

Development of forms of interaction between universities and the business community in the digital economy

E.V. Kulyasova¹

P.V. Trifonov¹

¹ Financial University under the Government of the Russian Federation

ABSTRACT

The article is devoted to the construction of a model of interaction of economic entities using the method of project work of participants in the system “enterprise/employer-University – state” on the technological platform of the meta-University in the conditions of digitalization of the economy, which allows to increase the synergy effect of the interaction of the main institutional participants.

In the context of the impact of digitalization processes on the transformation of behavioral models within the existing economic relations in the VUCA world, new requirements and ways of interaction of subjects of the triple helix model are considered. The article analyzes the main existing and prospective forms of cooperation between universities and business structures. The detailed description of barriers and difficulties on the way of digitalization of enterprises and scientific organizations is given.

For employees of scientific and commercial enterprises in the conditions of digitalization and General increased uncertainty, recommendations are formulated for the choice of a behavior model that adapts their professional identity based on the principles of a proactive position and knowledge and skills at the intersection of different technological directions.

Under the conditions of variability and uncertainty of the environment, a scientific problem has been identified, there is a high interest in collaboration between universities and businesses, but there is no mechanism that allows this interaction to be carried out with a high degree of efficiency.

A set of mechanisms that help reduce the level of uncertainty is proposed, as well as a project method of interaction within the framework of the digital meta-University technology platform model is described.

The article provides recommendations for the full implementation of human capital in the new technological conditions of economic and social development, in the so-called VUCA-world, which is characterized by the lack of a developed digital infrastructure, as well as a high level of transaction costs.

A new approach is proposed, based on which participants will interact on the basis of shared access to information and digital resources and the ability to combine the development of innovative projects and training of personnel necessary to unite the University, enterprises and scientific organizations to reduce transaction, fixed and variable costs of participants in the process.

KEYWORDS:

VUCA-world, ecosystem, flexibility, project learning, digital meta-university, digital transformation.

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1. INTRODUCTION

Contemporary economic entities have to exist under permanently changing conditions of environment. Such transformation can be observed in terms of changes, which form the business model of values, flexibility and openness to innovations, proactive position of all entities while working with uncertainty, updated requirements to system operation (strength, versatility, flexibility, ability to evolution, combinability).

2. RESEARCH METHODOLOGY

The development and active introduction of information and communication technologies into activities of enterprises are an essential condition for social and economic development of a country and for ensuring the high level of competitiveness of industry sector. The role of such technologies in economic development of a country is outlined in the Decree of the President of Russian Federation from 07.05.2018 No.204 “On the national goals and strategic objectives of the development of the Russian Federation for the period up to 2024”¹ in compliance to which “the accelerated introduction of digital technologies in economics and social sphere” has been determined as one of national objectives for development of Russian Federation.

Digitalization, which replaced technological paradigms related to automation and informatization of management processes, is a new technological stage in development of economics and society in 21st century.

In the context of birth of qualitatively new system of economic relationships, let's consider the transformation of behavior models and interaction means, including requirements to sustainability, which are the main points in the Itskovich's Triple Helix concept in stimulation of

the economics of knowledge, creation and development of innovations [Leydesdorff, 2011].

It is worth noting that after transition to the digital economics, the entities of business community, government and political structures, scientific organizations (universities, research institutes, etc.), as well as the processes occurring between them, including the management processes, exist in a new VUCA-world now, where new models of behavior, interaction between them, as well as effective management systems only start to re-form. Thus, new conditions impose new requirements on all participants of economic and public relations, and correspondingly, new principles of managing the interrelations between them.

The business community has to be flexible and open to innovations and digital technologies. The use of progressively open models with more blurred boundaries instead of old closed systems is a principal characteristic feature of transition to a contemporary generation of innovation processes. Digitalization itself, despite of its active development and provision of wide specter of advantages for business structures, is now mistrusted by the most of enterprises and is associated with significant barriers and risks [Korovin, 2019], among which:

- the complexity and high tech nature of digital projects;
- high cost of introduction and adaptation of digital technologies;
- resistance to changes by personnel of organizations;
- transformation of the labor market: from abolishment of a number of professions from the market to a shortage of highly qualified personnel;
- necessity of re-engineering of business processes of organization and alteration of the business model of organization's operation;
- immaturity of the digital regulations as well as variety of legal and executive restraints for the digitalization of organizations;

¹ URL: <https://www.garant.ru/products/ipo/prime/doc/71837200/>.

