

Federal State Budgetary Educational  
Institution of Higher Education  
"Astrakhan State University"

Rector

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**Program (draft program) of development**

Federal State Budgetary Educational Institution of Higher Education "Astrakhan  
State University"

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**for 2021-2030**

The program (draft program) of Federal State Budgetary Educational Institution of Higher Education "Astrakhan State University" is presented as part of the application to participate in the selection of universities within the "Priority 2030" program (hereinafter – selection).

The program (draft program) is aimed at assistance to Federal State Budgetary Educational Institution of Higher Education "Astrakhan State University" in achieving the national goals of development of the Russian Federation in the period to 2030, at the balanced spatial development of the country, at availability of good-quality higher education in the regions of the Russian Federation, within the "Priority 2030" program.

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## **1. Current state and results of the university's development in 2010-2020. Target model and its key characteristics.**

### **1.1 Key results of development in the previous period and the existing potential.**

#### Educational activities

At the beginning of the 2020-2021 academic year, 12,974 people studied at the FSBEI HE "Astrakhan State University" (hereinafter referred to as the University, ASU) on basic professional educational programs, the list of areas of training and higher education programs are presented in tables 1 - 3 of the appendix to the section. The formation of the structure of specialties was based on the needs of industries and spheres of activity of the Astrakhan region, in this regard:

- opened a bachelor's degree in welding for regional shipbuilders (300 people);
- the faculty of agribusiness was created (directions "Agronomy", "Agroengineering", "Technology of production and processing of agricultural products");
- "Biotechnology" master's degree program was opened for the fishing industry (about 400 people were trained), a scientific laboratory of biotechnology was created, advanced training programs are being implemented, a joint postgraduate program of ASU and Ca'Foscari University (Venice, Italy) with the simultaneous obtaining of a Russian candidate of science and PhD. The "Ichthyology and fish breeding" direction was opened under the order of the region;
- in order to develop at the enterprises of nanotechnology and nanoindustry, a bachelor's degree in robotics was opened (100 graduates);
- "Tourism" bachelor's degree was opened (annual admission of 60-65 people, in total, about 600 specialists in tourism and hotel business have been trained);
- seven educational programs were opened under the President's program for the training of management personnel, more than 750 people were trained;
- in order to develop the transport and logistics complex of the region in 2014, all levels of the "Logistics and supply chain management" were opened (100 people).

When forming educational policy, the trend of a decrease in the birth rate (in 2020, natural population decline - 2,701 people) and migration outflow in the region (2019 - 7,881 people, 2018 - 3,496 people) are taken into account. According to Rosstat, by 2036, there will be 867 disabled citizens per 1,000 workers, and therefore the university conducts admissions campaigns in Russia and the countries of the near and far abroad (primarily the Caspian region).

As part of the CDIO methodology, in 2013, the Philosophy in Large Streams project was launched for most areas of training (9,000 people received soft skills in team building and leadership), for students in robotics (329 people), training was fully based on CDIO standards.

## Research activities

The ASU implements more than 30 scientific directions corresponding to the Russian scientific and technological standard. There are 6 scientific schools, which are the core of 50 postgraduate training programs: more than 700 graduate students have graduated, of which they defended their dissertations for the degree of PhD more than 160 people (22.8%, which is higher than the national average). Projects of ASU scientists have repeatedly received grants from Russian scientific and foreign foundations, programs and organizations.

2007 to 2015 ASU has created more than 100 SIEs (aggregate turnover of about 230 million rubles) on the basis of the ASU Technopark. The result is the publication activity of the teaching staff, undergraduate and postgraduate students (annually about 3000 scientific papers, the creation of RIA, the receipt of Russian and foreign grants). ASU cooperates with industrial partners in the implementation of research projects (more than 120 agreements have been concluded). For more than 10 years, the Center for Collective Use "Advanced Technologies in Electronics and Robotics" has been operating; technologies of the project office "Artificial Intelligence". The most significant results have been achieved by scientific schools in the areas of studying the problems of the Caspian: conservation and restoration of biological resources; production of ecologically clean agricultural products; ecology of improving the quality of life; integrated security and geopolitics.

## International activities

ASU has signed "double-degree" agreements for joint master's degree programs. ASU has signed agreements with universities from 29 countries, the University is a member of the SCO University (since 2009 in the field of "Information Technology"), the Association of Universities of Caspian Region States (which includes 55 universities), Black Sea Universities Network (BSUN), it is a partner of the Directorate-General for Conference Interpretation of the European Parliament, Directorate-General for Interpretation of the European Commission, the World Intellectual Property Organization (WIPO), World Association of Russian Graduates of Higher Educational Institutions, International Association of Translation Institutes CIUTI, World CDIO Initiative, International Labour Organisation (ILO). It is also promoted by the UNESCO Chair "The Learning Society and Human Sustainable Development" established in 2004 at ASU, which aims at creating a regional system of continuous education and enhancing the development of innovative programs and projects aimed at the implementation of UNESCO's ideas and mission.

In 2007 ASU was selected by Harvard Business School (USA) as a pilot site for implementing an educational program in international competitiveness. In this regard the Russian-American Centre for Education and Research was set up and a new management training program based on the "Microeconomics of Competitiveness" course delivered by Professor M. Porter (USA) was developed. Since 2000 more than 10 major international projects under the Tempus-Tacis Programme have been implemented at the University. ASU was the coordinator of works in 5 projects (together with universities in Nice (France) and Glasgow (Scotland)).

With the help of ASU Tempus projects, the European Credit Transfer System (ECTS) has been introduced into the university's educational process, which allows to intensify student exchanges with European universities, which helps (since 2013) to train translators (more than 120 people, including 14% - students from Italy, Kazakhstan, Azerbaijan). In the framework of cooperation with WIPO, CITS undergraduates enreaches the WIPO Rearl terminology base. Education at ASU takes place in 15 languages, including 9 oriental. The high level of professionalism of the graduates is confirmed by the Department of Linguistic Support of the Ministry of Foreign Affairs of the Russian Federation. In 2010 - 2020 ASU demonstrates a positive dynamics of indicators characterizing the effectiveness of international activities (Table 4 of the Appendix to the section): the number of foreign students - (as of 01.10.2020) 1958 people. from 50 countries of the world (17.7% of the total number of students), which is 40 times more than 2010 (50 people), 88 programs of international academic mobility (8 times higher than 2010), 29 double degree programs (growth more than 2 times).

## Human Capital Management

By 2014, the university had 13 dissertation councils and the level of tenure was 75% (annex, Table 5), there was an active recruitment of doctors and candidates of science (Oriental languages, Robotics). Improving the competence level of personnel, 15% improved their qualifications in leading universities in Russia and the world: a) interaction with St. b) projects with the Worcester Polytechnic Institute and the Financial University under the Government of the Russian Federation made it possible to develop hard skills in the field of engineering sciences and digital culture (advanced training of teaching staff, creation of joint student teams in robotics and alternative energy); c) cooperation with MIT (USA) and with Skoltech in the framework of CDIO made it possible to switch to a project-based method in teaching and research; d) participation in international conferences on the initiative of CDIO made it possible to build up the competence of teaching staff and open the direction "Robots and robotic systems" according to international standards; e) partnership with Toyota (Japan) made it possible to work out management technologies for organizing educational and scientific

processes (built-in quality (5S, TPM, Kanban), Just In Time).

In 2016, an educational building (more than 14 thousand sq. M.) Was introduced, designed taking into account the requirements of project learning, innovation and innovation based on CDIO and including a laboratory of robotics, electronics, design and prototyping, a laboratory of ideas. Over the past 15 years, the number of educational buildings has been increased from 3 to 12, the number of student dormitories - from 3 to 7, the main part of the classroom fund has been modernized.

## Additional education

ASU is the permanent leader in additional education in the region (appendix, Fig. 1). At the moment the university offers more than 500 practice-oriented additional education programs, more than 300 of which are professional development and professional retraining (10-fold growth for 2010-2020). In 2019 Astrakhan State University won the competitive selection under the project of the Ministry of Education and Science of the Russian Federation "Training citizens in lifelong learning programs in educational organizations, implementing additional educational programs and vocational training programs" of the federal project "New opportunities for everyone" of the national project "Education". Main results of the project in 2019: 7,600 people from 66 cities of the Russian Federation were trained under 4 life-long education programs. In 2020: 3,473 people from 93 cities and 35 regions of the Russian Federation were trained under 8 professional development programs. In 2019, as part of federal projects:

- "Every Child's Success", the University opened the Center for Development of Modern Competences of Children "House of Scientific Collaboration named after V. K. Trediakovsky" in 4 trajectories: genomic engineering, bioinformatics, machine learning and design. More than 500 people attended the classes;
- "Teacher of the Future" created two centers for continuous professional development of teaching staff, on the basis of which about 850 people were trained.

In 2019, the Caspian Higher Engineering School was opened at ASU, which, together with the engineering classes operating on the basis of partner schools, solves the problem of forming engineering competencies of students. The project of the World Engineering Games, the regional stages of which are held annually by ASU, contributes to the solution of this problem.

In the period 2010-2020 ASU: formed as a multipurpose educational complex based on the dynamic renewal of EP, taking into account development trends and global trends, providing personnel for the socio-economic development of the Astrakhan region; a significant scientific groundwork has been obtained in certain areas; educational products that are competitive on the Russian and international markets (primarily in the Caspian region) (robotics, oriental languages,



agricultural areas, information security) have been created, developed international cooperation to increase the attractiveness of Russian education; built up human resources (organizing foreign internships, obtaining additional vocational training in Russian and foreign EP, corporate training); ensured the growth of the material and technical base that meets modern requirements; occupied a strong position of AE in the region, based on an in-depth analysis of the labor market and modern trends.

### **1.2 Mission and strategic goal.**

The mission is - to promote the economic power and Russia's international influence in the Caspian Sea, to develop human, scientific and technical potential of the Astrakhan region as a geostrategic territory of the Russian Caspian Sea, generate and transfer scientific knowledge and technologies, preserve and enhance spiritual values and traditions by integrating the reproduction of new scientific knowledge, elite staff and innovation.

The strategic goal of the ASU development until 2030 is to establish the university as the core of an innovative scientific and educational cluster, a resource, expert and analytical centre of the Caspian macro-region.

### **1.3 Key characteristics of the target model of the university's development, comparative analysis based on the exemplary indicators and the university's target model.**

The ASU development program is based on a territorial leadership model based on the integration of three elements: 1) Region-shaping University, holding a special place in the regional socioeconomic system, having a special impact on regional development through building up human capital, participation in national and international projects and programs, integration into the global scientific and educational space, development of humanitarian cooperation. Uniting intellectual resources, facilities and socioeconomic relations into a single whole on the basis of the university ensures the vital activity of the region, determines its socioeconomic, sociopolitical and sociocultural stability and enhances an integrative role of the region as a geostrategic border area. 2) University, having a unique top-level infrastructure, concentrating all the resource potential on the scientific frontier and using the educational, scientific, technological and innovative potential of the partner group for implementation in the educational process (academic mobility, traineeships, online courses and other forms), and offering new solutions to the issues of spatial, personnel, social and technological development on ensuring the socioeconomic growth of the region. 3) University as an infrastructure platform for developing a wide range of search activities aimed at promoting diversification of the regional economy by creating new points of growth - technological industries of the region-shaping clusters, ensuring the security of the geostrategic border area, expanding the influence in

terms of the export of education through a constant influx of the active youth.

The target model will be implemented through the solution of the following tasks:  
to form a single integration environment with strategic partners that will help overcome resource limitations (including by means of the merging of Astrakhan State University of Architecture and Civil Engineering (ASUACE) and ASU),  
generate and disseminate innovative knowledge and breakthrough technologies;  
to shift to a practice-oriented learning model, transform educational trajectories into individual ones, expand the module of Master's and postgraduate studies in cooperation with the leading partners;

to update the model and pedagogical design of the main EPs, their actualization, taking into account the labor market and the emergence of new professions, based on the competence of network partnerships and interdisciplinarity;

to implement a flexible architecture for continuing education by promoting new unique programs with a variety of training formats;

to form ideological values in students by scaling up new pedagogical practices and introducing the opportunities for free self-determination to increase their competitiveness;

to ensure the development of competitive scientific schools in priority areas for Astrakhan Region and the whole country;

to develop scientific services (protection and promotion of the university's intellectual property);

to create a motivating environment and individualize HR development trajectories, conditions for attracting talented specialists from leading Russian and world scientific and educational centers;

to form an efficient system of work with the youth, aimed at civil-patriotic and spiritual and moral education, to expand opportunities for self-fulfillment and develop youth entrepreneurship;

to create an efficient digital university with the maximum coverage of the digital services on a single digital platform;

to transform the management system into a flexible project environment, to form an adaptive organizational structure and increase the management efficiency.

The target model will be implemented in three stages: 1 (2021 - 2022): reorganization of ASU through the merging with ASUACE. 2 (2023 - 2025): strategic investment in the university – creation of the necessary infrastructure, material, technological, organizational, financial, HR and information conditions. 3 (2026 - 2030): obtaining results from the investment, aimed at strengthening the university's position in education, research and innovation at the Russian and international levels.

Stages 1 and 2 form a basis for achieving future excellence in the selected priority areas by combining a critical mass of invited experts and infrastructure; active participation of the university in the implementation of national projects will increase.

The key characteristics of the ASU target model are: the volume of R&D per one

scientific and pedagogical worker will be 225,000 RUB in 2030; the number of foreign students of the university will double and will be 4,200 persons in 2030; the share of Master's degree students and PhD candidates will increase to 20.4%; the number of students of additional education programs (AEP) will increase 2.5 times (up to 15,000 persons in 2030), including online courses, expansion of the range of digital and the most in-demand AEPs; at least a double increase in the volume of income from the implementation of AEPs – up to 203.76 million RUB; more than 70% of the University students will be involved in volunteering; an increase in the number of publications and citation in the journals of Q1 and Q2 in Scopus and Web of Science; the employment rate of the university's graduates will exceed 95 percent.

