Integration Processes in Universities

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Abstract: The relevance of the topic is expressed in the reform of the higher education system, associated with the acceleration of scientific and technological development, increasing competitiveness, the development of human resources, etc. The purpose of the article is to study the prospects for the development of higher education in Russia until 2040:- analysis of integration alliances - consortia and universities as ecosystems, the development of innovative models in universities. The main objectives of the scientific work are - to study the current problems of development and opportunities for improving higher education in Russia; - to form and substantiate the directions of the long-term development of higher educational institutions of the Russian Federation for the period up to 2040. The novelty of the research is to develop an image of the infrastructure of higher education-2040; Research methods. The article applies the methods of comparative analysis, forecasting and generalization, comparisons and analogies, methods of classification and expert assessments, as well as the principle of historicism, concretization.

1 INTRODUCTION

Active attempts of reforming systematization of higher education in Russia have been made since 2004. There are certain results, however, in a period of significant acceleration of scientific, technological and socio-economic development of world leaders, it is necessary to find a possible solution to achieve the competitiveness of higher education within the short period of time. Maintaining the gap in the era of technological singularity will lead to this gap fixation and the exclusion of Russia from the ranks of both an international competitor and a significant partner in development, will put Russia in front of the fact that it is impossible to guarantee a favorable (better) future of the country (Vorozhikhin, 2020).

Today, society is trying to get rid of ageism, when the criterion of scientific significance of activity is replaced by age criteria - someone is too young, someone is too old to have adequate ideas and modern knowledge. Every year the role of man and science increases, requiring attention to value ideals that lead to certain criteria for decision-making (Vorozhikhin, 2020).

2 RESEARCH MATERIALS AND METHODS

Research materials and methods are approaches related to the use of system analysis and synthesis, structural-logical and economic-statistical analysis, comparative and retrospective analysis, methods of forecasting and generalizations, comparisons and analogies, methods of classifications and expert assessments.

3 ROBLEM STATEMENT

Scientific education is a constantly developing field necessary to identify and promote existing abilities. Each area of interest or subject plays a role in creating a favorable future. Education of future specialists is very important for the sustainable development of society, therefore it is reasonable to equip students with the necessary knowledge to solve tasks set.

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Scientific education has led to the emergence of new technologies and the ability to explain scientific concepts and processes. It is believed that this is necessary for technological progress, as it is a dynamic, progressive and collaborative human enterprise that "causes excitement" as a result of interest and curiosity.

Technology and innovation have been vital throughout human history, and will continue in future. While the energy of water and steam was the source of the first industrial revolution, electricity for mass production formed the basis of the second, and electronics and information technology influenced the third, which led us to the fourth. The boundaries between the physical, biological and digital spheres are blurred during the Fourth Industrial Revolution against the background of advances in artificial intelligence, quantum computing, the Internet of things, nanotechnology and advanced materials. Countries around the world should try to implement policies that promote this innovation and integrate it into their development (successful efforts made by developing countries around the world were highlighted by the United Nations Conference on Trade and Development). Innovations should be adaptive and step-by-step and based on the country's special potential to develop technological and scientific solutions to local problems with possible global impact. In addition, innovation is necessary in an effort to adapt solutions developed elsewhere to local needs. Such problems may be always opportunities to promote innovation. For example, in many low-income countries, mobile devices and wireless Internet connectivity have proven invaluable in meeting the needs of public, information and utility services.