- difficulties of the effective evaluation of the digitalized projects;
- cybersecurity-connected risks.

When working with uncertainty, a proactive position is required from corporate staff during digital transformation. In Nassim Taleb's terminology [Taleb, 2019], a future worker is considered as a highly "antifragile" object, that is a person, who is able to make decisions under conditions of "non-transparent environment" and will contribute the system's escaping from versatility and disorder with superior properties. In the scope of "employer - employee" relationships effective executive decision-making in an uncertain environment will consist not in lessening outcome or disregarding the uncertainty, but in the employee's readiness to work under elevated uncertainty. This feature is described in psychological literature as "ambiguity tolerance" or "tolerance of uncertainty" which is directly linked to the economic term "risk appetite" that is executive decision-making under insufficient awareness or lack of control conditions [Kornilova, 2016]. This flexibility (resilience) that guarantees system preservation, along with antifragility (that improves the system), is the best possible answer to unexpected and/or unexampled changes of an external environment that serves as a decision-making field for economic entities.

Furthermore, future employees are obliged to possess cross-competent skills and knowledge in order to cope with a wide variety of specific problems on digitized workplaces and to manage digital processes. This raises new demands to both future staff training programs and retraining of the existing employees.

Under these circumstances, a modern university cannot ignore a permanently transforming external environment and demands of the internal customers. In order to fulfill its functions universities ought to meet contemporary challenges by implementing a sustained engagement with the real sector (including potential employers). For modern educational providers this requirement will be met through problem-solving in the form of providing students with a necessary set of equipment that will work under new conditions and satisfy relevant requests from employers. To maintain flexibility/ antifragility an educational environment needs to be properly designed. This environment should combine elements of the "enterprise/employer - university - government" system and build deep professional knowledge simultaneously entering a wide range of related/varied fields. A system of a stable interaction (ecosystem) with the real economy needs to be built.

The role of information and communication technologies in the economic and social development of the country that influences society, people, enterprises, and organizations is growing. In the context of this large increase, it is a task for the government to create a digitalizing system control tool from top to bottom (from macroeconomic to microeconomic).

The pattern of main digitized management tools under different economic and social systems is exemplified on the fig.1. As it is shown on the figure, human capital is a key element in implementing digital transformation for each management level (enterprise, branch or governmental level).

Digitalizing brings fundamental restructure to professional competence, personnel demands, operation and business processes on enterprises. When entering a new era of digitalization, the government needs to support highly cooperation between educational entities and enterprises [Ivanova et al., 2020]. Not only society and government are obviously interested in collaborative approaches between universities and business entities but the enterprises themselves. Organizations are interested in highly-qualified personnel that will strengthen the companies competitiveness as well as in effective execution of digital transformation. The necessity in cooperation between universities and business entities was described in "University-Enterprise cooperation" (Bonn Declaration "University-Enterprise cooperation: building on new challenges from past experiences") that was passed by European University Association for reaching the following aspects: increasing education relevance; developing of scientific and project activities; and other forms of cooperation [Savitskaya, 2019].

3. THEORY AND CALCULATIONS

Modern changes during current stage of development can be described with the following expression:

$$SPOD_{world} \rightarrow VUCA_{world} \quad (1)$$

where $SPOD_{world}$ means the world that is characterised as stable and Steady, Predictable, Ordinary, and Definite. Such a world allows establishing development plans and is definite and expected result-orientated. However, changes in the modern world that are caused by brisk growth of advanced digital technologies defined the transition of one social unity into another. Term components $VUCA_{world}$ (Volatility, Uncertainty, Complexity, Ambiguity) are now essential part of the decision-making sphere for each economic entity. Changes like that are based on digital transformation that had impact on all the spheres of economic and social life.