#### **1.4 Unique characteristics of strategic positioning and development routes.**

ASU is a multidisciplinary educational complex in the region with unique resources and competitive advantages:

- Modern scientific and educational infrastructure of the University, formed taking into account the geographical and geopolitical location of the Astrakhan region (the border geostrategic territory of the country, representing Russia in the strategically important Caspian macroregion).
- ASU is a leader in training specialists for region-shaping clusters.
- Membership in associations of leading universities of the European Union and Asia; cooperation with major leading foreign and Russian organizations in the field of science, education and economics, public authorities.
- ASU is the leader of the region and the Southern Federal District in innovative technologies and a project-oriented approach to teaching engineering specialties (CDIO).
- High level of students' involvement in scientific research (more than 70%).
- Deep orientation of ASU scientific school to the final results.
- Formed team of highly qualified specialists of the scientific pedagogical school.

Merging ASU with the Astrakhan State University of Architecture and Civil Engineering (ASUACE) will strengthen the competitive advantages of ASU that will expand the number of training programs for engineering and transport infrastructure; will ensure consolidation of regional and federal financial resources; will complete the formation of the distributed (network) university and will create the architecture of a "region-shaping" university, expand the university's participation in the development of main regional clusters and strengthen the ASU position as a territorial leader.

The university maintains the effective functioning of the integral system and considers a set of positioning models for development: 1) affordable high-quality education for the population with different income levels; 2) a modern university ecosystem with a campus, convenient location, unique educational programs, which are less expensive in comparison with programs in elite universities; 3)

categorization of scientific and pedagogical specialist, reduction of bureaucratic procedures of accompanying processes.

The available resources will allow ASU to become an integrator in the scientific and educational area of the Caspian macroregion, to develop export of educational services for the Caspian countries, CIS and SCO countries. The multilevel system of educational programs (vocational secondary education, higher and supplementary vocational education) will ensure the content and competence continuity of educational levels, creating conditions for comprehensive and continuous professional development. After merging the ASU with ASUACE, the diversification of the nomenclature of specialties will be continued, taking into account the demand of region-shaping clusters. Expansion of the pool of strategic partners and development of integration contacts will allow to ensure the personnel and technological needs of region's economy.

The implementation of strategic projects will contribute to the ASU transformation into entrepreneurial research university. The new role of the University development is unique innovative educational products aimed at mastering new professions and obtaining innovative skills, ensuring territorial leadership in the research and technological aspect, aimed at the development of the region's economy. The program will make a significant contribution to the achievement of the national development goals of the Russian Federation until 2030 and will allow solving tasks of the federal and regional levels.

### **1.5 Principal limitations and challenges.**

External restrictions and challenges for ASU's activity are: a) maintaining a low level of demand that can be paid by population for services; b) high competition in the market of innovative services; c) decreasing attractiveness of the teaching profession as well as the status of a young scientist for talented university graduates; d) the employers not ready to invest personnel training, professional development of specialists, improving the competencies of personnel and financing scientific research; e) insufficient number of high-tech industries in the region; f) increasing competition from leading universities and dumping prices from competitors in the regional market; g) the lack of the possibility to involve "world-class" scientists from other universities.

Internal restrictions for the university's development are: a) the educational process aligned insufficiently with world science, high-tech production, developing business achievements; b) a short list of educational programs taught in foreign languages; c) decrease in the efficiency indicators of research activities: reduction of budget funding for research and development, low growth rates of Research, Development and Engineering volumes; d) inflexibility in the management of research activities, low level of commercialization; e) low publication activity of the university's practices and scientific developments; f) lack of Dissertation Board; g) insufficient development of the digital scientific and educational space; h) university's employees not ready for changes; i) significant moral and physical

deterioration of the property complex, a limited number of places for foreign and nonresident students to stay in dormitories.

Possible obstacles and factors hindering the implementation of strategic projects:

a) the active development of the transport and logistics sector determines the relevance and the need of research in improving the efficiency of transportation. Changing internal market, increasing prices for fuel and cargo transportation may lead to a decrease in business activity. b) The agrarian character of the Astrakhan region determines the special relevance of applied research and developments and is a prerequisite for high-tech products and technologies. A growing competition in the market, reducing investment of the area, impact of the adverse agrometeorological conditions also could be the restrictions. c) A weak innovative activity of regional companies could restrain the marine robotics development. d) The outflow of the young population (school graduates) such as the redistribution to other cities, as well as a possible reduction in the inflow of nonresident and foreign students.

Mechanisms for solving the main challenges are: a) creation of a Headhunter space for identification, development and retention of young recruitment; b) internationalization of scientific and educational activities of the university as a soft power's representative of Russia in the Caspian region through the Association of state universities and Scientific institutions of the Caspian region countries, the Commission for Science, Technologies and Innovations, and Transport & Logistics Consortium; c) incorporating the Kaizen's principle into education and scientific activity, broadening of the spectrum of services, providing choice of unique educational paths and flexible pricing; d) creation of an entrepreneurial model of the university through achieving financial autonomy by increasing the share of revenues from extra-budgetary sources.

## **2. Plans to achieve the target model: the university's policies in the main domains of activity.**

### **2.1 Educational policy.**

The current situation and available resources including characteristics of integration and cooperation with other institutions. The main stakeholders in the market of educational services of higher education in the Astrakhan region are 5 higher education institutions, 9 branches of Russian universities that implement their unique areas of training for their professional and subject areas and meet there with ASU. This determines the following milestones of educational policy:

- 1) transition from a bachelor's university to a master's university,
- 2) updating educational programs (thereinafter EP) with respect to the emergence of new professions, transformation of the traditional training model into a project practice-oriented one, including flexible EP with an interdisciplinary nature of training,
- 3) transformation of regulated academic paths into individual ones (up to 50% of EPs with dynamic academic groups),
- 4) relying on the competencies of network partners, obtaining new educational practices, building digital competencies and skills for using digital technologies among teachers and students.

ASU has the internal restrictions. By ratings the university is the sixth institution of higher education in the Southern Federal District (table 1 of the Appendix to the section) and is on the first place in the 2d league (in accordance with 2021 data of National Aggregated Ranking). ASU has a significant groundwork in internationalization of education and it acts as a basic university in the field of IT technologies at the SCO University through its participation in three major international network projects under the TEMPUS program and its membership in the Global Access Asia Educational Platform where it organizes academic mobility and academic students exchange programs which let it be highly competitive with the leading federal universities (Figure 1 of the Appendix to the section) in the annual growth of foreign students (near-abroad States). That explains the cooperation with far-abroad countries as well as growing number of students from those States with which contacts have been established.

ASU has a leading position in terms of the range and number of additional EPs in comparison with other universities of the region (Figure 2 of the Appendix to the section). The task of providing the opportunity to have, along with the main professional education, the additional educational programs in digital competencies (thereinafter, DC) and professions of the future has not implemented.

The key priorities of the educational policy are defined (Schema 1 of the Appendix to the section) are: updating the model and pedagogical design of the main EPs, developing a network educational space and its internationalization, development of additional EPs.

The updating of the pedagogical design of educational programs will be carried out in the context of the standards of the CDIO Global Initiative, which are: the transition to interdisciplinary project-based education and the reorientation of educational paths to individual ones. The choice of individual educational paths (IEP) will be facilitated by the implemented training model "2+2+2" (2+2 years of bachelor's degree + 2 years of master's degree) allowing to make a conscious choice of an IEP. The use of the IEP will be carried out as part of the phased distribution of the model "2+2+2" in bachelor's and specialist's programs. An example of an EP constructor is shown in the figure of the Appendix to the section. An increasing number of students enrolled in master's degree programs in the total number of students will lead to a changing structure of the master's degree educational model (Figure 4 of the Appendix to the section). Master's programs will form DCs for undergraduates in order to ensure the continuity of bachelor's (specialty) and master's degree educational programs and taking into account the greater differentiation of initial training. The new model for implementing EPs involves the extension of the practice of student's project activities involving employers and university departments in educational projects, the use of an adaptive learning method and adaptive leveling courses as well as a digital service based on the intellectual analysis of educational data "Achievement Profile".

It will be created a system for evaluating the effectiveness and efficiency of the EPs by their participants (students, teachers, employers).

The development of network educational space. Modernization of the pedagogical design of EPs through network interaction: a) creation of the Caspian Network University carrying out interdisciplinary network EPs, including their online format, covering STEM-specialists training as well as specialists of non-IT area, but applying digital competencies in pedagogy, socio-cultural areas, linguistics (within the framework of a Consortium of universities and scientific institutions of Astrakhan region), b) development and implementation of network EPs for the branches of the regional economy (including additional EPs) (Transport & Logistics Consortium of Caspian Higher Educational Institutions, the world-class Research and educational center "Innovative solutions in the agro-industrial complex", the Consortium "Shipbuilding & Marine Technology"), c) building inter-university student teams.

In order to expand the possibilities of the network form of implementing EPs, ASU will use different types of partner and network interaction which can be reduced to the program of "two diplomas", "combined educational program", "academic mobility", "online mobility" programs depending on the EP structure.

The internationalization of education will be possible due to: the introduction of new educational programs (EP) focused on the best international educational practices and the global market; the development of new joint EP and programs in the English language, development of online education, academic mobility, summer educational programs for foreigners. To achieve that, the conditions for

the education of foreign students will be provided; new double-degree programs will be opened, academic mobility will be organized, the presence of ASU resources on the global online platforms will be increased; there will be implemented a multilevel model of the continuous foreign-language training which will let increase the number of Russian students involved into EP in the English language as well as the number of educational and scientific projects accomplished in foreign languages; EP implemented online (both in the English (foreign) and Russian languages) will be created; the practice of admission of foreign students to the interdisciplinary EP will be expanded; the representative offices of ASU in CIS countries on education, science and technologies will be opened.

Development of additional education and vocational training.

ASU is planning to provide the students with a continuous, “seamless” transition into work or scientific activity, other qualifications. Additional education and vocational training will be implemented through the potential of digital technologies which are regarded both as a learning tool, and as a tool to be taught. The range of programs for businessmen will be expanded in accordance with all the demands of the business environment to the business competencies. The implementation of the programs will be based on competence-based, practice oriented and project-based approaches, on the usage of the cases-oriented education.

Special attention will be paid to the citizens of the third age. There will be developed and implemented adapted EP which will enable socialization and active longevity of people of the third age. The university will increase the number of learners involved into the programs of additional vocational education from 6 thousand people in 2021 to 15 thousand people by 2030. This will be achieved by increasing the focus on the programs, developing the additional education based on business partners’ franchises, increasing the range of modern tools for the work with the consumers of additional education services. This new approach to the organization of additional education and vocational training will let more than 30% of students get the professions of working men/women and office workers or take advanced training courses.

All the activities named above will be accompanied by the structural changes in the university which will be merged with Astrakhan state university of architecture and civil engineering (ASUACE) which will enable ASU to strengthen its scientific and educational potential, as well as training and laboratory base, to obtain new Russian and foreign partners, to diversify a range of EP (to fill a niche in the field of construction, heat power engineering, fire safety), to open interdisciplinary training programs. There will be the transition to the system the main structural unit of which will be an EP headed by a leader who has vast powers not only in the organization and implementation of the educational process, but in the recruitment of employees, interaction with employers. New structural units will appear: institutions/academies/schools, training offices, the



department of the development of educational programs and projects. There will be organized professional internships for the teaching staff, academic mobility, engagement into scientific and practical activities, active learning during the classes.

The following results of the educational policy are expected:

- a) the strengthening of post-bachelor education and inclusion of the university into global scientific and educational network;
- b) the change of the traditional form of education into a project-based one will increase the demand for qualified personnel and will lead to the implementation of the appropriate educational programs;
- c) changes in the educational programs contents which are aimed at meeting the needs of a dynamically changing economy and the formation of a critical mass of young talents at the university;
- d) international expansion of master's and postgraduate programs.

### **2.1.1 Establishing the necessary conditions for the formation of digital competencies and skills of using digital technologies among the students, including students of IT.**

The implementation of the educational policy will be connected with the digital transformation of programs in three areas.

Systemic educational changes will affect the educational environment, information content and EPs. It is connected with the creation of conditions for downloading the digital footprint of each participant of the educational process: developing a model of competencies, unified technological standards and EPs for working with the digital footprint as well as developing a community of specialists, working with the digital footprint in education, the university's educational information content through its own unique groundwork as well as through access to external digital platforms and online learning platforms, the use of big data processing methods, virtual and augmented reality technologies, block chain technology, Internet of Things technology for the development of EPs and IEPs, a mandatory inclusion of assessment tools for testing digital competencies and skills into finds, development of EPs for advanced training for additional EPs in the field of digital economy.

The development of EPs will be connected directly with the digital profiling EPs, the extended range of additional EPs for students of IT non-core areas (for their future professional adaptation in the professional world), the extended range of profiles of EPs from the list of training fields for professions and specialties of educational programs of higher education with the building of two or more key competencies of the digital economy.

The development of digital competencies and skills of using digital technologies among students will be made through:

- preliminary study in the information technologies field, an IT action group from among students working with employees, students and other various groups of

the region population;

- updating the content of EPs for digital, elective courses aimed at mastering algorithms and programs suitable for practical application as well as skills for using and mastering new digital technologies, an intra - university project for the exchange of digital skills between students and "My digital Environment" students, professional training at the stage of mastering the main professional program in priority areas.
- monitoring digital performance using the service "Achievement profile" and elaboration of an individual program of development, startups as the graduation theses, intensive courses in programming, project session on technology for navigation in space (including their relevance to the objectives, the personal qualities and abilities of the student);
- integration into EP's structure of the subjects (modules) aimed at mastering more than 2 competencies of digital economy that will increase the number of students with digital competencies from 1360 people in 2021 to 12408 people on full time.

The improvement of digital competencies and skills of using digital technologies by teachers will be implemented by means of the development of digital literacy and digital culture and it includes the following activities: an individual program of digital development of each employee of the University, a digital assistant created under psychological and digital profile, a system monitoring once every three months the digital success of the University and rating digital literacy, professional development and retraining of the ASU's academic staff in the implementation of the educational process on the basis of DCs; training in the form of online and offline practical monthly meetings for working out specific situations of communication with other users of social networks, presentation of information about yourself to build the skill of correct self-presentation in the information space, participation in project sessions to create digital competencies, as well as to support students startups.

