

Preface

In 2016 the I International Scientific Conference “Convergent Cognitive Information Technologies” (Convergent'2016) was held on November 25 – 26 at the Moscow State University by M.V. Lomonosov Faculty of Computational Mathematics and Cybernetics. The conference were held within the scope of the activities of the Federal educational-methodical Association in the system of higher education in the enlarged group of specialties and areas of training 02.00.00 Computer and Information Sciences.

The thematic scope of the conference Convergent'2016 has reflected the main trend in the development of scientific knowledge and technological bases of the information society, namely, the convergence of different scientific disciplines, basic and applied technologies existing under the conditions of rapid digital transformation of all activities and transition to the new scientific and technological system, characterized by the integration and interpenetration of Sciences and technologies, total intellectualization of the technological and instrumental base.

The growing integration and interpenetration of such technologies as, computer, communication, instrumentation, software, robotcontroller, nano-, bio-, cognitive, information, printing, and etc. leads to accelerated rates of scientific and technological progress, determines the formation of a new complex science-intensive technology areas. These directions should first include the Internet of Things (Internet of Things - IoT), Smart Cities (Smart Cities), Large data (Big Data), intelligent control systems, industrial clustering technology of the digital economy (digital economics). Wherein, as in previous years, one of the main catalysts of scientific progress as a whole and the development of the above-mentioned areas are information technologies (IT), and now they are becoming a feature of the widespread use of artificial intelligence technologies. Therefore, unifying concept, namely, cognitive-information technology (CIT) or a smart technology is increasingly being used for information and cognitive technologies. Exploration and development of these important scientific and technological trends of the digital economy are the goals of the conference Convergent'2016.

The particular relevance of the conference was shown by the speech given by the President of Russia Vladimir Putin in which he proclaimed the course on digital Economics the strategic growth area of the country.

Plenary reports had fully covered the topic of the convergent nature of technology development, the most important trends of the digital transformation of the various activities, the emergence of new industry, science, and education challenges.

The report of Askar Akaev (foreign member of the RAS, professor of the Lomonosov Moscow State University) and Andrey Rudskoy (corresponding member of the RAS, rector of the Peter the Great St.Petersburg Polytechnic University) “Convergent ICT as a key factor of technological progress in the coming decades and their impact on world economic development” analyses the impact of ICT (information and communication technologies) on workforce productivity and economic growth. The authors have proposed an information model for the calculation of the ICT contribution to the pace of technological progress, using the laws of growth of technological knowledge in the ICT sector, as well as models to calculate the rate of technical progress, contingent upon the production and use of ICT products and services that enables to calculate forecasted rates of technological progress according to the dynamics of the number of active researchers in the ICT sector or the dynamics in the numbers of patents granted in the field of ICT research.

In Konstantine Kolin's (professor of the Federal Research Center “Computer Science and Control” of RAS) report “Quality of life and convergent technologies in the Strategy of scientific and technological development of Russia” the emphasis was given on the role of

converged information and communication technologies and information and communication infrastructure in the Strategy of scientific and technological development of Russia aimed at ensuring Russia's national security.

Vasily Kupriyanovsky's report "The experience of the launch of breakthrough projects of digital transformation in the economy" examined the concept of the digital transformation of society and its capabilities in resolving challenges of the 21st century: global climate change, the need for a total change in the energy balance, the need for protection of biodiversity and nature in general, rapid urban growth, the need for increase the production level while changing the working environment in industry, agriculture, transport, energy, medicine, etc. As an example of the digital transformation the report analyzed the experience of Great Britain - one of the first countries which have chosen to build a digital economy. A significant part of the report was focused on the review of the Digital Railroad Project as a moving cause of the process of transformation of the economy in general, as well as the overview of the concept of smart cities in relation to the Russian conditions. Finally, the report touched on the problem of digital exclusion.

Dr. Nikolaos Mavridis from Innopolis University (PhD, Massachusetts Institute of Technology, Greece) dwelled on modern problems of robotics and existing curriculums. He also presented the work carried out in the Interactive Robots and Media Lab of the University of Innopolis headed by him Interactive Robots and Media Lab Innopolis University.

The report of Dmitry Namiot and Vladimir Sukhomlin examined the curriculums of new courses, new master's programs on "Internet of Things", "Smart cities", Big Data developed and partially tested at the Faculty of Computational Mathematics and Cybernetics, Moscow State University.