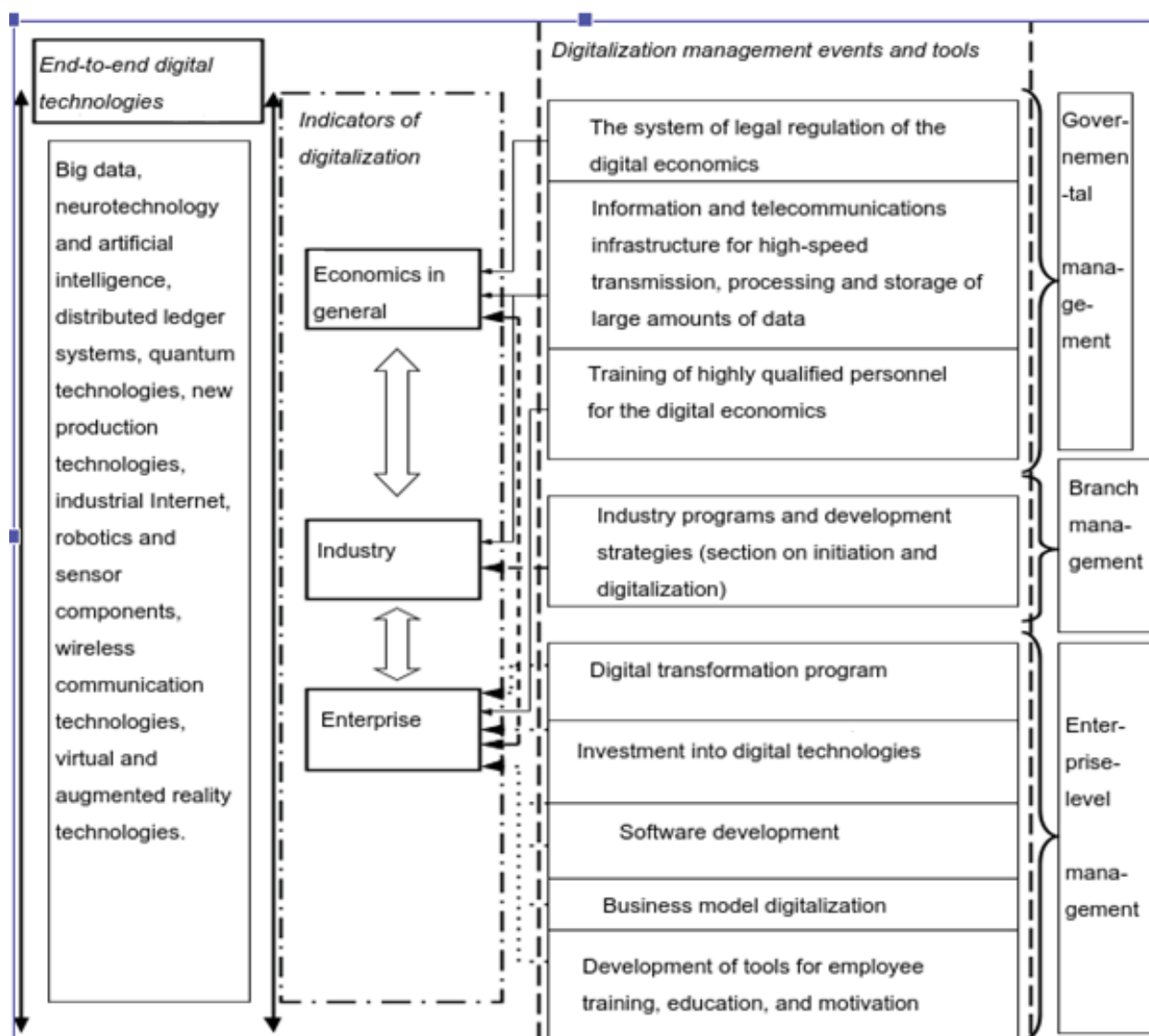
It stands to mention that accumulation of new skills and knowledges will allow to transform $VUCA_{world}$ into a new $SPOD_{world}$ that will create new changes and form new $VUCA_{world}$ in the following [Yamilov, 2019]:

$$SPOD_{world\ 1} \rightarrow VUCA_{world\ 1} \rightarrow SPOD_{world\ 2} \rightarrow VUCA_{world\ 2} \rightarrow \dots \rightarrow SPOD_{world\ n} \quad (2)$$

Where by each following $VUCA_{world}$ possesses some features of $SPOD_{world}$, therefore the ground rules, policies and other factors of the $SPOD_{world}$ are applied to new $VUCA_{world}$ but under limited conditions.