Science has been declared a national project in Russia for the first time. By 2025, Russia should - enter the top five countries in priority areas of science; - make work in Russia attractive for Russian and foreign scientists, as well as - ensure a faster growth in domestic research costs compared with the growth of the country's GDP. Worldwide, the education sector is facing technological changes to meet the growing demand of the 21st century. These changes have opened up wide opportunities for scientific and pedagogical personnel to integrate technology-supported materials into research and teaching practices through the use of information and communication technologies (ICT). Currently, ICTs create opportunities that provide valuable assistance in improving the task, smoothing the teaching and learning process, and enriching the goals of education. The integration of ICT into the research-learning process has mainly increased the efficiency and effectiveness of these processes. The modern complex dynamic world is developing in conditions of global hypercompetition for the future, which is realized in complex forms of competitive partnership, when agents, competing in some markets, influence the others, and over time this picture changes or repeats. In this world, it is impossible to separate development and security management (risks) – risks accompany any processes and technologies, any activity carried out at different levels of the economic system. Development goals are formed on the basis of vision of the desired future, and the area of safe development is based on acceptable deviations from the trajectory of its achievement. Security in a dynamic system is defined as a goal-result – a favorable future – and the process of achieving it. The current changes in the speed of development of public institutions lead to a change in the development leader. The business leader, who has been permanent for decades, transfers this role to universities, i.e. universities assume the role of ensuring strategic economic security of business. The development and safety of universities require the formation of scientific research, on the basis of which unique courses are created, traditional and distance, with the right internal and external positioning, while developing a unique brand. Universities are forced to use complex forms of partnership in the context of global hypercompetition, attract talents – both students and teachers, participate in the economy of the territories of their presence, interact with all stakeholders, finding a balance of interests not only in the short term, but also in the strategic period. Graduates should be ready for lifelong learning and be able to repeatedly master new specialties at different stages of their activity. Another important factor of influence is the adequacy of criteria for evaluating projects, processes, results, texts, and research. The system of priorities and criteria of each decision-maker is based on his personal system of knowledge, skills and experience. From the perspective of assessing complex experience, it is necessary to go beyond assessing the economic effectiveness of a particular project, taking into account changes in potentials at all levels of the system being evaluated, up to the global one. The system of indicators for a comprehensive assessment of the state of complex systems, strategies, programs, and projects for their development requires a multi-vector, multi-level, multi-network description. The normalization of the weights of indicators requires regular correlation with the level of global development. The development assessment should be

based on an integrated assessment of megaproject implementation scenarios, differentiated for internal projects. The type of project significantly changes the impact of external factors on efficiency. Depending on the type of project, it is necessary to evaluate the integrated effectiveness. A comprehensive system of evaluation criteria allows evaluating heterogeneous projects included in a single megaproject on a single methodological basis, taking into account the importance of each project for the overall result. At the same time, an integrated assessment of all changes in development potentials (opportunities) for each level of the system is required, which with different weights contribute to the integral indicator of development potential at the global level – taking into account contributions to global knowledge chains, technologies, cost, value, as well as positions in global markets. Their ratio will also change rapidly, taking into account the digital speeds of development and changing positions.

4 FORMATION OF THE ECOSYSTEM OF HIGHER EDUCATION

We live in a system of growing socio-historical demands of modern post-industrial society. One of the fundamental paradigms of its improvement is cooperation of all who are interested in its prosperity. For this, the integration of the customer and the contractor, the development of hyper-actualized, incredibly active projects becomes inevitable. And it is necessary to start with the education quality improvement, the most important lever of socio-economic and political development, the processes of integration of which with the outside world are diverse, voluminous and multidimensional. If we talk about truly modern education, then we must first of all talk about an ecosystem in which all sides of the process are interconnected – an educational institution, a consumer of knowledge, skills and competencies, a customer of a future specialist and, of course, the state and society as a whole. At the same time, it is the educational link of the ecosystem that is associated with scientific, industrial, innovative, and entrepreneurial activities, since it unites the requests of all interested parties (Fig. 1).

In the structure of the university as a key link of the ecosystem, such levels can be distinguished:

• intra-university cluster as a set of communicating units;

• high educational platform is an environment for the integration of its infrastructure and organizational culture;

• the network is a means of intra–university communications that contributes to the effectiveness of educational and management processes;

• incubator is a subsystem for supporting the organization of intra–university projects and programs, including in the field of R&D.

Ecosystems:

– contribute to the creation and development of social and cultural innovations;

– promote technological innovations, including the development of teams of technology entrepreneurs and developers;

– create equal opportunities in conditions of gender, economic, and ethnic inequality.

– become part of social development to empower young people to receive profound education.

Advantages of educational ecosystems:

1. A variety of resources and routes.

2. The possibility of competent, full-fledged use of resources and their exchange to create new methods and ways of learning.