The conference Convergent'2016 were attended by about 250 people. The conference Program Committee has reviewed 112 submissions and accepted of them 69 as full papers, 12 as short papers, 2 as posters, 1 as demos, whereas 18 Convergent'2016 submissions were rejected. According to the conference program, these 84 oral presentations (of the full and short papers) are structured into 8 sessions including Theoretical questions of computer science, computational mathematics, computer science and cognitive information technologies, Parallel and distributed programming, grid technologies, programming on GPUs, Cognitive information technologies in control systems, Big Data and their applications, The Internet of Things (IoT): standards, communication and information technologies, network applications, Smart Cities: standards, cognitive-information technologies and their applications, Cognitive information technologies in the digital economics, Applied optimization problems. Most of the presentations are dedicated to the results of researches conducted in the research organizations located on the territory of the Russian Federation including Chelyabinsk, Dolgoprudny, Dubna, Ekaterinburg, Irkutsk, Kazan, Kostroma, Moscow, Nizhny Novgorod, Novosibirsk, Obninsk, Omsk, Orenburg, Perm, Ryazan, Saint Petersburg, Samara, Saratov, Togliatti, Tomsk, Tula, Tver, Tyumen, Ufa, Veliky Novgorod, Voronezh, Yaroslavl, Yelets and foreign countries Belarus (Minsk, Grodno), Bulgaria (Sofia), Greece (Athens), Italy (Bolzano), Kazakhstan (Astana, Almaty, Pavlodar), Latvia (Ventspils), Slovakia (Kosice), USA (New York), Uzbekistan (Tashkent).

The conference were attended by leading experts and teams from research centers, universities, IT industry, institutes of the Russian Academy of Sciences, Russian high-tech companies and from the near and far abroad countries.

Workshop containing 4 presentations; an open workshop "Economy 4:0 requirements for digital competencies and personnel training system sought", including three round tables with the discussions of business models, mobile technologies, as well as two master classes entitled as "Robotics Education" and "Tunneling Technology and firewall". Round Table on "The impact of the Internet of Things on the development of economy, science, education,

social sphere”. This workshop is prepared according to the initiative of Vladimir Sukhomlin (Lomonosov Moscow State University; Institute of Informatics Problems, Federal Research Center “Computer Science and Control”, Moscow, Russia).

69 proceedings were published in two editions of scientific collection “Modern information technology and IT-education” in the electronic collection of scientific conference proceedings.

All scientific proceedings presented at the conference were prior reviewed by the expert council and a further public discussion of the results took place on the Breakout Sessions. First of all review and selection of articles for publication in the collections of scientific papers gave an assessment of content, execution style, scientific-practical and applied value of the work, and took into account the interests of the development of the following areas: Theoretical questions of computer science, computational mathematics, computer science and cognitive information technologies, Parallel and distributed programming, grid technologies, programming on GPUs, Cognitive information technologies in control systems, Big Data and their applications, The Internet of Things (IoT): standards, communication and information technologies, network applications, Smart Cities: standards, cognitive-information technologies and their applications, Cognitive information technologies in the digital economics, Applied optimization problems.

Traditionally, the editorial staff and the editorial board of scientific journals are working harmoniously. Taking into consideration that our publication combines Scientific-Practical specialized institutes of Russia and the CIS and foreign countries, the editorial board and the board include the leading experts residing in different regions of the world.

The chairs of the Program Committee and Organizing Committee of Convergent'2016 express their gratitude to Dmitry Namiot for the effective interactions by the CMT system with the authors of submissions and with the PC members reviewing the submissions, as well as for preparing a layout of the conference proceedings during the process of its publishing. The chairs of PC also express their gratitude to the PC members for carrying out the reviewing of the submissions and selection of the papers for presentation, as well as to Evgeniy Ilyushin for keeping of the up-to-date content of the conference site at all stages of the conference preparation.

The Moscow State University by M.V. Lomonosov in which the conference was held is a major traditional educational institution in Russia, it offers training in almost all branches of modern science and humanities. Providing an up-to-date infrastructure, convenient logistics, historical and natural attractions, the venue contributed to the organization of the Convergent'2016 conference on a high standard.

The chairs of the Organizing Committee and Program Committee of Convergent'2016 express their gratitude to the authors of the submissions as well as to the Russian Foundation for Basic Research (Russian), Internet Initiatives Development Fund (Russian), Foundation for Promotion of Internet media, IT education, human development “League Internet Media” (Russian), LANIT group of companies (Russian), CJSC INLINE GROUP (Russian), D-Link Corporation (Russian) for the financial support to the Conference.

Co-chair of the Program committee

Co-chair of the Organizing committee

Vladimir A. Sukhomlin
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