## **2.2 Policy in science and research, and policy in innovation and commercial use of developments.**

Current Issues. The regional specifics and challenges of Astrakhan Region (issued faced by the Caspian macroregion and by Astrakhan Region as a frontier geostrategic area of Russia) have determined the key research fields for ASU: research of unique biological diversity and ecology of this region, sturgeon breeding and aqua culture; new technologies for the agricultural industrial sector; robotics for shipbuilding; assessment and development of unique fields of natural gas, gas condensate, and sulfur; complex security and geopolitics of the Caspian macroregion. Fundamental science is developing at ASU (over 30 fields), first and foremost: Physics and Material Science, Chemistry of Hydrocarbons, computer modeling, Humanities and social sciences, Biology, Biomedicine and Gerontology. Six research schools operate at ASU. Researchers of ASU perform their activities

in accordance with the Strategy of Social and Economic Development of Astrakhan Region. The leading research fields in the number of publications in Scopus and Web of Science journals are as follows: Physics, Engineering, and Robotics – 363 articles; Chemistry – 124 articles; Ecology and Earth-related sciences – 103 articles; complex security (Humanities, culture, multidisciplinary research) – 103 articles; Biology, Genetics, and Biomedicine – 103 articles; agriculture – 58 articles; Economics, transport, and logistics – 32 articles. ASU research activities aim to integrate into international collaborations to resolve issues that the Caspian macroregion is facing: ASU is responsible for activities of the Commission for Science, Research and Technology at the Association of Universities and Research Centers of the Caspian Region States. In 2020, ASU joined the Caspian Hub on Sustainable Development Goals established by Atyrau Oil and Gas University named after S. Utebayev (Kazakhstan). ASU is integrated into the Russian research network with the key centers of competencies; based on its cooperation with its partners, research laboratories operate to tackle the regional tasks and comply with Russia's national priorities (See Table 1 of Appendix).

The result of ASU research activities is 752 units of its nonmaterial assets (as for December 31, 2020), including 75 inventions and useful models. The total balance value of objects of intellectual activities is 6.49 m RUR, including the book value of inventions and useful models – 1.3 m RUR. The number of staff members and students applying for registration of their rights for intellectual property is growing (from 45 staff members and 9 students in 2017 to 70 staff members and 42 students in 2021). Over the last 2 years, the number of ASU students involved in project activities has increased as well. A first-level Technology and Innovation Support Center operates at ASU. In 2021, ASU has also joined the National Association of Technology Transfer. ASU has signed over 120 direct agreements of cooperation with a number of enterprises both in Astrakhan Region and outside it. It cooperates with 18 consortiums. ASU has assumed the 98th position in the National Ranking of Universities in the nomination "Innovations".

At the same time, there are considerable issues and risks: 1) the dynamics of average annual funding of research per professor is not stable; it depends mainly on federal programs and funds (See Fig. 1 of Appendix). The main share of income from research activities tends to relate to contractual agreements; however, this field should be increased. 2) Analysis of attracted income over 2010-2020 demonstrates prevalence of research activities in the field of Humanities related to geopolitics and complex security of the Caspian region (418,960,200 RUR of attracted funds or 53 %), in the field of natural sciences and agriculture (243,247,400 RUR or 36 %), in the field of technology and applied sciences (49,505,500 RUR or 11%) (See Fig. 2 of Appendix). Only 10 % of faculty staff members have been involved in research funded by grants.

The results of publication activities have been demonstrating sustainable growth over the last decade. The total amount of Web of Science and Scopus publications

has increased fivefold at ASU over this decade. If compared with other universities of South Russia, ASU rates are average; yet, there is a real sustainable growth potential.

Issues & Restrictions. ASU research activities have a number of different strategies, which results in irregular growth in particular rates and in high susceptibility to external factors. The internal restrictions of ASU research include: 1) insufficient involvement of its faculty staff (90 %) in research; reduction in grant funding for regional universities; closure of research funds; 2) publication activity of ASU staff in foreign journals (WoS and Scopus) is rather low; 3) commercialization of intellectual property is run inefficiently; 4) there is no interdisciplinary interaction between different research schools and fields; 5) the system of faculty stimulation for research results is not efficient.

The external restrictions for development of ASU research activities are as follows: underdeveloped digital economy in Astrakhan Region; orientation at the agrarian and industrial technological sectors (1); there is no clear correlation between activities of the productive research centers and schools of ASU and the needs of Astrakhan Region (2); an unstable demographic situation in Astrakhan Region (3); inefficient interuniversity integration (4).

These challenges imply meeting the following goals: inclusion of ASU into research educational and innovative networks; formation of a single integration environment with its strategic partners that contributes to overcoming of resource limits, provision of a large number of search activities aimed to contribute to diversification of the regional economy by establishing new “points of growth” – technological sectors; concentration of the resource potential of ASU and its partners at the research frontier. Achievement of leading positions in R&D, generation of new knowledge, and creation of competitive intellectual products will make it possible to break through in the top-priority fields and become a real leader in innovations in the Caspian region.

Based on analyzing the best practices and selecting universities for benchmarking (See Appendix), ASU has developed the following tasks and goals: the research policy of ASU, which is traditionally aimed at achievement of KPI in obtainment of research income and increased publication activities, will be supplemented with a number of entirely new tasks related to realization of strategic projects: 1) Development of research teams to resolve fundamental and applied tasks as part of interdisciplinary cooperation, attracting the faculty staff and students to cooperate closely with business partners (there is a social elevator program and students socialization mechanisms at ASU); 2) Provision of the right conditions to develop and keep talented young researchers at ASU and in Astrakhan Region based on the system of internal grants and scholarships (the Top 5 Program for future Doctors of Sciences); 3) Establishment of new centers of competencies related to strategic projects; 4) Creation of an efficient convergent system of management of research and innovations (See Fig. 3 of Appendix) to implement strategic projects.

The key directions of ASU research policy are as follows:

“Program – 5 Priorities” – top priority of five strategically important fields of development of ASU research activities: Marine Robotics; Transport & Logistic Facilities of the Caspian Region; Complex Security of the Caspian Macregion; Ecology & Biological Resources of the Caspian Region; Agriculture. The expected result is integration of ASU research activities in Astrakhan Region’s economy; increase in the share of ASU incomes from the real sector of economy from 48 % to 60 %; creation of a network innovative space in Astrakhan Region, with ASU participating in it actively (See “Program – 5 Priorities” in Appendix).

Establishment of a staff growth research system in the following fields: upgrading the university research facilities; implementation of new mechanisms to stimulate efficiency of research (internal grants for young researchers, financial support of the regional research fields); obligatory involvement of young researchers (under 39 y. o.) in all the research activities to share skills between older and younger generations of researchers; development of competencies of promising students and young researchers in Academic Writing, English, Project Management, and Commercialization (at least 200 people annually).

Youth innovative entrepreneurship: improved environment of accelerated development of young people aged 18 to 24 in the field of natural sciences, technology, and ICT (with the autonomous not-for-profit organization “Russia – Country of Opportunities” providing methodological support; creation of a regional center of competencies assessment); development of facilities of the ASU youth innovative cluster (the Technopark, laboratories, and research centers); implementation of regional acceleration programs, arrangement of hackathons and contests in particular fields of innovations; participation of talented students in innovation-related events of the national and international level (Startup Village, Open Innovations, SLUSH); integration of activities of the ASU youth innovative cluster in the agenda of the Caspian Region Technology Transfer Network; arrangement of the Caspian Startup Event on an annual basis; organization of the #I Wish to Get a Patent acceleration program (this is an interregional event arranged jointly by Astrakhan Region, Kalmykia, and Dagestan). The expected result (KPI) is an increased number of students involved in innovative activities from 18.3 % (2021) to 60 % by 2030.

Digital transformation of research activities: establishment of a single digital space to systemize and manage research data and results; relaunch of the existing digital platform ([science.asu.edu.ru](http://science.asu.edu.ru)); digitalization of research products promotion (Web presentations of projects to disseminate knowledge and select customers); creation of a single digital platform of big data related to the Caspian Region with a “heat map” to assess potential threats to sustainability and national security; creation of mirror IT Labs at universities that are our partners for research and analyses of macroprocesses (4). The expected result (KPI) is a 3.5-time growth in publication rates based on access to big data and digital modeling.

Network marketing to integrate science, innovations, and the market: integration and interaction between research schools, centers, and laboratories of the universities that participate in the Consortium for end-to-end projects; financial stimulation of interdisciplinary projects; involvement of the regional business elite in ASU activities; formation of a system of companies founded by ASU students and graduates around our University; making our research and educational activities more practically-oriented (“Startup as a Diploma Project”); creation of a special online site to promote products of startups launched at ASU; development of ASU innovative facilities (launch of a new engineering center and startup studio, etc.), scaling of acceleration programs to be implemented in cooperation with development institutes and legal authorities, technological companies and financial institutions; realization of educational programs to train innovation managers – qualified specialists in the field of intellectual property administration. The expected result (KPI) is an increased value of ASU nonmaterial assets from 6.5 m RUR to 50 m RUR by 2030.

The transformation initiatives of ASU research policy aim to provide the following results: a) quality and quantity growth in research publications; increasing their rate from 0.18 per professor (Scopus, WoS) to 0.6; b) changed structure of incomes: a dynamic sustainable growth in attracted funds in each of the five strategic projects; c) a fivefold increase in the number of R&D implemented into the regional economy; d) projection of R&D in educational projects by means of a system of formation of competencies in project activities, reduction of the percentage of theoretical tasks (to 40 %) and increase of the percentage of applied tasks (first of all, regionally-oriented) (to 60 %); increasing the share of course and diploma projects related to startups from 0.5 % to 25 %; e) inclusion of ASU in national rankings and nominations in the field of research and innovative activities (TOP 50 of the Russian National Ranking (Innovations); TOP 50 of the Russian Universities Inventive Activities; inclusion of ASU researchers in the database of winners of the Rospatent nomination “100 Best Inventions of Russia”); f) modernization of the system of financial stimulation, involvement of a majority (up to 70 %) of the faculty and research staff in the top-priority research fields, increase in the share of young researchers to 30 %, creation of a staff reserve, provision of productive conditions for key researchers

### **2.3 Youth policy.**

Youth policy (hereinafter - YP) of university is focused on creating conditions for successful socialization and effective professional self-realization of young people from school to career start in order to maximize their involvement in solving strategic problems of innovative development of the region and country. The most important challenges and risks for the regional YP are the lack of identification by young people of their personal goals and needs with the interests of society and the state, skeptical attitude in assessing the reality of achieving national development goals of the country, the outflow of talented young people

to more developed regions. YP priority tasks at the university: the formation of a holistic worldview based on the values of patriotism, family, morality, legal consciousness, healthy lifestyle and the development of in-demand supraprofessional competencies.

The university created a multilevel organizational and material-technical base for full coverage of the target groups of the program. A pool of key partners of ASU has been formed, with the participation of which at least 1,500 extracurricular events are held annually (coverage of more than 80% of students). There are 20 student clubs in various areas, a unique project "Socialization of students" is being implemented (twice a year). ASU annually becomes the winner of the All-Russian competition of youth projects through Rosmolodezh. The Boiling Point is operating at the university, the supervision of study groups and mentoring of foreign students have been introduced, a student volunteer corps is operating, projects of the "third mission" are being implemented, faculty schools for young researchers are functioning, a youth employment system has been created (including an electronic labor exchange), the ASU Alumni Club is functioning.

Priority 1: My University, my City, my Country – Goals and objectives: to become a center for identifying, attracting and supporting talented youth of the region, countries of the near (including the Caspian region) and far abroad, who are motivated to research, entrepreneurial, creative, volunteer and other activities. The priority will be implemented through: strengthening the production and technological infrastructure, searching for new financial instruments to support innovative projects, developing expert consulting and information infrastructure, developing communities of proactive young people, creating an interuniversity student center of Friendship of the peoples of the Caspian countries, developing a digital product "Navigator for foreign student ", the creation of an interuniversity center for creative creativity of youth to scale the project" Socialization of students ".

Priority 2. My Achievement Profile - Goals and objectives: building an IET for schoolchildren, students and young university staff, aimed at developing soft-, self-, hard-skills necessary for shaping the personality of a young leader, creating individual digital profiles. Activities: opening of a Competence Center (together with ANO "RCO") for conducting specialized research, making recommendations for personal and professional development, implementing additional vocational education programs (SkillsLAB Laboratory project), creating digital competency profiles in the student's personal account, creating an IFC for students "Unified dean's office", the introduction of a flexible change of work trajectories (reducing the load and taking into account incentive payments for participation in design and innovation activities), creating new jobs at the university for graduates, opening a unified youth recruiting center, improving the system of student teams.

Priority 3. My Focus and Support - Goals and objectives: involvement of young people in the practice of a healthy lifestyle, the introduction of methods of civic education and patriotic education, the development of a mentoring system.

Activities: creation of a digital platform for supporting youth science and a system of student scientific recruiting, an exchange of innovative youth projects, a program of financial support for youth scientific projects, expanding the practice of mentoring, developing search teams, archaeological and military-historical clubs, associations of Cossack youth, expanding the activities of student associations, development of volunteering and popularization of volunteering, regional volunteer Internet space, a comprehensive program for the environmentally friendly entry of Astrakhan State University of Architecture and Civil Engineering students into the ASU ecosystem, implementation of intensive courses "Technologies and practices of family education of youth", creation of an inclusive education service, expanding the trajectory of projects on social inclusion of deprived groups of the population of the region, training courses on health preservation and psychological overcoming of life difficulties, development of cooperation with international regional organizations in the field of work with the youth.