3. Dynamism, changeability, adaptability to different conditions of knowledge transfer.

4. The presence of formal and informal learning processes.

5. A decentralized management system.

6. Student-centricity (or the presence of a student-oriented "change leader").

7. Focus on solving urgent socio-economic problems (Titova, Shishkin, 2023).

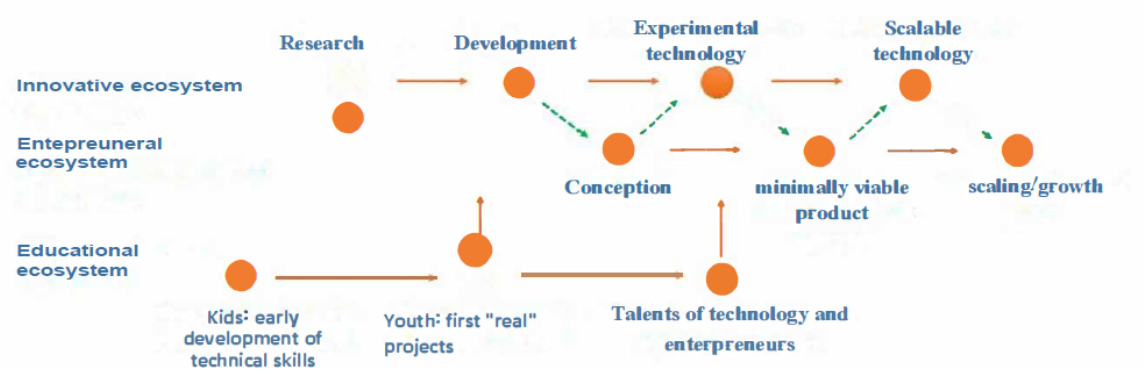

Figure 1. The place of education in the ecosystem of society.

Such structure as the National Research University can be named a classic way to integrate science and education. This cohort of federal and research universities, for which indicators have been developed and control programs have been drawn up for the entire educational system and in which serious resources are invested, have been identified as "locomotives", flagships of education.

But one cannot solve the problem with the state efforts only. Therefore, a public-private partnership system is absolutely necessary. It is important to take into account the opinion of the professional community, representatives of universities, employers, and society as a whole. Another promising type of integration alliances is consortia: an association in which the processes, roles and functions of the participants are established through agreements reached (Fig. 2).

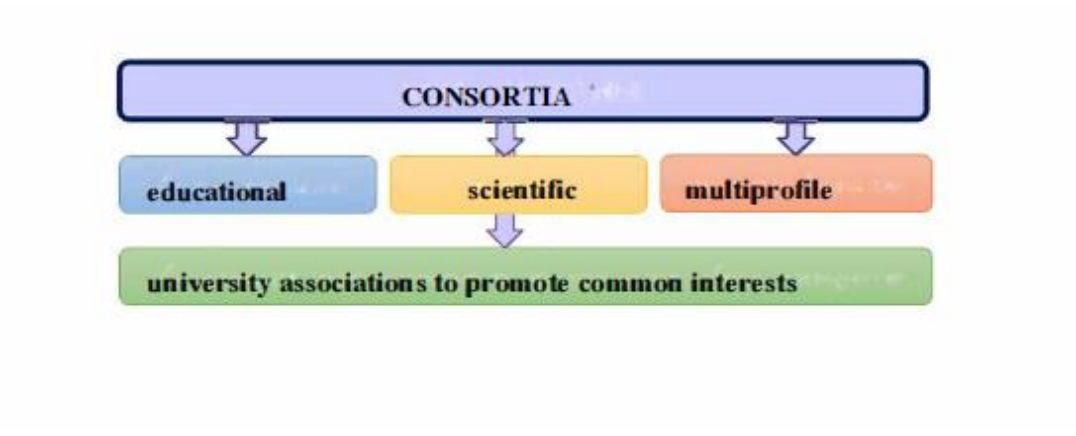

Figure 2: Types of consortia united by a common goal.

The most significant of them involve integration: (Titova, Shishkin, 2023).

1. The Russian higher education system in the global educational space and the global system knowledge.

2. Higher education with business (production);

3. Science and higher education. 4. Universities in the regional economy.

5. Universities in the national knowledge structure.

Increasing the integration potential of universities is a factor of competitiveness. Integration processes in higher education (Fig. 4) are aimed at combining the resources of universities to increase their competitiveness at the global and national levels, which creates a synergy effect. These processes are multidirectional, including the unification and standardization of educational norms and traditions, the preservation of one's own uniqueness and identity in the field of education, and the achievement of common goals and objectives through maximum

academic profit. Cooperation can take place not only within the framework of joint educational programs, but also scientific, innovative and social projects.

