

TRAINING OF IT-PERSONNEL IN THE INTERIOR OF “DIGITAL ECONOMY”

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Nowadays it is undeniable that the active introduction of new technologies into production, whether it is an industrial business or a social service, increases the importance of the information resource. The rapid growth of competition in national and global markets acts as a chain reaction for economic participants in the search for factors to achieve competitive advantages.

For example, the Government of the Spanish autonomous community Aragon has allocated more than 12 million euros (13 million dollars) for the development of the Industry 4.0 project, which includes blockchain technology, artificial intelligence and other new technologies. It is known that the funds were co-financed by the European regional development Fund within the framework of the Aragon development Strategy for 2014 – 2020. They will be used for the development of industrial property and consulting projects. The program also aims at helping small and medium-sized enterprises to integrate the digital technologies transition into their processes and products, and to enable technological companies to develop their Research & development in order to accelerate the digital transformation of the industry.

The International Data Corporation and the manufacturer of data warehouses Seagate talk in their report about those who produce and collect the most data and how the situation will change in the future. It turned out that the leaders are China and the United States. Now their results are, in fact, close to each other – 7,6 zettabytes – in China and 6,9 zettabytes – in the USA, where one zettabyte is approximately equal to a trillion gigabytes. The report states that companies use data in order to enter new markets, to improve customer service, and in some cases to generate revenue through the sale of information.

In collaboration with Norwegian Telia provider, Odeon cinema in Oslo is starting to show films that are broadcasted through the live 5G network. 5G broadband wireless connection can be an acceptable alternative to storing files on local servers, even for the film business, when buffering or reducing the image quality is unacceptable. It is known that during the tests, Telia achieved the data transfer rate of 2,2 Gbit/s, which is 5-20 times faster than the standard 4G user network and the wired Internet of the cinema. In addition, 5G opens up new opportunities for cinemas, for example, film centers will be able to broadcast live performances and concerts in real time mode.

And the Competence center for robotics and mechatronics of the Russian University Innopolis has developed a cable robot that will be used for welding of metal parts in shipbuilding.

There are many examples like these. All of them confirm the rapid growth of technological progress that changes the world and the people who live in it. In order to implement the breakthrough scientific, technological and socio-economic development of the Russian Federation, to increase the population of the country, to improve the standard of citizens' living, to create the comfortable conditions for their living, as well as conditions and opportunities for self-realization and disclosure of each person's talent, the President of Russia issued the Decree “On national goals and strategic objectives of the Russian Federation development for the period up to 2024”, which sets strategic objectives for the country [1]. At the all-Russian meeting of the executive authorities heads of the Russian Federation subjects exercising public administration in the field of education, the key tasks in the field of digitalization of Russian education were identified [2].

These and other factors explain the relevance of the emergence of the National project “Digital economy”, which aims at providing the increase of inner costs for the development of the

digital economy from all sources; the creation of a stable and secure information and telecommunications infrastructure for high-speed transmission, processing and storage of large amounts of data available to all organizations and households; the use of mainly domestic software by government agencies, local governments and organizations.

Not only foreign universities and IT-companies are concerned about the training of specialists, but five areas of development of the digital economy have been identified in Russia until 2024, including changes in legislation, information infrastructure and information security, and certainly, the improvement of the education system and training personnel for the digital economy, the formation of research competencies and technological reserves. It is clear that everything related to the formation and development of competencies, training of IT-personnel for the digital economy is of the educational system concern [3].

We studied the data provided by the Internet Initiatives Development Fund (IIDF), which analyzed the state of the labor market, selecting for the study only the part that is associated with the training of IT-professionals. Experts of the Fund believe that in the near future it is necessary to seriously reconfigure the system of Russian secondary and higher education. Thus, in order to meet the projected demand in the labor market, educational institutions need to allocate additional funds for training of about 40 thousand students in IT-specialties in 2019. Universities are supposed to play the role of the Competence development centers, which will present high quality programs both of applied and academic nature [4].