Planned Outcomes: 80% is the share of students involved in the activities of student associations, student teams, discussion platforms, forums to develop the intellectual, scientific, methodological, creative potential of students, 70% is the share of students involved in volunteer activities, creating a competency profile of a graduate as a separate annex to the diploma, increasing the number of students being defended in "Startup as Diploma" format to 50%, launching the "professional elevator: rotation map", increasing the number of teachers - to 50%. The creation of a real mechanism of "social elevator" for young people and coordination of all stakeholders in the field of YP will maximize the potential of the university, the business community and civil society organizations.

## **2.4 Human capital management policy.**

The main trends in the development of the university's human capital for 2010-2020 are shown in the figure (Fig.1 of the appendix to the section). The source of the university's staffing problems is academic inbreeding. The main HR problems specific to the university were revealed during the studies conducted in the preparation of the human capital management policy.

Fig. Main HR-problems of the university (from 1 to 10, where 10 is the highest degree of the problem manifestation)

We have developed several measures to compensate for staffing gaps: Short-term perspective - Stabilization of ASU & ASUACE staffing (2021-2022); Medium-term perspective - Development of staffing (2023-2025); Long-term perspective - "Talent management" (2026 -2030).

Activity 1. Optimize and stabilize structural subdivisions staffing: a) Cascade key indicators of university development to the level of a structural subdivision; b) - Analyze the compliance of employees' competencies with the planned scope of tasks (Applicability of existing employees' competencies to the competence



requirements of strategic projects. Implementing the "Talent Management" program); c) Improve the evaluation of professional level and quality of performance of employees' functional duties; d) Optimize the university staff ; e) Implement intra-university mentoring system; f) Doctoral Training Program "Top-5" (Develop the Doctoral Training Grant Program (conditions - age under 30 years old, availability of scientific groundwork through the following mechanisms: Travel Grants, sabbaticals, reduced workload , as agreed by the parties).

Activity 2. Create an effective motivation system: a) Develop a personalized approach to categorize academic teaching staff according to the focus of achievements; b ) Implement grading in the incentive payment system for academic teaching staff in accordance with the category; c) Implement the Regulation on incentive payments and a system of one-time awards for the achievement of outstanding results, d) Improve the competitiveness and attractiveness of salaries of SPS; e) Conduct "5-100. Leaders of Change".

Activity 3 - Create and develop the system of training and professional development of ASU staff: a) Form the Unified University Employee Development Plan ; b) Develop a personalized development plan for university employees following the identification of their role in implementation of the development program; c) Develop digital literacy and digital security; d) Create electronic educational environment for training and employees professional development on standard programs for the development of employees basic competencies on the ASU Competence Center platform.

Activity 4 - Create and strengthen the corporate culture of the university: develop the University Code of Corporate Culture , involve the active part of the work staff in the personnel management process, create a Non-Monetary Incentive System, develop and implement Loyalty Program.

Activity 5 - Implement a personnel-oriented model of working: create a personal account of university employee, implement an electronic signature system for university employees.

The implementation of the personnel policy will allow to achieve the following results: a) The ratio of the average salary of SPS to average monthly income in region - 200% for 25% of the region's SPS, b) Retention of talented young people (200 people), The average age of SPS - 39 years old;

The implementation of the human capital management policy will enhance university's reputation; increase its competitiveness, the involvement and satisfaction of university employees with their work at ASU. The university will become a supporting resource for the implementation of strategic projects and policies.

## **2.5 Campus and infrastructure policy.**

Resources available. The infrastructure of Astrakhan State University is a distributed campus located in different parts of Astrakhan and the region. The main educational and scientific center consists of a group of buildings, located in

the city in close vicinity to the Astrakhan State University of Architecture and Civil Engineering which is being merged with ASU. The scientific infrastructure is located far from the educational buildings. Some of the buildings are located in the historical part of the city, in the buildings constructed more than 50 years ago, which does not allow the re-shaping of the premises for the modern educational needs. The university also rents some premises. All the premises of ASU and ASUACE comply with the current standards but have a different degree of functional and physical deterioration.

To solve interstate and regional problems and conduct world-class research activities, the university needs a modern technopark, a unique instrument base, comfortable living conditions for young researchers and invited leading scientists, and a platform for holding international forums and exhibitions. The infrastructure policy is aimed at building a campus based on cluster spatial organization; creation of a comfortable and safe green campus based on the principles of environmental management, energy efficient technologies, waste-free consumption and separate waste collection; an increase in the accessibility of the environment for the population of different ages and health opportunities, socio-professional, ethnic, linguistic and other groups; development of a modular transformable environment through co-working spaces, transforming study rooms, public spaces for teamwork and leisure.

Priority areas of the university campus and infrastructure policy: to create a comfortable, modern and smart environment through modular spatial, infrastructural and digital solutions; to improve the environmental friendliness of the ASU environment; to increase the campus involvement in the development of the urban environment; to implement project "Creation of a New Modern Campus in Astrakhan Region, a Geostrategic Border Area of Russia".

The existing infrastructure of the university is going to be modernized. As a result, more than 70% of the space will become a modern scientific and educational space. Projects and technologies of smart management of engineering systems will be introduced to ensure an increase in the efficiency of resource consumption. One of the significant infrastructural constraints for the development of the scientific and educational cluster of Astrakhan Region is the shortage of lodgings for nonresident and foreign students and teachers (Table 1 of the Appendix to the Section). By 2023, a complex of two 10-storey brick dormitories with 900 accommodation places will be put into operation. However, the construction of these dormitories will not cover the existing need for residential infrastructure: taking into account the implementation of the development program, the unmet need for dormitories by 2030 will amount to more than 6,000 places.

Implementation of the program strategic projects requires creation of an additional scientific and educational infrastructure to locate educational and specialized laboratory complexes for conducting research and testing the results, an environmental analytical center, a situation center, a multidisciplinary scientific center of excellence, including laboratories and a shared knowledge

center.

To address these issues, it is envisaged to create a modern campus of educational institutions of higher education in Astrakhan Region. The campus will combine the functions of education, housing, sports and recreation; universities and scientific organizations of Astrakhan Region that are members of the territorial consortium will be able to address the issues of socioeconomic development of Astrakhan Region on its basis.

The campus will have classrooms, research laboratories, a library, engineering centers, technology parks, and communication infrastructure. Specialists will be trained in cutting-edge majors for the professions of the future in modern modularly equipped premises. More than 6,000 m<sup>2</sup> of the campus will be allocated for scientific laboratories and model workshops, equipped with the facilities necessary for scientific creativity, and research centers. A technological, scientific and engineering area – Technopark – will be developed at the campus.

The campus will represent a perfect digital ecosystem covering all functions and services. It is planned to build a congress center and dormitories for students for 7,000 accommodation places (taking into account an increase in the number of foreign students in the universities of the region). Comfortable lodgings will be also built for young researchers, teaching staff, including for invited leading scientists from Russia and abroad.

Creating the campus will contribute to the development of adjacent urban areas and comply with modern architectural and planning solutions that will logically fit into the concept of urban environment development. The created infrastructure (city-wide area, open public areas) of the new campus will be available to of the region's residents for everyday use. Attracting new industrial partners to the campus to open joint ventures will give a new impetus to the innovative and economic development of Astrakhan Region.

The main results of the campus policy correspond to the indicators of achieving national goals. Implementation of the campus policy will result in: a) improving the efficiency of resource consumption; the annual savings will increase from 3.1% to 5.2%; b) an increase in the share of premises equipped with modern fire safety systems – from 80 to 100%; c) an increase in the level of accessibility for special-need students and the equipment level – from 75 to 100%.

## **2.6 The university's management system.**

The ASU structure: 3 institutes (Innovative Institute of Natural Sciences; Institute for Southern Russia and Caspian Region Studies, Institute of Physics and Mathematics), 16 faculties, ASU College, ASU Znamensk Branch, Preliminary Training Unit for Foreign Citizens. The management bodies are University Employees and Students Conference, University Academic Council, Rector, University President, University Guardian Council. 9 directorates, 7 project offices, 4 departments, Unit of Internal Financial Audit, Unit of Information Security, Law Unit are functioning.

After merging ASUACE with ASU, the "Academy of Architecture and Construction" will be created, which will include ASU Faculty of Architecture and Design. Several administrative divisions of ASUACE will be abolished. All the best – the scientific school, the teaching staff, students traditions will be adopted from ASUACE and unified corporate culture will be formed with the preservation of the academic values system, which will allow "gently" and quickly integrate into the ASU system.

ASU's organizational management structure is sound; it will not change significantly. In order to improve the efficiency of university management, it is planned to change the management system within the university.

The main organizational principles of the ASU management system and development program, as well as various associations (including consortium) are: integration into a single planning system - individual programs (roadmaps) of the activity of employees, structural divisions, the University; openness and publicity in making management decisions, involvement of the university staff in the implementation of events; ensuring methodological and informational unity of the Program (systems of criteria for evaluation of the results of activities, forms of presenting the information about events at all stages, reporting forms, monitoring procedures and algorithms for predictive evaluation of the results); embedding projects of interfaculty, interdepartmental interaction of project teams in the system of financial responsibility within project management; ensuring adequate representation of the university staff, public authorities, industrial and scientific-educational partners and the public in management.

The head of the Program is the Rector of the University, who is personally responsible for its implementation, results, purposeful and effective use of the allocated financial resources; he also determines the forms and methods of managing its implementation. General coordination of work on the Program and interaction with consortium participants will be carried out by the Directorate of Strategic Development Programs (DSDP), the University structural unit. The main activities of the DSDP are organization, monitoring and control of the Program implementation; coordination of strategic projects implementation and interaction with project teams; interaction with external organizations and experts.

The University Academic Council considers materials on the activities implementation; organises inspections of the implementation of activities and efficient use of funds; identifies problems and prepares recommendations for enhancing efficiency of activities implementation, taking into account the implementation process of the Program and trends in the social and economic development of the region and the Russian Federation. The University President considers the results of the program activities implementation of preserving traditions and accordance with university strategic development; prepares recommendations taking into account the way of the its implementation and trends of social and economic development of the country. The University Guardian Council considers materials on the activities implementation related to

the usage of extrabudgetary funding sources in order to control expenses; organizes activities to attract extrabudgetary funds; analyses the effectiveness of the policy in education, research and innovation.

The management model will be based on the decomposition of the Program performance indicators to the level of competence centers performance indicators. The management mechanism assumes a high level of independence of project team leaders, who will manage financial resources and be personally responsible for achieving indicators. Project team leaders are part of the DSDP and are responsible for implementing projects and events.

## **2.7 The university's financial model.**

Characteristic of the current financial model, including the structure of the main sources of income and expenses: ASU is a budgetary institution that independently carries out financial and economic activity according to the financial and economic activity plan based on all types of sources of financial support. The structure of income and expenses on the areas of activity is shown in Figure 1 in the appendix to the section. The total income of the University from all sources has been growing steadily for the five reporting years.

The main share in the income structure (excluding funds for capital investments) falls on educational activity (including supplementary education), - 68% (in 2020); scientific research and development - 2% (that indicates that the scientific and technical base is insufficient for the scientific development); other income - 10% (insufficient commercialization of the potential of the property complex, human capital, and inert development of endowment capital).

The main share of expenses in the structure of expenses falls on the wage fund (at least 78%), which significantly exceeds the level recommended by the Ministry of Science and Higher Education of the Russian Federation (70%). Despite the fact that property maintenance costs tend to decrease, their share (12%) in total expenses exceeded the average indicator by the end of 2020. The development budget was formed in 2020, its share - 7%. The University has approved the financial policy and structure, based on the organizational structure (without financial responsibility centers), there is no unified software product for automating processes.

The main financial model principles: striving for financial autonomy by increasing the income share of extra-budgetary sources; forming the development budget as a base for financial support of university initiatives, improving the image and competitiveness; creating financial responsibility centers, including financial results centers, by implementing budgeting mechanism as an incentive tool.

Mechanisms and tools of the financial model transformation:

1. Achieving the planned indicator of "autonomy": implementing the planned indicator for the income share from income-generating activities in the ASU total budget (excluding capital investments) - not less than 70 % (by 2030); increasing target capital - not less than 5% annually; maintaining the contingent of students

studying on a repayable basis - 97%; - fulfilling planned indicators of the enrollment of 1st year students under the admission quotas and students studying on a repayable basis (taking into account the annual increase) - 100%.

2. Achieving the income plan: increase in the income from income-generating activities per one scientific and pedagogical specialist (SPS) - not less than 6% annually; increase in the income share from research and innovation activities in total income by 2030 up to 6%.

3. Implementing the program-targeted financing by developing programs in the main areas of the University's activity: the share of the costs of ASU's development budget in the volume of costs of financial and economic activities - not less than 18% by 2030; the share of labor costs (taking into account the increase in staff due to the reorganization) - not more than 63% by 2030; the share of costs for property maintenance (taking into account the newly introduced parts of the campus and merging ASUACE) - no more than 9% by 2030; the share of costs for other expenses - not more than 10% by 2030.

4. Developing a balanced set of indicators and requirements for their implementation, fixed in the tasks for Central Federal District (CFD), based on both motivation to attract income by expanding the types of commercial activities and stimulation to develop faculties (chairs), structural units, taking into account implementation of basic internal regulatory indicators.

The expected effect of the implementation of the financial model:

- to increase the ASU's total budget income from 1.5 billion rubles to 3.3 billion rubles and ensure the achievement of the financial autonomy, increasing the income share from extra-budgetary sources in the total income from 37% to 70%;
- to increase the target capital to 5 million rubles with an annual increase of 5%;
- to ensure an increase in the income share from scientific and innovative activities in the total income by commercialization of scientific developments and results of intellectual activity, from 2% to 6% (8 times more than in 2020);
- to reduce the share of labor costs to 63%, the share of property maintenance costs to 9%;
- to ensure the SPS's average salary at the level of 200% comparing with the average one in the region;
- to allocate not less than 20% of the extra-budgetary income to co-finance the Development Program.

The structure of income and expenses on the main activities of the University in 2030 is shown in Figure 2 in the appendix to the section.