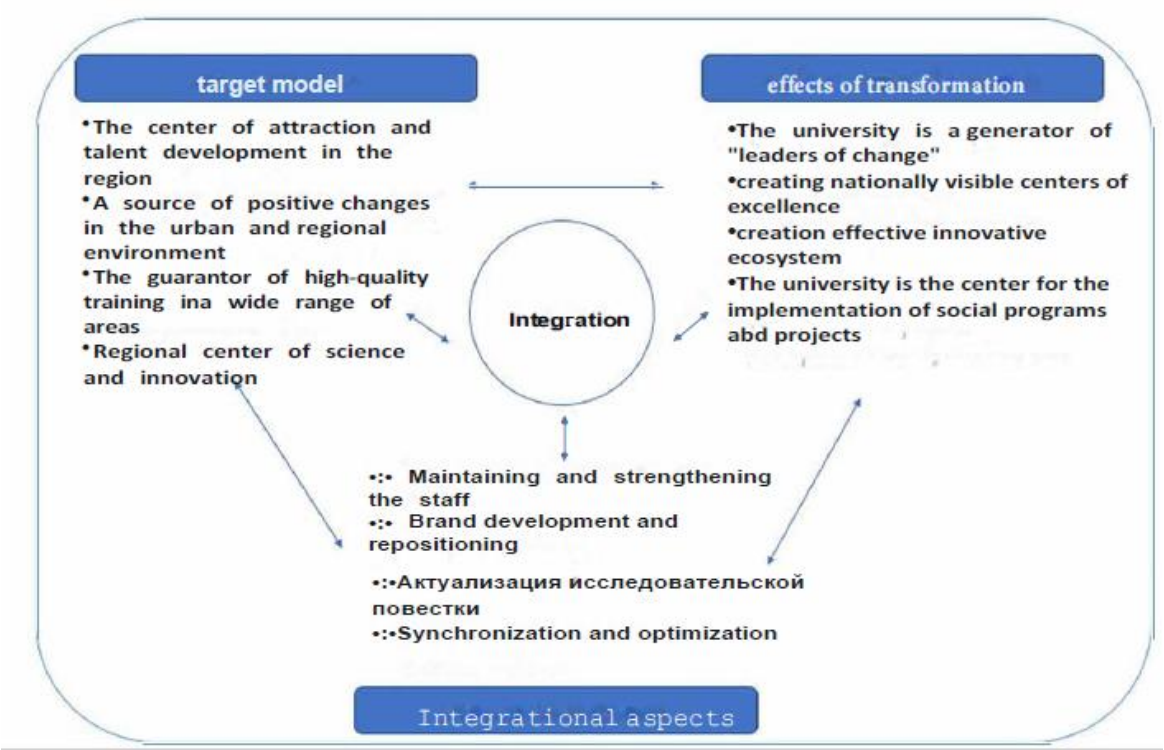

Figure 3: Integration processes in higher education.

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In addition, one of the tasks of the Ministry of Education and Science of the Russian Federation starting from 2024 is the introduction of network educational programs of technological master's degree in leading universities. It should be noted that the Master's degree programs are interdisciplinary. For example, "applied linguistics" combines a humanitarian component with mathematical methods of analysis and computer science. Specialists in this field are in great demand by those companies that are engaged in developments in the field of Internet search, creation of new programming languages, machine translation, etc.

Discoveries and breakthroughs are possible today, mainly at the junctions of sciences. The examples most often cited are physics, nuclear energy, IT, as well as biophysics, biology, biotechnology, medicine – everything related to living organisms, and this is where Russia has made especially significant progress.

Many universities have been developing for a long time not at the expense of paying students, but at the expense of income from science. New rules for financing scientific research are being formed on the basis of modern "measurement tools" of their effectiveness. One of them is publication activity. It is it that influences the scientometric indicator "Hirsch Index".

New federal educational standards should also be integrated into the existing system of interaction, in

which it is necessary to strengthen the professional component and integrated curricula.

The integration of universities into the regional economy requires that the content of vocational education takes place in accordance with the needs of the labor market. It's time to break the stereotypes that peel off from real life. Universities need to be combined with industrial complexes.

Thus, the educational process can help to increase the profitability, efficiency and profitability of the enterprise. There must be an understanding: even if it is a private enterprise, the mission is of national importance. And the specialists "motivated" for its production will eventually bring even more profit to the owner.

The trend of modern life, when the educational process is transferred to the enterprise of business partners, is symbolized by the so-called dual education system, the meaning of which is to "bind" theoretical knowledge to the realities of a high–tech production process. The basic principle of the dual training system is that part of the educational process – lectures, laboratory work – takes place on the basis of a university or college, and the "fine–tuning" of a specialist, industrial training - at industrial enterprises. The evaluation criteria needed by the business community should be incorporated into this system. And they will depend on a set of professional competencies dictated by business requirements.