Recent years marked a transmission to the new social developmental stages. It was described by Manuel Castells in the late 20th century in his scientific works "The Information Age: Economy, Society and Culture" [Inozemtsev, 1998]. Inside, the author discussed and analyzed the changes taking place in economics, politics, and culture from the point of view of information-oriented society formation.

Fig. 1. Management events and tools on different economics levels



Source: [Kulyasova, 2019].

4. RESULTS

In Russia, the cooperation of scientific entities with industrial establishments has been a pressing matter for a long time. Some barriers exist that make this cooperation unattractive (for industrial establishment above all) despite obvious efficiency and productivity that will allow both parties to benefit under conditions of implementation of synergistic effect.

Let's discuss basic groups of factors that prevent and limit cooperation between universities and business-unities both in the context of training qualified practice-oriented personnel, and development of scientific and project works.

Among inner factors connected to scientific organizations' functioning, the following need to be distinguished:

- insufficient level of qualification of scientific employees and teachers, that mostly does not coincide with market demands and requests of commercial entities;
- rejection of customer orientated concept;
- temporary aspects of cooperation;
- low quality of students / graduates training;
- outdated material and technical resources and infrastructure at the universities;
- inactivity and high level of bureaucracy at the universities;
- functioning in isolation from changes that take place in economics;
- limited resources of universities that are not enough to complete tasks that transformation requires.

Some other factors that prevent cooperation with universities are based on behaviour of the business-unities. They are the following:

- questionable efficiency of common projects;
- commercial structures are committed to short-term results;
- the investment process initially treated as high-risk including;
- lack of clear requests for a set of specific skills and competencies.

Despite mentioned, there are some external factors that jeopardise formation of enabling environment for cooperation of universities and business-unities:

- high level of risks of the Russian economics;
- low level of development of the rules and regulations of the intellectual property;
- strict standards of education field;
- high level of control over universities activities;
- slow government response to the demand changes on the labour market as well as to training qualified employees.

Currently exist various cooperation forms despite all the barriers. They help to achieve specific goals for both parties. Basic forms of cooperation between universities and business-unities that are aimed to develop new and improve existing educational programs, expand research activities, evolve common areas of cooperation and support innovative business projects are described on the fig.2.

However, it is worth mentioning that not all forms of interaction between universities and business entities are widespread. For example, according to annual reports of the largest chemical industry enterprises, and Scientific Research Institute of Technical and Economic Research in the Chemical Complex [The main indicators., 2018], there are two main forms of cooperation between chemical complexes and universities that are widely used: 1) research collaboration on efficiency of operational and technological processes for output products and designing new products, and 2) search for talented students for further recruitment.

However, it should be taken into account that the cooperation between universities and representatives of business-unities (who serve as potential employers), should reduce the existing disproportion between demands from the labor market and the relevance of education received by university graduates. According to Russian Federal State Statistics Service, the amount of graduates who were employed as qualified averaged 71%, while 29% of graduates were forced to find a job not connected to their qualification or scope of education.

It is also worth mentioning employers being dissatisfied with the professional level of graduates who they hire: 91% mentioned the insufficient level of practical skills, and 53% noticed insufficient levels of theoretical knowledge. Most likely this trend was a ground cause of insufficient graduates who managed to obtain employment in 2018 - that is only 72%.

Fig. 2. Forms of collaboration between universities and business-unities.