## **2.8 Digital transformation policy.**

Current capacity and available resources

The current state of the IT infrastructure of the university can be characterized by the following indicators:

More than 90% of the computer equipment used in the educational process was purchased in the period before 2014. Updating of personal computers and

software versions is required to ensure the specified quality of IT infrastructure; The share of classrooms equipped with multimedia presentation equipment in the total number of classrooms is 17.5%. It is necessary to increase the number of interactive panels, which will improve the quality of the educational process, including through the use of online courses provided by partner universities;

The educational process in the remote mode is implemented only with the use of foreign free video conferencing services. The risk of imposing restrictions on the use of such services in the educational process requires a transition to alternative solutions available on the Russian market;

The share of classrooms with Internet access via Wi-Fi network is 10%. Access to Wi-Fi-network is provided only to the employees of the university;

The intra-university local network is not segmented into subnets; its security is at a low level, while the share of academic computers connected to the network is 98.5%.

Information security tasks are mainly focused on the technical support of information systems, working with means of cryptographic protection of information.

The mobile reserve of computer equipment for the workplace arrangement in the remote format in the university is minimal.

The electronic information and educational environment is represented by a set of more than 30 information systems and services. The educational process management system provides a high level of automation of typical tasks, starting from the applicant's application package for enrollment through a personal account and ending with the printing of the diploma to the university graduate. At the heart of the systems and services used is the "Oracle" database management system.

University LMS is based on the use of open system Moodle, 100% of professors and students of the university are registered in it. The current capacity of the server equipment is not enough to ensure the simultaneous work of up to 15% of the system users.

The risks related to the restrictions on the use of foreign database management systems make it necessary to use Russian platform solutions. The process of the university's transition to domestic software will take from one to two years.

The "Directum" electronic document management system is implemented in ASU, the share of administrative and managerial staff with access to EDMS is 27.3%. At the same time, many scientific, administrative and household tasks in ASU are not automated. Most business processes involve working only with paper documents, which significantly increases the time of approval and execution of tasks.

Over the past 10 years the number of objects connected to the IT-infrastructure of the University has significantly increased, the load on computing power and data transmission channels has increased, the number of information systems in use has increased. The proposed reorganization of ASU through the joining of Astrakhan State University of Architecture and Civil Engineering will entail an

additional increase in the load and will require solutions to the problems of network infrastructure integration and organization of export-import of data between information systems.

Key areas of digital transformation

Stage I (short-term perspective of 1-2 years):

The IT-infrastructure updating to the specified quality parameters (100% updating of the training PCs of average performance, equipping 40% of classrooms with multimedia equipment, the formation of a mobile computer reserve - up to 40% of the teaching staff).

Transition to the use of domestic software, including operating systems and office applications. Providing at least 40% of the faculty with videoconferencing licenses.

Modernization of the local ASU network and expansion of Wi-Fi coverage in the academic buildings to 100%.

Improvement of digital literacy of teaching staff - implementation of professional development programs aimed at the formation of digital economy competencies (increase in the proportion of the teaching staff who have undergone retraining or advanced training in mastering digital tools to 100%).

Stage II (Medium-term perspective 3-5 years)

University business processes transformation, the transition to task automation at the university using robotic software (Robotic process automation), reducing the processing time of standard documents.

Design and implementation of a universal integration data exchange bus of university information systems, which will increase the efficiency of data use and provide a single entry point for obtaining information about the current state of educational, scientific, administrative and economic processes. Unification of information entities and data types used in the university information systems, creating opportunities for seamless integration with information systems and services of the RF Ministry of Education and Science and partner universities.

Organization of the rector's situation center (which provides receiving and analytical processing of a set of operational data from the university's information systems) to monitor and support management decision-making.

Providing university faculty with a technical and technological base that enables them to participate in the creation of digital content for educational activities.

Providing stable wireless Internet access for students campus-wide.

Development of a set of programs to continuously improve the digital literacy of university employees.

Stage III (Long-term perspective 6-10):

Transition of the university to a single integrated solution to computerize all business processes of the university, optimize the administrative staff maintaining the educational process.

Providing the university professors with a technical and technological base that will enable them to participate in the creation of digital content using augmented



and virtual reality (AR/VR) tools;

Providing university researchers with access to virtual laboratories, including augmented and virtual reality (AR/VR) facilities;

Implementation of the Smart Campus system using artificial intelligence, the Internet of Things (IoT), digital controllers, the use of Internet of Things (IoT) technologies to improve the efficiency of the university's engineering networks and the campus as a whole.

Expected outcome

The implementation of a digital transformation policy will have the following outcome:

High level of equipment of teachers, research staff, administrative staff and students with modern technical means, the ability of IT-infrastructure of the university to provide educational, scientific and administrative processes without interruptions and limitations in the 24\*7 mode.

The availability of digital services that enable the formation of a digital profile and record the digital footprint of the student to form individual educational trajectories, develop supraprofessional skills, and get involved in innovative scientific and entrepreneurial projects.

Formation of individual educational trajectories, based on the use of digital tools, including with artificial intelligence technologies.

Expanding the range of educational content through the introduction of augmented and virtual reality technologies, video games, simulators, digital simulators in the educational process, creating a new generation of textbooks and teaching materials with AR/VR, as well as integration into the ASU educational process online courses of partner universities.

High level of digital economy competencies among university students and compliance of ASU graduates with the employers' demand for digital technology skills.

High level of digital literacy of ASU professors, enabling the wide use of modern educational technologies and digital tools for the generation of educational content, in Russian and foreign languages, demanded in Russia and foreign countries.

Improving the efficiency of management decisions at the university through the use of data-driven management using the "Smart Campus" system, IoT, a single data exchange bus between information systems of the university, operational control in the rector's situation center.

## **2.9 Open data policy.**

The policy of disclosing data and publishing it in machine-readable formats is aimed at making it easier to access.

On the ASU portal, in the section "On the educational organization" there are data in a machine-readable format with micro-markup. For the convenience of processing news information, a unified format has been developed, and an RSS

news feed is being formed. The system for recording scientometric indicators science.asu.edu.ru uses data from open bibliographic sources. The University is a source of other data used by third parties to develop information services. Sharing data will have a positive impact on the effectiveness of collaboration.

To optimize the use of open data within the consortia, uniform regulations (rules) and data exchange formats will be applied. As a pilot project, ASU organizes the development of rules and regulations that determine the composition of data and exchange formats in organized consortia. The main characteristics in the field of open data: creation and provision of sets of own data, scientific and educational, for open use; development of information systems and services capable of using open data provided by other organizations in scientific, educational and administrative activities.

Data sets, the formation of which in a priority order: information about the centers of collective use (composition of unique research equipment, the purpose of equipment and the composition of potentially solved research problems, information on its certification and verification, software that processes research results and the period of validity of licenses on software); information about scientific developments of ASU (information about researchers, scientific publications, patents, inventions, utility models); calendar of events held by the University; a competency map, formed on the basis of an analysis of employers' requirements for educational programs, knowledge and skills of graduates and a forecast of the executive bodies of state power about the need for specialized specialists; information about teaching staff - carriers of unique educational technologies; information about ready-made bilingual educational programs; information about outstanding graduates and their achievements; information about books published at ASU; information about partnership agreements (in the scientific field, in the field of education, in other areas, partnerships with foreign organizations, partnerships with organizations that provide places for internship); register of software used at the University; the results of an independent assessment of the quality of the educational process; data on paid and free services provided by the University (description of the service, terms of provision, conditions of receipt, information about the sites provided to external users for organizing events).

The level of practical usefulness of using open data will be significantly higher when scaling and involving in the processing of similar sets of information generated and made publicly available by the partners of the University.

## **2.10 Additional routes of development.**

### **3. Strategic projects aimed at achieving the target model.**

#### **3.1 Description of strategic project № 1**

The strategic project aims to achieve knowledge-intensive results that influence the strategic policies of educational and research organisations in the Caspian macroregion working with the partners of the agro-industrial complex (AIC) in the field of science, innovation and education. The project consists of 5 interrelated pools: innovations in crop production, animal husbandry, aquaculture, deep processing of agricultural products, agricultural digitalisation and staff training for the AIC (a detailed description is set out in the Appendix to the section).

##### **3.1.1 Strategic project's name**

Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"

##### **3.1.2 Strategic project's goal.**

Ensuring food and technological security in the Russian part of the Caspian Sea region with preservation and mobilisation of the world's genetic resources in crop production, animal husbandry and aquaculture in an arid climate.

##### **3.1.3 Strategic project's tasks.**

Creation of high-yielding varieties of agricultural crops with given technological parameters and development of innovative technologies for their cultivation based on the biologization and greening of arid agriculture;

Obtaining of the adaptive to the arid areas and productive potential farm animals, consistent improvement in the economic performance of the breeding heads of cattle, sheep, goats, horses and camels through the introduction of the latest genetic technologies;

Development and implementation of modern technological approaches to the creation of innovative agricultural food products based on the effective use of natural and climatic conditions and environmentally friendly raw material resources of the Russian part of the Caspian Sea region;

Development of alternative and low-cost sources of protein components for aqua feed, taking into account the regional raw material base; creation of new generation algicides to suppress the development of microalgae and cyanobacteria causing toxic water blooms; creation of integrated biological supplements based on aquatic macrophytes and microalgae in feeds to reduce aquatic organism disease development, using physico-chemical and genetic methods for aquaculture product quality assessment;

Creation and implementation of digital solutions, including the use of robotics and artificial intelligence systems to identify problem areas in agricultural fields and greenhouses;

The staffing requirements of key employers in the agro-industrial complex of the

economies in the Russian part of the Caspian Sea region.

#### **3.1.4 Strategic project's expected results**

The project will help to achieve knowledge-intensive results that will influence the strategic policy of educational and research organisations in the Caspian macroregion, working with industrial partners in the AIC.

The results of research on improving the productive and breeding qualities of farm animals using the latest advances in molecular biology and genetics will make it possible to obtain highly productive farm animals adapted to arid climate conditions that will increase the productivity of farms in the Russian part of the Caspian Sea region by 12.5%. Creation of the innovative agricultural products based on the use of environmentally safe raw material will increase import substitution by 2.5-5% in the region.

Experimental studies on adaptation of cotton plant from different cotton-growing countries to create a collection of donors and to select high-yielding varieties will allow to obtain new high-yielding cotton varieties with technological parameters that meet the requirements of modern agricultural production, which will allow to occupy 8.6% of the world cotton production market.

The creation and zoning of new high-yielding varieties of perennial fruit and berry plantations adapted to climate conditions will save the region up to 1.2 billion rubles per year on the purchase of non-released planting material.

The development of new varieties of vegetable crops with high consumer qualities for industrial vegetable production for fresh and processed use will reduce imports in this segment by 15-20% by 2030.

The introduction of complex fish farming approaches using technological elements of hydro- and aquaponics will reduce the cost of commercial production of hydrobionts by 24.5%, and ecological approaches in the cultivation of hydrobionts for organic aquaculture will make it more attractive to consumers. The project will ensure the bio-independence of the region and the Russian part of the Caspian Sea region and contribute to achieving the goal of accelerated development of genetic technologies.

According to the atlas of new professions, by 2030 ASU will have implemented programs and profiles of training and retraining of the AIC staff such as "Agricultural dietitian", "Developer of the AIC digital models", "Agricultural ecologist" with a total number of 900 students, or 17% of the total enrollment in all the enlarged groups of AIC training areas.

Development of infrastructure of laboratories, experimental sites, centres of collective use for projects of agriculture and aquaculture will provide annually at least 5 interdisciplinary research, with involvement in research project activities at least 60% of students per year; at least 10 students passed Ph.D. and doctoral dissertations defense; at least 5 scientific publications per year, included in Scopus and Web of Science journals; increase in publication activity of the university teaching staff by 25%.

The project in the field of innovation is focused on patent umbrella expansion, which will provide an increase in replication and scaling of developed technologies in the field of crop production by 11% and by 5.5% in the field of animal husbandry and aquaculture, getting income of the amount of 200 000 rubles per year from implementation of the intellectual property.

### **3.2 Description of strategic project № 2**

The Volga Delta has unique ecosystems, including wetlands, and largely determines the biodiversity of the Caspian region. The ecological situation in the region is tense: the volume of polluted wastewater discharged into the Volga basins is 38% of the total Russian. The load on the Volga's water resources is eight times higher than the average for Russia. According to the UN, there is currently no territory facing a greater threat of desertification than the region between the Caspian Sea and the Pamir Mountains. This leads to a decrease in the species diversity of fish due to the impoverishment of the food ration, which hinders the growth of commercial fishing in the Caspian region. The developed unique technologies and approaches will contribute to the preservation of the region's biodiversity and land resources, and the improvement of the ecological situation. The problematic for the Astrakhan region has a "cross-cutting" interdisciplinary nature, since is associated with ensuring the health and quality of life of people, stable economic growth, and reasonable consumption of resources. The strategic project is key for the university, the Astrakhan region and the Caspian macro-region in the logic of the national project "Ecology", the UN Convention to Combat Desertification (UNCCD) and 17 UN Sustainable Development Goals (description of the project in the Appendix to the section).

#### **3.2.1 Strategic project's name**

Strategic Project No.4 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".

#### **3.2.2 Strategic project's goal.**

Increasing the level of environmental safety and preservation of natural systems in the Caspian region.

#### **3.2.3 Strategic project's tasks.**

- improvement and application of new technologies in ecology and environmental protection: degradation and desertification of soils, conservation of biodiversity;
- creation of new EP and areas of training with the inclusion of online courses of disciplines from partner universities; additional EP and bringing them to online platforms (Coursera, SkillShare, Edx, iSpring Market);
- creation of the research sector "Ecology and Climate", the sector "High-performance computer systems and distributed data processing";

- environmental education of schoolchildren;
- interpolation (adaptation) of the project to other arid or deltaic areas of the world.

### **3.2.4 Strategic project's expected results**

For the Caspian macro-region: introduction of technologies and methodological methods for restoration and conservation of biodiversity (rare endangered plants, flora and ichthyofauna); development of technologies for obtaining data for the operational adoption of management decisions, including in the event of natural or anthropogenic phenomena, and the restoration of degraded lands and prevention of their desertification.