Such a training system can be divided into 3 parts. If, for example, we are talking about production, then this is theory; training on special simulators that allow you to qualitatively simulate a modern expensive CNC machine – in fact, a computer combining software with a mechanism of execution; and, in fact, the practical part, reflecting the trend of modern life, when the educational process is transferred to an operating enterprise business partners to perform real production tasks.

Close cooperation takes place in two directions: business forms an order, and educational institutions make plans, programs, create joint laboratories to train personnel at the level of international standards. Mutually beneficial cooperation is based on the interaction of science and business, the commercialization of scientific developments, investments in projects that can be brought to market and receive financing.

Universities use the following ways to develop skills and build competencies:

– basic departments that allow you to obtain those competencies that cannot be acquired within the framework of a theoretical educational program (for example, work on nuclear reactors for transport installations, aerospace defense systems, small arms and artillery missile weapons);

– world-class laboratories as a prototype of the sites where graduates will work (for example, in the field of extreme applied optics, research of human brain processes, development of nanostructured materials based on titanium and zirconium for dentistry – practitioners and their patients are waiting for this, that is, almost every one of us);

– a system of clinical practice bases that allow you to prepare and then implement your own micro–project, the main feature of which is to obtain a practically significant result;

– cooperation with institutes of the Russian Academy of Sciences, participation in the work of technoparks, author's schools of scientists, sessions of young scientists at which they make innovative proposals;

– training and production grounds for working out professional competencies directly to meet the requirements of employers;

– upgraded resource centers which accumulate the latest production and educational technologies.

As a result, enterprises do not spend money on "refining" and "tuning" of young personnel: their competencies fully meet the requirements of the labor market. For example, the Russian Union of Builders conducted a certification procedure for the professional qualifications of graduates who undertake to work in production and construction sites, based on world requirements for the World Skills system or personnel certification – Gost R or ISO 9001:2001.

Employer’s expectations from young professionals are:

• be able to replenish their knowledge, strive for additional professional training;

• be oriented in related industries;

• apply non-traditional approaches to solving problems, finding competitive solutions;

• possess modern means of communication, methods of economic analysis and organization of marketing activities;

• promote the results of their professional activities in the market;

• be aware of the basics of Russian legislation, and often international law.

A profession that will always be in demand involves transformation according to the challenges of time – then education will allow you to change with it, "anticipate" tomorrow's demands of the real sector of the economy.

Formation of a multidimensional university model.

Modern higher education acquires features it did not have before. For example, in connection with the formation of the University 3.0 model, an innovative Triple helix model of innovation arises. From this moment, the mission of the educational complex includes education, science and innovation. Such a model involves interaction between universities engaged in basic scientific research, business that creates value added, and the state that coordinates and controls these processes. Hybrid structures such as technoparks, business incubators, etc. can be the results. Fig. 4 demonstrates strategic interactions along the triple helix model (triad) (Itskovits, 2011).