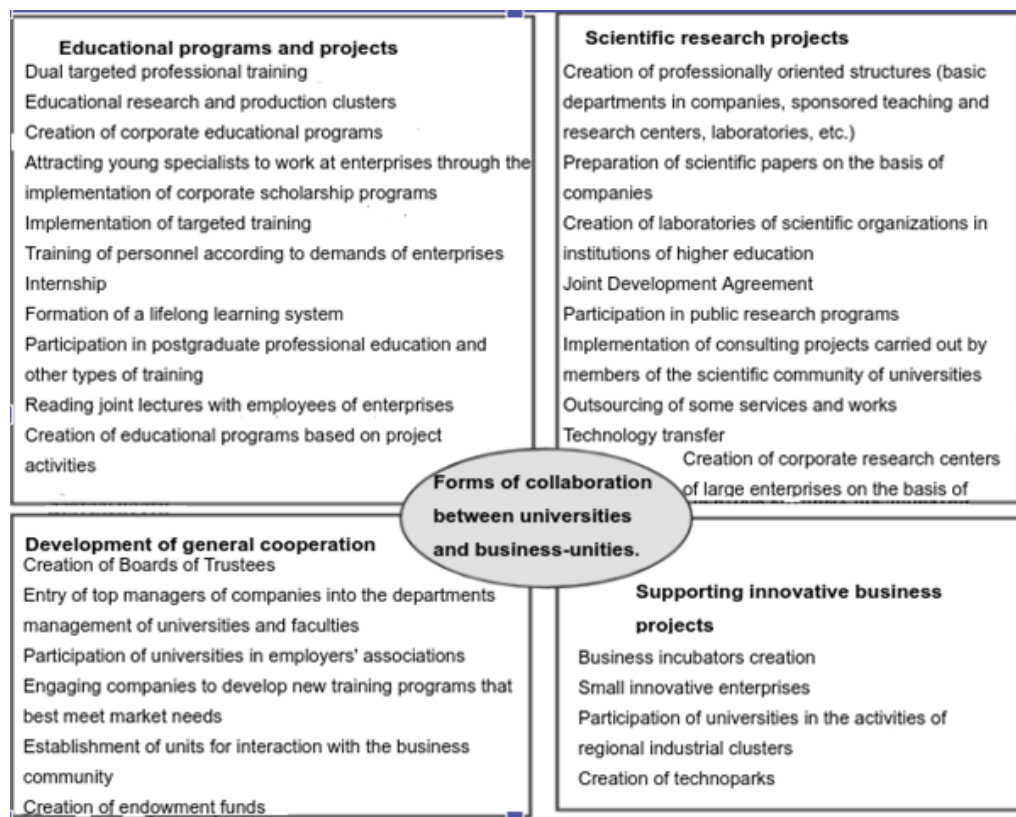


Table 1.
Number of graduates employed as qualified, 2015-2017

Number of employed graduates, total (thousand of people)	According to qualification			
	number (thousand of people)		percentage (%)	
	corresponds	doesn't corresponds	corresponds	doesn't corresponds
2447.0	1733.5	713.5	71	29

Digital transformation of the universities, that now gains an evolving dynamic, is partly aimed to cut through those unpleasant negative developments. In 2019, started a project on creating a model of the "Digital University" under the conditions of the federal project "Human Resources for the Digital Economics"² of the national project "Digital Economics". This project is aimed to digitally transform the universities and includes four main blocks:

- creation of digital services for students;
- changing into an online communications platform;
- infrastructure automation;
- forming of individual plans in the education system that are based on an opportunity for students to choose the academic subject area.

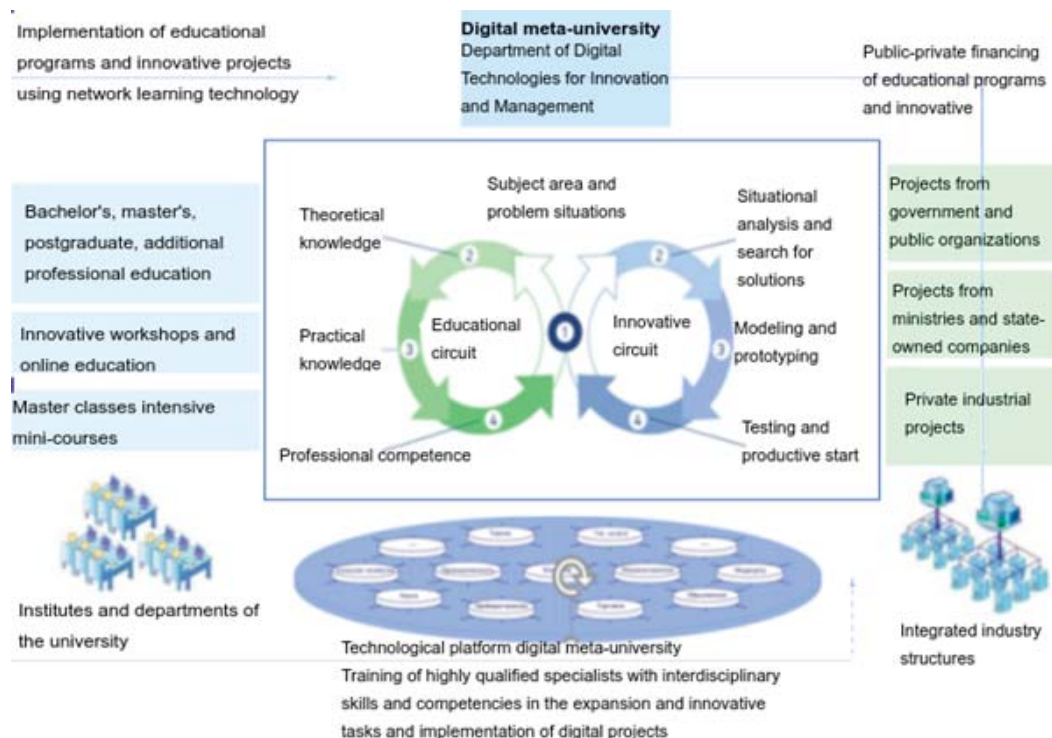
Figure 3 shows a digital meta-university model that combines in virtual space, universities, corporations, research organizations, laboratories, enterprises and development institutions. It allows maintaining general access to

