as submittal into data bases, editing, search, archiving of information from questionnaires as well as preparation of statistical, dynamic reports and forecasting in projected monitoring information system (MIS). Reports can be submitted in accordance with any organization or structure (i.e. for ANAS, ANAS-Presidium-departments-institutes). Exploitation of the system in stationary and in SciNet corporate network is considered. In first case, statically collected questionnaires can be submitted into the information system from one workstation, and in second case information is submitted from the workstation of each directly territorially distributed scientific institution through network environment.

On July 01, 2009, information submitted from organization was entered into MIS data base and necessary processing works were performed. Reports were grouped in three directions such as ANAS, Field SR Institutes, Higher Education Institutions; reports were conducted individually by those groups and generally on Republic level. For example, the results for main scientific institution of the country – ANAS are as following: availability of official e-mail addresses in organizations – 78%, availability of official web-sites – 32%, availability of official web site – 32%, availability of electronic library – 22%, availability of magazines with web-sites – 24%, availability of devices for conduction of on-line researches – 19%, availability of IS and resources – 46%, as well as, number of computers in that organization per 100 employees – 16, number of computer equipment – 13, number of employees with computer literacy – 43, number of Internet users – 30, number of computers connected to Internet – 9, number of automated work stations – 1, number of e-mails – 27, number of web-sites – 4.

Multiple factor character of conducted monitoring detects obstacles and weak fields on the way of successful development of scientific activities, and allows formation of adequate measures system for development of efficient condition for effective use of IT. In conclusion, we would note that, such monitoring must be conducted continuously, and existing statistical mechanisms must be improved for this purpose.

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