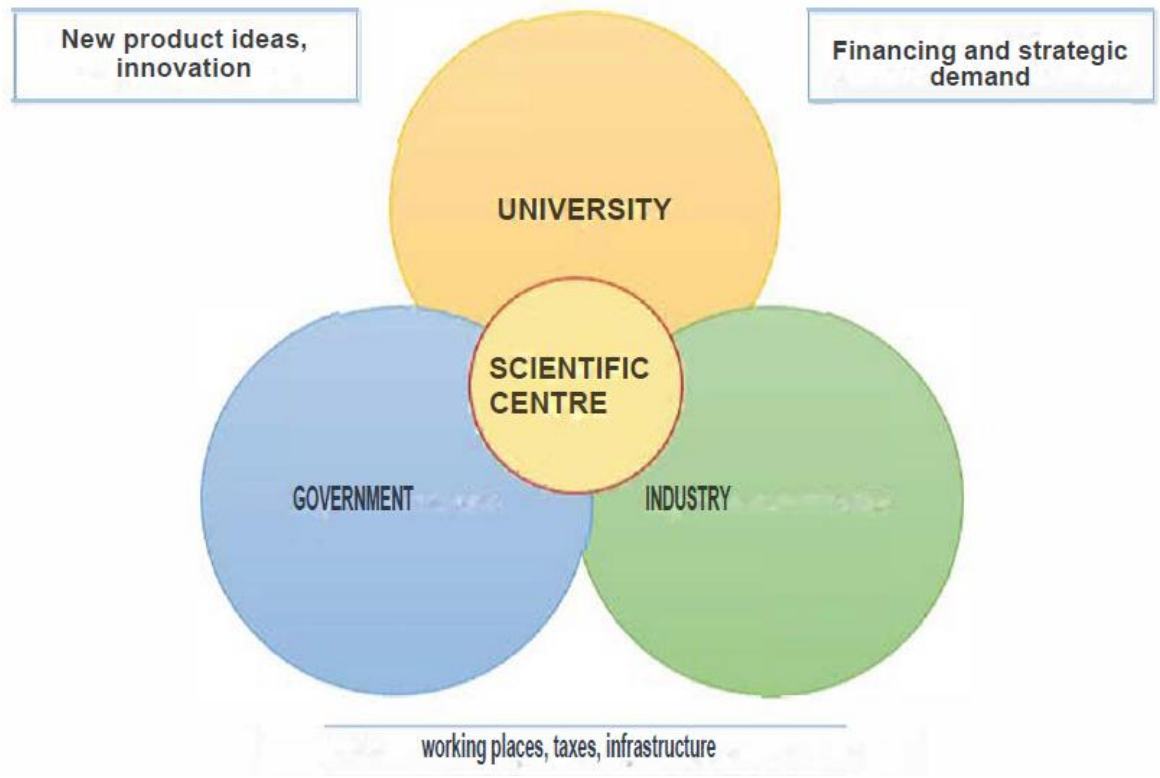

Figure 4: strategic interactions along the triple helix model.

The triple helix model demonstrates the openness of the innovation process and the gradual involvement of new parties in it. In the case of an even greater branching of models, for example, into a four-link one, the interaction of four subsystems is reflected:

– Science and education (universities and research institutes);

– Economic sector (industry, services and financial and credit institutions);

– State and political institutions that set the vector of innovative socio-economic development;

– Society (representatives of the media and culture).

With the further branching of the innovation spiral, issues of social and environmental responsibility of business, society and social institutions are accumulated in the formation of the fifth element – the "natural environment of the society".

5 CONCLUSIONS

Russian science is a strategic area of activity which the state invests in even in the most difficult times, because the viability and prosperity of our country depend on it.

Moreover, science is divided into fundamental, applied and university. At the same time, university science is "two–headed": it can be both fundamental and applied, implementing its developments in industry – many universities use this competitive advantage. And real results generate demand from partners and customers.

Advanced universities are developing experimental, research, testing facilities, and methods for modeling nuclear processes in the energy sector, including by means of supercomputers: improving nuclear installations is impossible without applied developments that are conducted in cooperation with universities.

But development is impossible without talented youth, the point is in their systemic motivation and the creation of conditions for the development of research, entrepreneurial and innovative activity.

The fundamental steps in this regard are legislative initiatives that take into account trends – the need for universities to interact with organizations of the Russian Academy of Sciences and organizations of applied science to conduct research. The Foundation for Advanced Research has been operating in Russia for more than 10 years. It focuses on systematic, purposeful work, because the development of one direction gives an impetus to the development of others. The Russian Scientific Foundation, established for financial and organizational support of fundamental and exploratory scientific research, personnel training, and the development of teams that occupy leading positions in a particular field of science, is successfully functioning.

A number of regions have adopted laws on grants in the field of science, technology and technology, on state support for innovation and investment activities, etc.

6 DISCUSSIONS

The search for a tool that provides advantages in the global hypercompetition of countries for successful future is the goal of our country's development and security. But import substitution is only the first step away from dependence. The following steps are export and import anticipation.

Hence the setting of a super task: to build a balanced, self-improving multi-network of scientific research and cultural support for reforms. The result should be a noospheric society with a predictable future based on multidimensional strategic management systems. The vectors of its development will be such as artificial intelligence and robots, human-machine interaction and bionics, electronics and computing, bio-hybrids, biomedicine, 3D printing and materials, overcoming resource boundaries, energy.

Modern scientific research is the work of many teams of different directions, whose results add up to an unexpected mosaic, and it turns out in something that yesterday seemed impossible. In conditions when there is a competition for the quality of human capital, it is necessary to talk not just about individual innovations, but about the assessment of innovative activity, the formation of an innovative society that imagines new ways, thinks in a new way.

Russia's task is to invest in quality education and support key initiatives aimed at the prosperity of the Russian economy.

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