Preface

In 2017 the II International Scientific Conference "Convergent Cognitive Information Technologies" (Convergent'2017) was held on November 24 – 26 at the Lomonosov Moscow State University Faculty of Computational Mathematics and Cybernetics. The series of scientific events relevant to the priority directions of development of science, technology and engineering in the Russian Federation in the major modern interdisciplinary field – information and telecommunication systems – which brings together representatives from Mathematics, Informatics, Physics and Materials Science, Computer Science, Data Science and Humanities from Russia and foreign countries.

The conference was traditionally focused on research and development of scientific and technological foundations of the information society, the key development trends of which are the convergence of various scientific directions, basic and applied technologies; total intellectualization of technologies and services of the modern society's ecosystem; a comprehensive digital transformation of the world economy. The relevance and timeliness of the conference was emphasized by the fact that the Government of the Russian Federation approved the program "Digital Economy of the Russian Federation" just before the conference (Order of the Government of the Russian Federation of July 28, 2017 № 1632-p). This program is aimed at "creating conditions for the development of the knowledge society in the Russian Federation, improving the welfare and quality of life of our country's citizens by improving access and quality of goods and services produced in the digital economy using modern digital technologies, raising awareness and digital literacy, improving the availability and quality of public services for citizens, as well as security, both within and outside the country."

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, Smart Cities, Big Data, intelligent control systems, Digital Transformation of Transport, industrial clustering technology of the digital economy.

The plenary reports demonstrated the full convergent nature of the scientific and technological development, the most important directions of the digital transformation of various activities, the formation of new challenges to the industry, science, and the education system.

In the report "Contours of digital reality" Georgy Malinetsky (Doctor of Physical and Mathematical Sciences, Professor, Keldysh Institute of Applied Mathematics) examined the main features of the global economy in its current state, as well as the main trends associated with total digitalization of social -economic sphere in the information society. He also gave a critical assessment of the Russian economy's current state and showed the need for a break in conservative trends in the country's economic development. In the context of the ongoing tasks of the Russian economy's digital transformation, the sepaker examined from the synergetics and the theory of reflexive control point of view the principles for the formation of infrastructures, the creation goals, and algorithms for the organization of innovative environment required to implement the Eurasian Project, one of the most relevant for modern Russia.

In the report "Ontological and Semantic Methods in the Implementation of Digital Railway Projects Based on the Example of Creation of BIM Rail IFC BuildingSmart and Their Significance for Infrastructure Projects" Vasily Kupriyanovskiy considered approaches to solving the digital economy's infrastructural problems using the example of the digital transformations "locomotive", for which some countries have chosen the digital railway construction project.

The speaker paid special attention to the ontological issues of designing such a system, since in order to ensure its correct and safe functioning, it is necessary to maintain the digital status of the digital replicas of the system in an up-to-date state, as well as to ensure the synchronization and

interoperability of its various information models, and, as a consequence, standardize the representations and connections of these models and data. In particular, digital ontological and semantic standards are considered as the main tool for obtaining the maximum data value chains formalized in the form of mathematically validated ontological and semantic languages.

In the report "Scientific and Methodological Aspects of the Problem of Technology Integration" Konstantin Kolin (Professor, Federal Research Center of the Russian Academy of Sciences "Informatics and Management"), presented a general methodological view on the integration and convergence of technologies, justified the urgency of creating a new scientific discipline, with the technologies themselves, their classification, integration methods, performance criteria as its subject matter.

In the report "Modern Didactics of Mass Electronic Education" Mikhail Karpenko (Doctor of Technical Sciences, Professor, President of the Modern University for the Humanities), predicted the structure of higher education based on an analysis of new opportunities provided by modern high-tech. He emphasized the consideration of the advantages of electronic educational technologies in comparison with the traditional campus education. The report proposed the structure of the organizational and technological methodology of the robotic educational process, the composition and functionality of the robotic educational components were determined, and the automation tools for the administration of the educational process developed in the MUH were also considered.

Boris Slavin (Academic Advisor of the Faculty of Applied Mathematics and Information Technologies, Financial University under the Government of the Russian Federation) devoted his report to a critical analysis of the Digital Economy Program (DE). Specific coverage was given to the programs that are directly related to the teaching staff and education for DE. The forecasts of the characteristics and indicators of the Future University were presented.

In the report "The Cyber-Physical Systems Concept and the Process of Their Standardization" Dmitriy Namiot (Senior Scientist at the Faculty of Computational Mathematics and Cybernetics of Lomonosov Moscow State University), discussed the basic concepts, reference architecture, applications, the current state of the cyber-physical systems, and its relationship with other technological areas, such as, Internet of Things, Big Data, Cloud Services, Systems of Systems, etc. The speaker also mentioned the work of the Technical Committee 194 "Cyber-physical Systems" of Rosstandart and its plans to harmonize national and international standards.

The conference Convergent'2017 were attended by about 300 people. The conference Program Committee has reviewed 140 submissions and accepted of them 93 as full papers, 15 as short papers, 5 as posters, 2 as demos, whereas 25 Convergent'2017 submissions were rejected. According to the conference program, these 90 oral presentations (of the full and short papers) are structured into 9 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 applications, The Internet of Things: standards, communication and information technologies, network applications, Smart Cities: standards, cognitive-information technologies and their applications, Cognitive information technologies in the digital economics, Digital Transformation of Transport, 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 Arkhangelsk, Barnaul, Bryansk, Chelyabinsk, Dubna, Kaluga, Karachaevsk, Kazan, Khabarovsk, Kostroma, Krasnodar, Krasnoyarsk, Magnitogorsk, Moscow, Nizhny Novgorod, Orenburg, Perm, Rostov-on-Don, Ryazan, Saratov, Smolensk, St. Petersburg, Stavropol, Surgut, Togliatti, Tomsk, Tula, Tver, Tyumen, Ufa, Ukhta, Vladivostok, Volgograd, Voronezh, Vyatka, Yalta, Yaroslavl, Yelets, Yoshkar-Ola and foreign countries Armenia (Yerevan), Belarus (Minsk, Grodno), Côte d'Ivoire, Kazakhstan (Astana, Almaty), Latvia (Ventspils), Saint Vincent and the Grenadines, the Republic of Chad, Ukraine (Sumy), 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 "Digital Economy: the Concept of Digital Skills and the Training System of Highly Demanded Personnel", including three round tables with the discussions of business models, mobile technologies, as well as two master classes entitled as "Gamification in Education" and "Training in Network Security Technologies". Video conferences under the title "Modern Training Courses and Manuals". 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" of the Russian Academy of Sciences).

The chairs of the Organizing Committee and Program Committee of Convergent'2017 express their gratitude to the authors of the submissions as well as to the Russian Foundation for Basic Research, Samsung Research Center, D-Link Corporation, Promotion of Internet media, IT education, human development "League Internet Media" for the financial support to the Conference.

Co-chair of the Organizing committee
Vladimir A. Sukhomlin
(MSU; FRC CSC RAS)

Member of the Organizing committee
Elena V. Zubareva
(ELSU; FRC CSC RAS; MSU)