For the Astrakhan region: practical implementation of unique environmental monitoring technologies to achieve leadership positions in automation and resource provision of integrated environmental monitoring of water areas using unmanned marine robots; development of methodological approaches and implementation of technological solutions for the restoration of land resources and ecosystems (degradation, desertification, siltation, irrational nature management); contributing to the improvement of ecology and preservation of unique biodiversity.

Effect for the university:

- development of promising areas of research and educational trajectories that have a competitive development advantage;
- leadership positions of ASU in the Caspian macro-region in the field of environmental protection of ecosystems of inland water bodies of the Earth and achievement of the positions of the middle group in the QS World University Rankings, the National University Ranking in the subject areas of environmental protection, ecology, earth sciences, agriculture, biodiversity;
- introduction of 10 individual trajectories of students, academic mobility in partner universities; 2 new network EPs; 3 online courses, on online platforms; an increase in the number of students enrolled in HE programs - up to 150 people;
- creation of a research sector "Ecology and Climate" with laboratories and centers in the areas;
- creation of the sector "High-performance computer systems and distributed data processing" - a supercomputer center for solving resource-intensive tasks, transferring, storing and processing data; a multipurpose hardware and software complex, a resource center for computing with high throughput and a data center with the output of monitoring parameters using AI technologies, BigData and DataScience;
- the number of interdisciplinary subprojects within the project - 14; the share of students involved in research project activities - 90%; postgraduate and doctoral students who received an academic degree - 4 people; international projects - 4; registered rights to RIA - 10.

### **3.3 Description of strategic project № 3**

From the perspective of European security, the Caspian region is a part of an "arc of vulnerability", a conflict zone covering the Black Sea, Mediterranean, North Caucasus, Transcaucasia, Central and Middle Asia where meet the geopolitical interests of Russia and other countries. Our country is gradually being forced out of this region. The Caspian Sea region is important not only in terms of resource wealth, but also as a zone for the creation and formation of a single economic, political and cultural system. The project aims to increase the economic power and international influence of Russia in the Caspian Sea region by creating a common scientific and educational space, to develop innovative technologies and solutions contributing to social and political stability, preservation of ethnic and religious identity of the multicultural environment, sustainable economic development and environmental safety and security of the Caspian Macroregion information space. The implementation of the project is possible by combining the potential of different faculties of the university – cultural specialists, philosophers, political scientists, sociologists, ecologists, economists, mathematicians, computer scientists with the involvement of consortium partners. A detailed description of the strategic project is provided in Appendix to the section.

#### **3.3.1 Strategic project's name**

Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"

#### **3.3.2 Strategic project's goal.**

Establishment of a center for strategic analysis and mathematical forecasting of possible problematic situations, risks and threats to military, state, national, cultural, confessional, social, geopolitical, economic and environmental security in the Greater Caspian Region.

#### **3.3.3 Strategic project's tasks.**

Formation and further development of the scientific direction "Integrated research of the Greater Caspian region issues" based on theoretical concept of societal security in relation to the Caspian macroregion.

Development of an algorithm for mathematical analysis of statistical data in order to generate the variable scenarios of development of the Caspian macroregion.

Creation of a set of new EPs, including network EPs, as well as flexible educational paths in vocational education, bachelor's and master's degree programs, and additional EPs for the formation of competencies of the integrated security.

Formation of a sustainable positive population attitude to the national and regional history and culture, cultural heritage, cultural identity in order to engrave in the collective memory of the younger generation the foundations of patriotism, competent and tolerant intercultural communication.

### **3.3.4 Strategic project's expected results**

Creation on the basis of ASU of a center of strategic analysis and mathematical forecasting of possible problems, risks and threats to the security of the Greater Caspian region.

Development of a scientific school in the field of studying integrated security of the Caspian macroregion, with the possibility of extrapolation of the research to other multinational regions.

An integrated (societal) security model for the Caspian Sea macroregion, which takes into account a set of social and cultural issues and risks as well as the specifics of the information space, covering not only the interests of the South of Russia, but also the first and second line foreign countries.

A scientific and educational multilingual and multidisciplinary online platform in the field of Caspian Sea region security which will be a systematized, replenished database that will perform an educational function to promote the history of the region and cultural heritage, build an intercultural dialogue (including among the youth).

A software package to identify and predict issue areas with data sharing functionality and access restriction mode for different user groups.

A complex of new EPs created on the basis of the obtained scientific results.

Determination of the efficient development vectors of the region on the basis of predictive simulation modeling, recommendations in the field of operational managerial and political decisions under various scenarios of the region development.

### **3.4 Description of strategic project № 4**

The Volga Delta has unique ecosystems, including wetlands, and largely determines the biodiversity of the Caspian region. The ecological situation in the region is tense: the volume of polluted wastewater discharged into the Volga basins is 38% of the total Russian. The load on the Volga's water resources is eight times higher than the average for Russia. According to the UN, there is currently no territory facing a greater threat of desertification than the region between the Caspian Sea and the Pamir Mountains. This leads to a decrease in the species diversity of fish due to the impoverishment of the food ration, which hinders the growth of commercial fishing in the Caspian region. The developed unique technologies and approaches will contribute to the preservation of the region's biodiversity and land resources, and the improvement of the ecological situation. The problematic for the Astrakhan region has a "cross-cutting" interdisciplinary nature, since is associated with ensuring the health and quality of life of people, stable economic growth, and reasonable consumption of resources. The strategic project is key for the university, the Astrakhan region and the



Caspian macro-region in the logic of the national project "Ecology", the UN Convention to Combat Desertification (UNCCD) and 17 UN Sustainable Development Goals (description of the project in the Appendix to the section).

#### **3.4.1 Strategic project's name**

Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".

#### **3.4.2 Strategic project's goal.**

Increasing the level of environmental safety and preservation of natural systems in the Caspian region.

#### **3.4.3 Strategic project's tasks.**

- improvement and application of new technologies in ecology and environmental protection: degradation and desertification of soils, conservation of biodiversity;
- creation of new EP and areas of training with the inclusion of online courses of disciplines from partner universities; additional EP and bringing them to online platforms (Coursera, SkillShare, Edx, iSpring Market);
- creation of the research sector "Ecology and Climate", the sector "High-performance computer systems and distributed data processing";
- environmental education of schoolchildren;
- interpolation (adaptation) of the project to other arid or deltaic areas of the world.

#### **3.4.4 Strategic project's expected results**

##### **3.4.4. Expected results of the strategic project**

For the Caspian macro-region: introduction of technologies and methodological methods for restoration and conservation of biodiversity (rare endangered plants, flora and ichthyofauna); development of technologies for obtaining data for the operational adoption of management decisions, including in the event of natural or anthropogenic phenomena, and the restoration of degraded lands and prevention of their desertification.

For the Astrakhan region: practical implementation of unique environmental monitoring technologies to achieve leadership positions in automation and resource provision of integrated environmental monitoring of water areas using unmanned marine robots; development of methodological approaches and implementation of technological solutions for the restoration of land resources and ecosystems (degradation, desertification, siltation, irrational nature management); contributing to the improvement of ecology and preservation of unique biodiversity.

Effect for the university:

- development of promising areas of research and educational trajectories that

have a competitive development advantage;

- leadership positions of ASU in the Caspian macro-region in the field of environmental protection of ecosystems of inland water bodies of the Earth and achievement of the positions of the middle group in the QS World University Rankings, the National University Ranking in the subject areas of environmental protection, ecology, earth sciences, agriculture, biodiversity;
- introduction of 10 individual trajectories of students, academic mobility in partner universities; 2 new network EPs; 3 online courses, on online platforms; an increase in the number of students enrolled in HE programs - up to 150 people;
- creation of a research sector "Ecology and Climate" with laboratories and centers in the areas;
- creation of the sector "High-performance computer systems and distributed data processing" - a supercomputer center for solving resource-intensive tasks, transferring, storing and processing data; a multipurpose hardware and software complex, a resource center for computing with high throughput and a data center with the output of monitoring parameters using AI technologies, BigData and DataScience;
- the number of interdisciplinary subprojects within the project - 14; the share of students involved in research project activities - 90%; postgraduate and doctoral students who received an academic degree - 4 people; international projects - 4; registered rights to RIA - 10.

### **3.5 Description of strategic project № 5**

A comprehensive strategic project, aimed at rebooting the university in the field of science, innovation and education, has four related areas focused on achieving a unique result – Russia’s leadership in the field of marine robotics, crewless ships and A-navigation. This activity is carried out in accordance with the logic of the MariNet roadmap, with the support of the Caspian Distributed Center “MariNet”; the project is a key one for the National Technology Initiative (NTI). A detailed description of the strategic project is set out in Appendix 1.

#### **3.5.1 Strategic project’s name**

Strategic Project No.1 “Development of Marine Robotic Technologies in the Caspian Region” (“Marine robots – MR”)

#### **3.5.2 Strategic project’s goal.**

To create an innovative product based on a full scientific and technological cycle that ensures global competitiveness in the field of marine robotics and creation of an end-to-end HR training cycle for the marine robotics industry; it is designed for industrial and environmental monitoring, search for biological resources, geophysical research in transit areas, bathymetry, automated depth measurements.

### **3.5.3 Strategic project's tasks.**

Education block: creating network EPs within participation in consortia “University Consortium for World Ocean Studies” and “Shipbuilding and Marine Engineering”; ensuring academic mobility of students in the logic of the project and in the structure of university associations; creating and implementing AEPs in the logic of the project and placing them on online platforms; creating training laboratories and specialized classrooms (including a situation center with the monitoring output, including data of the earth remote sensing in the water areas covered by MRs); making changes to the EPs for including online courses of the partner universities.

Science and innovation block: conducting research, including within the framework of the consortia; attracting end customers to the project and its promotion on Russian and international platforms, including on e-trading platforms; managing the supply chains and product lines; bringing the project to the international market, including drawing up proposals for creation of non-residents in the EU, Asia-Pacific countries and the USA; holding all-Russia competitions in marine robotics in accordance with accepted international classes for autonomous surface vessels.

Engineering block: building digital twins of MRs and conducting virtual tests; manufacturing technological equipment and pilot industrial samples of MRs; conducting tests in the test water area to obtain certification and autonomy level assignment; designing a max MR in accordance with the rules of the Russian Maritime Register of Shipping; operating prototypes in the specified water areas; developing and maintaining software and hardware systems installed on MRs and in the MR control center to ensure safe navigation conditions; preparing documents for certification of products (underwater robots, unmanned aerial vehicles integrated on MR board).

### **3.5.4 Strategic project's expected results**

The global result is to build an innovative facility for MR production. With the cost of robots ranging from 16 to 60 million RUB (depending on their configuration), the volume of earnings for the given production volume will be from 800 million RUB up to 3 billion RUB. Implementation of the strategic project at the university level will provide conditions for an experiment on pilot operation of MRs in the Caspian basin; it will generate demand for the use of MRs for industrial and environmental monitoring, research in the field of aquatic ecosystems; it will significantly increase the number of studies and publications on the priority scientific topics of the university; it will form end-to-end training of MR specialists for the maritime industry in Astrakhan Region, thereby making regional educational programs unique; it will ensure the funds attracted in R&D in

comparison with the leading universities of Russia. At the national level, it will allow for a consistent transformation of marine research using MRs, thereby ensuring Russia's leadership in this area. The joint use of traditional research vessels and MRs will significantly expand the research potential of Russian scient

## **4. Key characteristics of inter-institutional network interaction and cooperation.**

### **4.1 Key partnerships' structure.**

#### 4.1. Key partnership structure

The main key partners are representatives of the economic clusters of Astrakhan Region (HR training,

research, advanced training):

in shipbuilding: United Shipbuilding Corporation, Lotos Shipbuilding Plant, Caspian News Start, Marine Robotic Systems scientific and engineering company, Tekhnologiya Magnitnykh Materialov (eng. Magnetic Materials Technology).

in the agro-industrial complex: Astrakhansky agro-industrial complex, Kharabalinskaya poultry farm, Rascat fish breed and reproductive complex, Akvatreyd and other livestock, crop and fish farms in the region;

in field development: LUKOIL-Nizhnevolzhskneft, Gazprom Dobycha Astrakhan, Gazprom Mezhregiongaz Astrakhan;

in the transport and electric power industries: Lotus special economic zone, Astrakhan Branch of the Volga Railway – a branch of the Russian Railways, Astrakhannergo of Rosseti South, Solar Systems;

in ecology: Neftegazovoye Oborudovaniye (eng. Oil and Gas Equipment), Gexa-Lotos, MorRobotSystem, LUKOIL-Nizhnevolzhskneft, Astrakhanrybhoz Association, Rybnyye Korma (eng. Fish Feed), Global Catering Service.

The interaction with the key partners has resulted in: creation of a Mirror Engineering Center, focused on addressing technological and high-tech tasks in the interests of the Caspian region; development of a technology for conducting environmental monitoring using autonomous marine surface vessels and robotic systems; development of a system of control over irrigator watering indicators (including drip irrigation parameters); resource-saving biotechnology for intensive cultivation of aquaculture commercial products; creation of a database for geopolitical processes and international relations of the Caspian states; foundation of an inter-university expert and analytical center “ Caspian International Discussion Club”, involving the best Russian experts.