information resources, makes possible implementing multidisciplinary training, as well as performing research and project work, accelerating the search for partners through a common database. Above all, it will increase interaction efficiency between all participants.

5. QUESTIONS TO DISCUSS

To sum it up, under conditions of VUCA_{world} it is prudent to consider in the system "enterprise / employer - university - government" a type of interaction between parties that will base on the method of project activities within the technological platform of the meta-university. This platform is supposed to serve as a basis for productive cooperation between the educational system and business-community in order to gain a common goal of training highly qualified and commercially successful employees through the maintaintment

Рис. 3. Технологическая платформа цифровой экономики на базе метауниверситета



² Personnel for the digital economy (2019) // Ministry of Digital Development, Communications and Mass Media of the Russian Federation. URL: <https://digital.gov.ru/ru/activity/directions/866/>.

of long-term relationships with potential employers. Projects for groups of students from real customers; graduation projects based on requests from an industrial partner; individual courses provided by the university if the industrial partner demands certain skills; courses, provided in cooperation by university and industrial partner centered around the topic of project activities - those are only some points from the list of opportunities of cooperation under combined project activities. However, it takes time and effort for universities and industrial partners to find a common ground. The government is expected to take prompt remedial action in order to eliminate misunderstanding between parties and actively involve them into national projects.

6. CONCLUSIONS

The authors presented a scientifically based model of interaction between economic entities under conditions of digitalization. This model is based on project participation of the parties "enterprise/employer – university – government" system, using the technological platform of the meta-university. It will allow us to achieve the following results.

1. Minimize level of uncertainty for the parties of cooperation under the conditions of new VUCA^{world}. Under conditions of digitalization and design of the educational environment (that combines "enterprise/employer – university – government" system within meta-university) a state of flexibility of the system will be provided. Meta-university synthesizes the emergence and penetration of cross-qualification and knowledge in related fields.
2. Implementing joint project activities in university educational and science systems as well as parties of the real economics sector and national projects within meta-university platforms under conditions of digital transformation.
3. Development of ecosystems (as mentioned by [Kleiner, 2019]) with the participation of the real economics sector within the meta-university platform under conditions of digital transformation. It is worth mentioning that basic connections between parties within the ecosystem are based on transfer of use rights by energy resources and resources of space and time. They are not based on the exchange of material and information resources as in archaic understanding of inclusive approach. The university ecosystem based on project activities can serve as an element of a wider industrial ecosystem. The creation of research and educational centers' networks, as well as participation as a customer of regional and municipal authorities, and attracting large, small and medium enterprises, etc., will allow those ecosystems to base on demands of regions and municipalities, taking into account a country's geographical differentiation.

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ABOUT THE AUTHORS

Elena V. Kulyasova

Candidate of economic sciences, research fellow at the Institute of Industrial Policy and Institutional Development, Financial University under the Government of the Russian Federation.

Research interests: strategic management, digital transformation of industry, economics of education.

E-mail: kulyasova.ev@gmail.com

Pavel V. Trifonov

Candidate of economic sciences, associate professor of faculty the Higher School of Management, leading researcher at the Institute of Industrial Policy and Institutional Development, Financial University under the Government of the Russian Federation.

Research interests: operation management, production management, industrial development.

E-mail: PVTrifonov@fa.ru