According to the social program HackerRank, which annually tests about one and a half million users-programmers around the world, Russian IT-specialists regularly get into the top three leaders. They receive 99-100% of credit points for tasks on algorithms, dynamic programming, Big Data, etc. Russian IT education occupies the leading position in the world and allows graduates to become popular specialists in one of the most high-tech fields of activity. However, one of the leading Russian universities include Moscow Institute of steel and alloys (Moscow, Russia), St. Petersburg National research University of information technology, mechanics and optics (Saint Petersburg, St. Petersburg Polytechnic University (St. Petersburg), Novosibirsk State University (Novosibirsk) [5].

Based on the above-mentioned, the team of like-minded people was formed at the Siberian Federal University, who developed a group project in the form of the Concept of a new Master's educational program. We understood that the program should develop a number of competencies that are in demand in various areas of the modern economy, have distinctive features and can offer unique advantages to applicants and employers. Therefore, it was a team decision to choose only one name from a wide variety, which would reflect the content of the main idea and mission – "Technologies in the digital economy". In the Russian structure of areas of training, we attributed it to the programs in the field of applied Informatics. It is clear that its relevance and purpose are dictated by the high demand on the labor market for professionals in the field of IT, possessing modern technologies and management skills in the conditions of digital transformation of the economy as a whole. At the graduation from the University, our graduates will be successful in the development, implementation and adaptation of information systems with industry orientation and the formation of Russian and world digital markets.

Developing a conceptual model of the program, we investigated the target market (the range of activities in which our graduates can occupy positions), conducted questioning, finding out what competencies in the opinion of employers today are not sufficiently developed among university graduates, presented the key skills for the development of which this program will be aimed, described the modules of the curriculum, psychological and pedagogical technologies for the implementation of Master's training, the institutional environment.

So, we found out that the target audience consists of specialized subdivisions and services of automated monitoring and evaluation of the industry organization activities, IT-infrastructure management services of enterprises, departments of management of smart technologies, smart systems and smart products of economic entities of various forms of ownership, services of promotion of organizations to new digital markets: Aeronet, Marinette, Helsnet, Energinet,

Neuronet, etc., research organizations and information and analytical services, digital transformation project management services in the sphere of communications and telecommunications, finance, energy, trade and logistics, housing and communal services, etc.

The questioning of 75 representatives of the labor market in the field of IT-technologies on the subject of what competencies their companies are striving for and what competencies are in high demand, showed that the most significant are digital literacy (Digital skills) – 100%; on-line communication skills and SMM promotion (93,3%), analytical skills and work with big data (90,7%). In the context of interdisciplinary teams, the ability to understand each team member, to take into account the opinion of experts from different fields (86,6%) was equally important. Figure 1 shows the results.