### **4.2 Description of consortium(s) established or expected during implementation of the development program.**

Description of the consortia established within the framework of the development program implementation

ASU is a member of 16 consortia, 14 of which were created on the initiative of academic and scientific organizations, and ASU was invited to join these consortia as a member, and two consortia were founded upon the initiative of the university. The potential of the following consortia will be used for the purposes of implementing the ASU development program:

The Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region (C1), established in March 2021 upon the ASU initiative. Its participants are six universities, a scientific center and an additional education institution. The ASU rector is the consortium's president. C1 activities are aimed at: ensuring research and development in the interests of Astrakhan Region; obtaining new competitive technologies and products and their commercialization with the subsequent transfer to real economy organizations; HR training for addressing large scientific and technological tasks of the development of science and technologies regarding the region's problems and in the interests of Russia; export of education to the Caspian countries and recruitment of promising HR from these countries to work in Russia; consolidation of the consortium members' potential and organization of their interaction for sharing intellectual, information, material resources in the implementation of joint interdisciplinary scientific and educational projects. The consortium is a non-commercial association of legal entities, branches and representative offices. The consortium was established under the agreement dated 12.03.2021. Governing bodies: General Assembly of Consortium Members, President and Vice President. Activities are carried out through the formation of project teams and implementation of network EPs, organization of joint academic and scientific events, and exchange of information. Activities are ensured through: a liaison protocol (to be formed), a model of the Caspian Distributed University (Network Educational Activities) – under development, shared knowledge centers (currently being established), a concept of an interuniversity campus, ensuring the opportunities for sharing infrastructure and joint information services (have been developed).

The Transport & Logistics Consortium of Caspian Higher Educational Institutions (C2) was established upon the initiative of ASU (agreement dated 12.12.2018) under support of the Presidium of the RF State Council, and is aimed at: forming a modern efficient corporate training system for qualified HR to fulfill the tasks in the transport and logistics sphere; creating an efficient innovative system to support the transport and logistics infrastructure and implement the results of innovative activities of the consortium in the field of logistics in the business community; integrating scientific, educational, innovative and technological potential of universities in the interests of sustainable innovative development of logistics in the Caspian region. The consortium is not a legal entity, it has neither its own property nor financial or any other tangible assets. The consortium is managed on the principle of equal cooperation. The governing bodies are the General Assembly of its members and President. The list of participants includes 18 universities (12 as of the date of establishment). The consortium president is the ASU rector, re-elected in 2020. Progress made: a map describing the competence of a transport and logistics specialist has been developed and recommended for taking it into account when developing EPs, scientific conferences, webinars, strategic sessions (including on the issues of

methodological support of the learning process, introduction of advanced developments in the field of logistics in the educational process); a joint research plan has been formed; development of joint Master's programs has been initiated. ASU has developed and administers an official website: [tlc.asu.edu.ru](http://tlc.asu.edu.ru). A virtual shared knowledge center with unique equipment for joint scientific research has been formed. ASU coordinates the activities of the consortium participants. The scientific and educational potential of the consortium participants will be used in implementing the project on creating a special economic zone in the area of the Olya seaport and its integration with the Lotus special economic zone into the Caspian cluster.

The Consortium "Ecology of the Volga River Basin" (C3) is aimed at: creating and developing high-tech methods and systems for monitoring environmental quality and biodiversity of the Volga-Kama basin; digitalization and comprehensive interpretation of the results of monitoring research of anthropogenically transformed locations of water bodies and areas of the Volga-Kama basin; research and development in the field of reducing anthropogenic load and systems for designing waterproof and hydraulic facilities of the Volga-Kama basin; creating a basis for restoration and conservation of agro-ecosystems under dynamic conditions of the external environment, based on the results of monitoring their condition, bioindication and biotesting with digital systems and multi-level sensing; development of equipment, contact and remote sensing methods, including new measurement and data processing systems for the development of network information systems to obtain, store and interpret the monitoring results. The consortium includes five scientific and educational organizations; it was initiated by Samara State Technical University. The consortium is managed on the principle of equal cooperation. ASU is its full member. The consortium members have submitted a joint application for a Russian Science Foundation grant; 15 areas of interaction have been determined. The Consortium "Shipbuilding and Marine Facilities" (C4) was established on September 19, 2018 on the basis of the St. Petersburg State Maritime Technical University; it includes 12 educational and scientific organizations. The consortium is managed on the principle of equal cooperation. ASU is its full member. The objectives of the consortium are: to promote and license new technologies; to conduct open innovative projects in the field of equipment development; to create joint international EPs and joint projects under support of international foundations.

The Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry (C5) was established on the basis of Moscow State University of Technology and Management named after K.G Razumovsky; the scope of its activities is the food and nutrition industry.

The University Consortium for World Ocean Studies (C6) is aimed at developing a modern and efficient system for qualified HR training and creating a world-class research and educational cluster to study the world ocean and coastal areas. The

consortium's priorities are to implement joint EPs, use the scientific potential of the universities to address a set of tasks in natural science, medicine and engineering, including innovative projects in the field of developing cutting-edge AI technologies and robotic systems for conducting research in the Greater Mediterranean, Caspian Sea, the world ocean and coastal areas, maintain collaboration between universities in the development of international (transnational and transboundary) socioeconomic regions and participate in international region-shaping.

The Consortium of Big Data Researchers (C7) has functioned on the basis of Tomsk State University since 2017; it is focused on research in the field of artificial intelligence and data processing obtained by marine robots on functional tasks – industrial monitoring, bioresources, ecology, geophysics, marine archeology, etc.

The Consortium “Caspian Macroregion Societal Security” (C8) was established on May 20, 2020 and includes universities and a scientific center of the Russian part of the Caspian Sea region. The consortium objectives are to conduct specialized research, to develop sustainable collaboration in order to form a joint scientific platform for the Caspian studies, to unite the efforts for developing a consistent database on the Northern Caspian region, to develop a cognitive model for identifying alert areas and predicting problem situations in the Northern Caspian region.

Based on the respective agreements, ASU is a member of:

World-Class Scientific and Educational Center “Innovative Solutions in the Agro-Industrial Complex”, Belgorod, in the area of biotechnology, breeding and genetic studies, cellular technologies and genetic engineering, digital transformation of agro-industrial complexes and resource-saving technologies;

World-Class Scientific and Educational Center “Engineering of the Future”, Samara National Research University named after Academician S. P. Korolev, in the area of agriculture and (digital) shipbuilding.

Members of the consortia and the scientific and educational centers will participate in the program through implementation of projects, activities within the strategic projects (detailed information is presented in Appendix 6) and policies; it will include: implementation of joint double-degree EPs; training and advanced training of specialists; joint research; scientific and technical evaluation of projects; assistance in the development of production ties and scientific collaboration; creation of distributed scientific groups; training of highly qualified HR; the use of the existing infrastructure of the consortia and centers' members (upon agreement), including for running tests. The pattern for the consortia's interaction within the implementation of the strategic projects is presented in Figure 1 (Appendix to the section). Detailed description of activities and projects of the consortia and centers' members (including results that ensure the achievement of the university's strategic goal) will be included in the program implementation roadmap.



The concentration of resources and competencies within the consortium will allow to obtain a systemic impact aimed at comprehensive development of the strategic area of the university and the whole region.

**Appendix №1. Strategic projects' coverage of the university's policies in the main domains of activity**

<b>The university's policy in the main domains of activity</b>	<b>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"</b>	<b>Strategic Project No.4 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</b>	<b>Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macro region (Greater Caspian Region)"</b>	<b>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</b>	<b>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots - MR")</b>
Educational policy	+	+	+	+	+
Policy in science and research and policy in innovation and commercial use of developments	+	+	+	+	+
Youth policy	+	+	+	+	+
Human capital management policy	+	+	+	+	+
Campus and infrastructure policy	+	+	+	+	+
University management system	+	+	+	+	+
University's financial model	+	+	+	+	+
Digital transformation policy	+	+	+	+	+
Open data policy	+	+	+	+	+
Additional routes of development					

## Appendix №2. Indicators necessary for achievement of the grant allocation results

[illegible]

2.1.2 Strategic Project No.3 “Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)”	unit	Base part of the grant	X	X	2	2	2	2	2	2	2	2	2
		Special part of the grant	X	X	3	3	3	3	3	3	3	3	3
2.1.3	unit	Base part of the grant	X	X		1	1	1	2	2	2	2	2
		Special part of the grant	X	X		1	2	2	2	2	3	3	3
2.1.4 Strategic Project No.5: “Caspian Incubator of Agro-Bio-Technologies”	unit	Base part of the grant	X	X	5	5	5	7	7	7	7	9	9
		Special part of the grant	X	X	5	9	9	13	13	13	13	16	17
2.1.5 Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	unit	Base part of the grant	X	X		1	1	1	1	1	1	1	1
		Special part of the grant	X	X		1	1	1	1	1	1	1	1
2.2 Among them, in activity «б», including:	unit	Base part of the grant	X	X	7	10	11	11	13	14	14	14	16
		Special part of the grant	X	X	10	15	15	17	18	18	16	16	21
2.2.1 Strategic Project No.1 “Development of Marine Robotic Technologies in the Caspian Region” (“Marine robots – MR”)	unit	Base part of the grant	X	X	1	1	1	1	1	1	1	1	1
		Special part of the grant	X	X	3	3	3	3	3	3	3	3	3
		Total			11	15	15	17	18	18	16	16	21

[illegible]

[illegible]

[illegible]

[illegible]



[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]





ent of Marine Robotics Technologies in the Caspian Region" ("Marine robots – MR")	unit	Special part of the grant	X	X	1	1	1	1	1	1	1	1	1	1
2.15.2 Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	unit	Base part of the grant	X	X	1	1	1	1	1	1	1	1	1	1
		Special part of the grant	X	X	2	2	2	2	2	2	2	2	2	2
2.15.3	unit	Base part of the grant	X	X	1	2	1	2	2	2	2	2	2	2
		Special part of the grant	X	X		1	2	2	2	3	3	3	3	3
2.15.4 Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	unit	Base part of the grant	X	X	2	2	4	4	4	4	4	4	4	5
		Special part of the grant	X	X	4	6	8	8	8	8	8	8	8	10
2.15.5 Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".	unit	Base part of the grant	X	X		1	1	1	1	2	1	1	1	1
		Special part of the grant	X	X		1	1	1	1	1	1	1	1	1
2.16 among them, in activity «p», including:	unit	Base part of the grant	X	X	1	3	3	3	4	4	4	4	4	4
		Special part of the grant	X	X	1	1	2	2	3	3	3	3	3	3

2.16.1 Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	unit	Base part of the grant	X	X		1	1	1	1	1	1	1	1	1
		Special part of the grant	X	X										
2.16.2 Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	unit	Base part of the grant	X	X	1	1	1	1	1	1	1	1	1	1
		Special part of the grant	X	X	1	1	1	1	1	1	1	1	1	1
2.16.3	unit	Base part of the grant	X	X		1	1	1	2	2	2	2	2	2
		Special part of the grant	X	X			1	1	2	2	2	2	2	2
2.16.4 Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	unit	Base part of the grant	X	X										
		Special part of the grant	X	X										
2.16.5 Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".	unit	Base part of the grant	X	X										
		Special part of the grant	X	X										
2.17 among them, in activity «c», including:	unit	Base part of the grant	X	X	2	5	6	7	7	7	7	6	6	7
		Special part of the grant	X	X	3	6	7	7	8	8	8	8	7	9

2.17.1 Strategic Project No.1 “Development of Marine Robotic Technologies in the Caspian Region” (“Marine robots – MR”)	unit	Base part of the grant	X	X		1	1	1	1	1	1	1	1	1
		Special part of the grant	X	X		1	1	1	1	1	1	1	1	1
2.17.2 Strategic Project No.3 “Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)”	unit	Base part of the grant	X	X	2	2	2	2	2	2	2	2	2	2
		Special part of the grant	X	X	3	3	3	3	3	3	3	3	3	3
2.17.3	unit	Base part of the grant	X	X		1	1	2	1	2	2	2	2	2
		Special part of the grant	X	X		1	1	1	2	2	2	2	1	2
2.17.4 Strategic Project No.5: “Caspian Incubator of Agro-Bio-Technologies”	unit	Base part of the grant	X	X			1	1	1	1	1	1	1	2
		Special part of the grant	X	X			1	1	1	1	1	1	1	2
2.17.5 Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".	unit	Base part of the grant	X	X		1	1	1	2	1	1			
		Special part of the grant	X	X		1	1	1	1	1	1	1	1	1
2.18 Among them, in activity «Т», including	unit	Base part of the grant	X	X	1	4	4	4	5	5	5	5	5	6



**Appendix №3. Target indicators of effectiveness of the development program's (the draft program's) implementation**

№	Indicator	unit of measurement	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Target indicators of the efficiency of implementation of the university development program for the basic part of the grant														
P1(b)	Scope of scientific work and R&D activity, per one person of academic staff	thousand rubles	50,034	50,034	160,933	169,632	173,92	178,223	182,697	190,694	199,053	207,445	215,976	224,933
P2(b)	Share of employees aged under 39 in the overall number of academic staff	%	38,4	40,4	40,5	40,6	40,6	40,6	40,7	40,7	40,8	40,8	40,9	
P3(b)	Share of students in bachelor's, specialist's, and master's full-time programs, who have acquired an additional qualification free of charge, in the overall number of students in bachelor's, specialist's, and master's full-time programs	%	1,5	1,5	1,6	1,6	1,6	1,6	1,7	1,7	1,7	1,8	1,8	
P4(b)	University's income from financially profitable activities, per one person of academic staff	thousand rubles	1 002,078	1 002,078	1 511,837	1 566,48	1 674,458	1 788,36	1 910,262	2 044,686	2 188,061	2 336,808	2 492,478	2 658,761

P5(b)	Number of students in programs of secondary professional education and/or higher education, where obtaining professional competencies is related to formation of digital skills of using and mastering new digital technologies, including educational programs developed with consideration of updated basic full-time educational programs with digital component, recommended by central educational center for replication	person	1 199	1 241	1 253	1 290	1 328	1 367	1 408	1 450	1 493	1 537	1 583	
P6(b)	Expenses for scientific research and developments from university's own finance, per one person of academic staff	thousand rubles	0	0	2,414	5,898	9,271	12,184	14,685	16,823	18,62	20,077	21,232	22,139

**Appendix №4. Impact of strategic projects on target indicators of the efficiency of the implementation of the development program (project)**