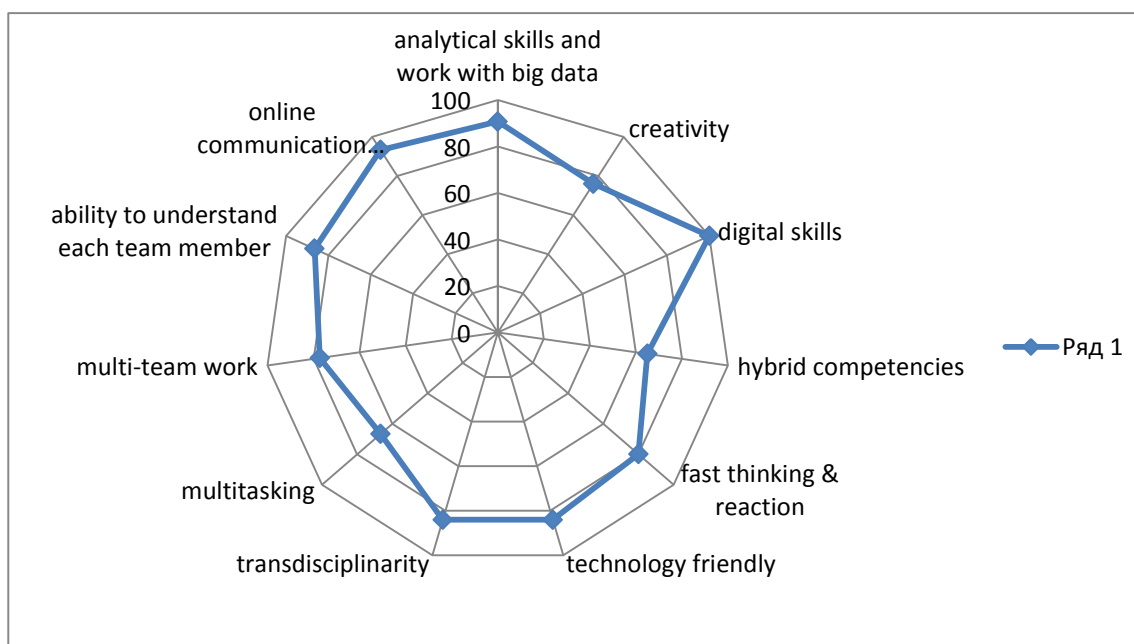
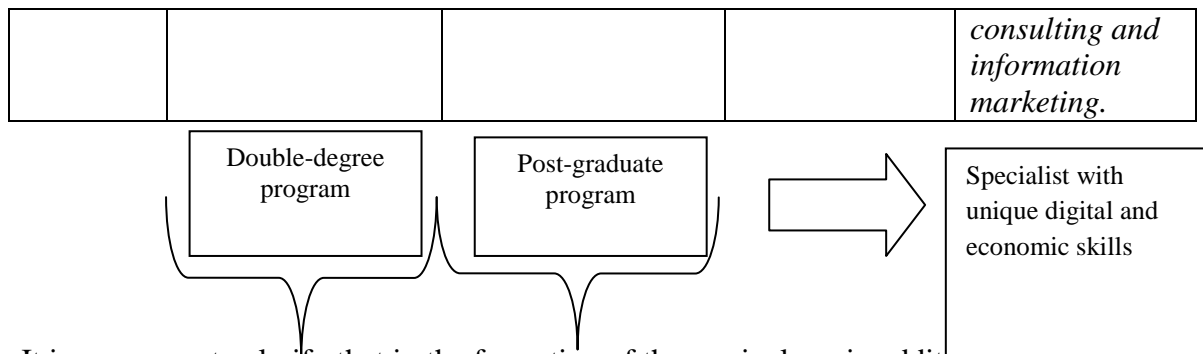


Figure 1. Analysis of the questioning of the labor market representatives in relation to the necessary competencies of IT-specialists (in %).

In the course of project activities, we also analyzed the training of IT specialists in both Russian and foreign universities. Among foreign universities the experience of Cardiff University (Communication Technology and Entrepreneurship (MSc) and Masters College Barcelona (Masters in Digital Economy, Communication & Marketing) was chosen. We found interesting the experience of implementing such Master’s programs at Samara State University (the program “Business technologies of digital economy”) with St. Petersburg State University of Economics (“Applied informatics in economics and management”). The comparative analysis was carried out in relation to the study of the focus of programs, the study of competencies that were supposed to be formed and developed in the learning process. We also revealed that the University of Cardiff is implementing a double-degree program, and the College of Barcelona is continuing to implement the program at a higher level of post-graduate school, which will actually help to prepare the specialist with unique digital and economic skills. The results of the analysis are presented in table 1.

Table 1. Comparative analysis of the implementation of Master’s programs in Russian and foreign universities

	Cardiff University Communication Technology and Entrepreneurship (MSc)	Masters College Barcelona Masters in Digital Economy, Communication & Marketing	Samara University of Business technologies of digital economy	St. Petersburg State University of Economics Applied Informatics in Economics and management
<i>The focus of the program</i>	<i>The aim of this course is to provide advanced knowledge and skills in the field of wireless technology with the addition of special skills in business and entrepreneurship.</i>	<i>Promoting innovation, competitiveness and internationalization of companies</i>	<i>The program is aimed at training IT-specialists in the economy, able to create and analyze business projects based on the use of digital data, as well as manage them.</i>	<i>Training of professionals capable of carrying out research, analytical, organizational and management activities in the field of information systems and information technologies in the economy and management.</i>
<i>Key skills</i>	<i>Skills in product design, project management, use of modern software</i>	<i>Digital skills, innovation, creativity, communication, empathy and the ability to work worldwide.</i>	<i>Creation, analysis and improvement of virtual enterprise; construction and analysis of business process models; use of blockchain technology; management of virtual and augmented reality technologies.</i>	<i>Skills in the field of research of the applied field for the construction of enterprise architecture; modeling of applied information processes and data structures, IT-infrastructure, IT-project management; evaluation of the economic efficiency of IT-projects; application of advanced methods of information</i>



It is necessary to clarify that in the formation of the curriculum, in addition to the survey, we analyzed the Federal state educational standard that describes the competence of the future Master in the field of applied Informatics, Professional standard “Information Technology Manager” that presents the labor functions and labor actions that are characteristic of specialists of the 7th and the 8th qualification levels.

The curriculum of the educational program consists of 8 logically linked modules, which are built on the basis of the analysis of the survey and standards. Please note that by modules we mean sets of disciplines united by a common theme:

1. Data analysis in the digital economy;
2. Technologies and platforms for e-business;
3. Design and digitization of business processes;
4. Digital communication strategies and tools;
5. Organizational behavior in the digital economy;
6. Reporting and creating monitoring dashboards;
7. Strategic analysis of network activities;
8. Work on the final qualifying work (Master’s thesis).

The name and the content of the presented Master’s program is substantiated and clearly reflect the sequence of development of students’ skills in specific methods, techniques and technologies that will be in demand both in general management and in special (digital design, modeling, analytics) types of activity.

In the implementation of the educational process it is very important for us to use modern psychological and pedagogical learning technologies. These include interactive forms of conducting classes, such as: the inverted class, the case-study, the conduction of trainings, the use of simulators, and the modern software.

The project team has a good experience in the implementation of educational programs using online technologies, which will be used in this case in the implementation of individual courses. In the age of information technology, this method of work is especially in demand with a shortage of time due to the workload of students, including practical activities, territorial, geographical distances, etc. This will also allow to attract leading domestic and foreign lecturers, practitioners and to be popular among students.

It should be noted that the program is included in the institutional environment of the university that has a developed infrastructure and all the necessary conditions for its effective implementation. Thus, the Center of responsibility that will provide organizational and methodological support of the program, is located at the Institute of Economics and business process management, and the operational management will be implemented by specialists of the Department of Economics and information technology management, the process of the program implementation will be organized by the efforts of several institutes of the university and supervised by the Academic Council, which is formed from among employers and professors.

The process will include specialists whose activities will be aimed at the development of Soft skills, IT-infrastructure of Siberian Federal University, including e-learning system, IT-platform of open on-line resources, Department of international programs of the university, which recruits foreign specialists to work in Russia.

Today we are developing methods to promote the Master's program in the educational market and at the same time we form a demand for future graduates from employers. It is clear that we are ready to use modern methods of marketing educational activities, and of course, IT-technology to attract students to the program of training in IT-technology.

So, the development of a new Master's program at the University of federal importance is the answer to the requirements of our time. There comes a new era of the labor market, the time when a saturated demand for personnel released from manual labor is formed. The development of new technologies will create a greater need for personnel with a "digital" focus.

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