<b>№</b>	<b>Indicator</b>	<b>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"</b>	<b>Strategic Project No.4 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</b>	<b>Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"</b>	<b>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</b>	<b>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots - MR")</b>
<b>Target indicators of the efficiency of implementation of the university development program (or draft program's) for the basic part of the grant</b>						
P1(b)	Scope of scientific work and R&D activity, per one person of academic staff	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	defines the value
P2(b)	Share of employees aged under 39 in the overall number of academic staff	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value
P3(b)	Share of students in bachelor's, specialist's, and master's full-time programs, who have acquired an additional qualification free of charge, in the overall number of students in bachelor's, specialist's, and master's full-time programs	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	defines the value
P4(b)	University's income from financially profitable activities, per one person of academic staff	contributes to the achievement of the value	contributes to the achievement of the value	has no effect	contributes to the achievement of the value	defines the value



P5(b)	Number of students in programs of secondary professional education and/or higher education, where obtaining professional competencies is related to formation of digital skills of using and mastering new digital technologies, including educational programs developed with consideration of updated basic full-time educational programs with digital component, recommended by central educational center for replication	defines the value	contributes to the achievement of the value	contributes to the achievement of the value	contributes to the achievement of the value	defines the value
P6(b)	Expenses for scientific research and developments from university's own finance, per one person of academic staff	defines the value	contributes to the achievement of the value	has no effect	contributes to the achievement of the value	defines the value

**Appendix №5. Financial support of the development program (draft program)****Financial support for the program (draft program) from different sources**

<b>№ п/п</b>	<b>Source of finance</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>
1.	Federal budget, base part of the grant, thousand rubles	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000
2.	Federal budget, special part of the grant, thousand rubles	285 000	285 000	285 000	285 000	285 000	285 000	285 000	285 000	285 000	285 000
3.	Federal budget, other sources, thousand rubles										
4.	Regional budget, thousand rubles		190 000	142 000	96 000	48 000	20 000	20 000	20 000	20 000	20 000
5.	Local budgets, thousand rubles		150	160	180	200	220	240	260	280	290
6.	Foreign sources, thousand rubles										
7.	Extra budgetary resources, thousand rubles	20 000	41 842	68 975	80 000	95 000	100 000	105 000	110 000	120 000	125 000
<b>TOTAL</b>		<b>405 000</b>	<b>616 992</b>	<b>596 135</b>	<b>561 180</b>	<b>528 200</b>	<b>505 220</b>	<b>510 240</b>	<b>515 260</b>	<b>525 280</b>	<b>530 290</b>

**Appendix №6. Information about consortium(s) established or expected in the process of implementing strategic projects of the program (draft program) of development**

№	Name of consortium	Strategic projects to implement with participation of consortium	Role of consortium in implementation strategic project(s)
			<p>The role of the consortium in the implementation of the strategic project (s)</p> <p>In February 2021, on the initiative of the University, a Consortium of Educational Institutions of Higher Education and Scientific Organizations of the Astrakhan region was created. A plan of activities, topics of joint research has been formed, and work on projects is being implemented.</p> <p>The activities of the Consortium of Educational Institutions of Higher Education and Scientific Organizations of the Astrakhan region are aimed at achieving the following goals:</p> <ul style="list-style-type: none"> <li>- providing research and development for the development of the Astrakhan region;</li> <li>- obtaining new competitive technologies and products and their commercialization with subsequent transfer to organizations of the real sector of the economy;</li> <li>- training of personnel to solve major scientific and technological problems of the development</li> </ul>

1	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<p>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies", Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)", Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".,</p> <p>Strategic Project No.1 "Development</p>	<p>and technological problems of the development of branches of science and technology on the problems of the Astrakhan region to the benefit of the Russian Federation;</p> <ul style="list-style-type: none"> <li>- export of education to the Caspian countries and attracting promising personnel from these countries to work in Russia;</li> <li>- consolidation of the potential of the Consortium members and the organization of their interaction for the joint use of intellectual, informational, material and other resources in the formation and implementation of joint interdisciplinary scientific, educational and other projects.</li> </ul> <p>The members of the Consortium are 8 higher educational institutions. The President of the Consortium is the Rector of the University.</p> <p>The consortium is a non-profit association of legal entities, as well as branches and representative offices of legal entities, educational institutions of higher education and scientific organizations, without forming of a legal entity.</p> <p>The consortium's activities are aimed at conducting joint research, increasing the competitiveness of higher schools in the region, jointly solving the problems of socio-economic and innovative development of the Astrakhan region, inter</p>
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		<p>t of Marine Robotic Technologies in the Caspian Region” (“Marine robots – MR”)</p> <p>acting with the expert community and industrial partners, improving educational programs. Besides, participation in the consortium complements the existing interuniversity mechanisms of interaction.</p> <p>The management bodies of the Consortium are : the General Assembly of the Consortium members, the President and Vice-President of the Consortium. The President and Vice-President of the Consortium are accountable to the General Assembly of the Consortium members and are responsible to the Consortium for the results and legality of their activities.</p> <p>The supreme governing body of the Consortium is the General Assembly of the Consortium members.</p> <p>The main forms of interaction of the Consortium members are:</p> <p>project interaction; interaction in the implementation of network educational programs; organization of joint academic and scientific events, conferences, seminars, symposiums, lectures, etc. ; development of human resources potential; exchange information.</p>
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		<p>In order to implement projects, Consortium participants can create common use centers and ensure the joint use of scientific equipment, material and technical base, in accordance with the procedure established by law.</p> <p>In order to improve their professional competencies, the Consortium members can undergo training on additional educational programs for advanced training and professional retraining on the basis of the Consortium Members and their competence development centers, as well as improve their qualifications by participating in specialized seminars, courses, and trainings.</p>
		<p><b>The Transport and Logistics Consortium of Caspian Higher Educational Institutions</b> was created to achieve the goals:</p> <p>formation of modern effective corporate system of training qualified personnel to perform tasks in the field of transport and logistics; creation of effective innovative system for supporting transport and logistics infrastructure and introduction of the results of the Consortium's innovative activities in the field of logistics into the business community; implementation of innovativ</p>

e projects based on the integration of scientific, educational, innovative and technological potential of higher educational institutions, Consortium members in the interests of sustainable innovative development of the logistics field; increase in the competitiveness of Consortium members performing educational activity on the national and international markets of educational services; involvement of teaching staff, researchers, doctoral students, PhD students, students and others; creating conditions and opportunities for the implementation of large programs and projects of an educational, economic and technological nature, activation of scientific research and innovation activities.

The consortium is not a legal entity, it does not have separate property, financial and other tangible assets deposited in banks and other financial organizations.

Consortium management is based on equal cooperation. Consortium management bodies are Members' General Assembly and Consortium President.

Currently, Consortium members are 18 institutions of higher education (at the time of foundation – 12). The Consortium President is the Rector of the University, re-elected in 2020.

In 2 years, the Consortium has held scientific conferences, webinars, strategic sessions (including on methodological support of the learning process, the introduction of advanced developments in the field of logistics into the educational process), the process of creating joint Master's programs has been launched. Map of the competencies of a specialist in the transport and logistics field was formed in cooperation with industrial partners in the field of transport and logistics on the issue of the quality of training personnel for them and based on their recommendations, it was recommended for taking into account while developing educational programs.

In order to develop Consortium activities and its awareness in scientific, educational and business communities Astrakhan State University has developed the Consortium website [tlc.asu.edu.ru](http://tlc.asu.edu.ru) and maintains it.

The most important element of the research infrastructure, the virtual center for collective use, which includes unique modern equipment for conducting joint scientific research has been formed. Modern equipment operates on the basis of the shared access principle, which implies the



e possibility of using the equipment by all interested parties (Consortium members), while following established general rules.

The University coordinates Consortium members' joint activities aimed to create an effective innovative system of supporting transport and logistics infrastructure and implementing innovative projects based on the integration of the scientific, educational, innovative and technological potential of the Consortium member organizations, introduction of the results of the Consortium's innovative activities in the field of logistics into the business community.

The creation of a port special economic zone (SEZ) near the seaport of Olya and its merging with the SEZ "Lotos" into the Caspian cluster, which will become the cargo base of the International North-South Transport Corridor with a single management company will give an impetus to the development of the port territory and increase of the importance of managing logistics processes of all types of transport (road, rail, river), which will require the use of the scientific and educational potential of the Consortium members.

Each Consortium member organization, within the framework of the strategic project "Creation

2	Transport and Logistics Consortium of Caspian Higher Educational Institutions	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	<p>of a digital logistic platform for the seaport to provide competitive world-class logistics services based on business processes operating in a digital environment", carries out:</p> <p><b>In order to form an effective corporate system for training qualified personnel</b> to perform strategic project tasks within the framework of the developed competence map of transport and logistics specialists:</p> <p>FSBEI HE "Astrakhan State University" in cooperation with FSBEI HE "Yuri Gagarin State Technical University of Saratov" and FSBEI HE "Platov South-Russian State Polytechnic University (NPI)" forms the competencies in the technologies of transport processes, in the management of the software projects development; FSBEI HE "Astrakhan State University" in cooperation with FSAEI HE "North-Caucasus Federal University" forms the competencies in the operation of transport and technological machines and complexes; each Consortium member organization in cooperation with FSBEI HE "Astrakhan State University" forms the competencies in learning English for logistics specialists; each Consortium member organization implements educational programs of supplementary vocational education in the field of logistic to form the skills of effective communication and technological entrepreneurship.</p>
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ective communication and technological entrepreneurship; implements academic mobility programs for research and teaching staff, students ; implements additional services for talented students in each area of study (the possibility of students' participation in project and scientific activities on the topics of leading enterprises of the Volga-Caspian region).

**In order to conduct joint scientific researches** to implement innovation projects, it is planned:

FSBEI HE “Astrakhan State University” in cooperation with FSBEI HE "Higher Education “Yuri Gagarin State Technical University of Saratov" does research in optimization of logistics business processes in the transport and logistics consortium basing on the mathematical models development; FSBEI HE “Astrakhan State University” in cooperation with FSAEI HE “Southern Federal University” does research in modeling management systems for port zones (Smart Port), in development of logistics strategy for the development of the organizations of sectoral areas, in studying the accelerators for the Special Economic Zone (SEZ) development – hubs, portals, intermodal container terminals; FSBEI HE “Astrakhan State University” in cooperation with FSBEI HE “Financial University under the Governm

ent of the Russian Federation” makes a project in digitalization of logistics processes and services, in impact of digitalization of transport and logistics systems of the Caspian bordering countries, in development of financial technologies in the implementation of logistics processes.

**In order to strengthen international cooperation in the field of science and technology**, the Consortium's activities will be expanded by joining new members from foreign universities and industrial partners interested in implementing projects aimed at lifting restrictions on the transportation of cargo flows in the Caspian macroregion. 15 scientific and educational organizations from Caspian and Asian countries showed interest. Joint activities for the development of the strategic project and the Consortium will be based on conducting research and testing the results on the partners' territory.

In order to increase the range and volume of research to solve technological **problems of industrial partners**, a set of measures is provided: conducting research, implementing research projects in accordance with requests for innovations, technologies and solutions for the industry of transport and logistics companies, developing and implementing complex scientific and technical projects and programs of a full innovati

		<p>critical projects and programs of a full innovation cycle.</p> <p>Within the framework of the Consortium's activities, it is planned to develop the system of internal grants with financial support on a competitive basis for research teams from among SPS and students (students, master's students, PhD students) who develop and implement scientific projects focused primarily on solving complex problems with the possibility of further commercialization. Preference will be given to the projects which topics correspond to the priority scientific fields of the Consortium. Particular attention will be paid to multidisciplinary scientific projects.</p>
		<p>The role of the consortium in the implementation of the strategic project (s)</p> <p>In February 2021, on the initiative of the University, a Consortium of Educational Institutions of Higher Education and Scientific Organizations of the Astrakhan region was created. A plan of activities, topics of joint research has been formed, and work on projects is being implemented.</p> <p>The activities of the Consortium of Educational Institutions of Higher Education and Scientific</p>

Organizations of the Astrakhan region are aimed at achieving the following goals:

- providing research and development for the development of the Astrakhan region;
- obtaining new competitive technologies and products and their commercialization with subsequent transfer to organizations of the real sector of the economy;
- training of personnel to solve major scientific and technological problems of the development of branches of science and technology on the problems of the Astrakhan region to the benefit of the Russian Federation;
- export of education to the Caspian countries and attracting promising personnel from these countries to work in Russia;
- consolidation of the potential of the Consortium members and the organization of their interaction for the joint use of intellectual, informational, material and other resources in the formation and implementation of joint interdisciplinary scientific, educational and other projects.

The members of the Consortium are 8 higher educational institutions. The President of the Consortium is the Rector of the University.

3	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<p>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies", Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)", Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region"., Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<p>The consortium is a non-profit association of legal entities, as well as branches and representative offices of legal entities, educational institutions of higher education and scientific organizations, without forming of a legal entity.</p> <p>The consortium's activities are aimed at conducting joint research, increasing the competitiveness of higher schools in the region, jointly solving the problems of socio-economic and innovative development of the Astrakhan region, interacting with the expert community and industrial partners, improving educational programs. Besides, participation in the consortium complements the existing interuniversity mechanisms of interaction.</p> <p>The management bodies of the Consortium are : the General Assembly of the Consortium members, the President and Vice-President of the Consortium. The President and Vice-President of the Consortium are accountable to the General Assembly of the Consortium members and are responsible to the Consortium for the results and legality of their activities.</p> <p>The supreme governing body of the Consortium is the General Assembly of the Consortium members.</p>
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		<p>The main forms of interaction of the Consortium members are:</p> <p>project interaction; interaction in the implementation of network educational programs; organization of joint academic and scientific events, conferences, seminars, symposiums, lectures, etc. ; development of human resources potential; exchange information.</p> <p>In order to implement projects, Consortium participants can create common use centers and ensure the joint use of scientific equipment, material and technical base, in accordance with the procedure established by law.</p> <p>In order to improve their professional competencies, the Consortium members can undergo training on additional educational programs for advanced training and professional retraining on the basis of the Consortium Members and their competence development centers, as well as improve their qualifications by participating in specialized seminars, courses, and trainings.</p>
		The Consortium was established to create and



develop monitoring systems for environmental quality and biodiversity of the Volga-Kama basin and to increase the global competitiveness of Russian science and higher education:

creation and development of high-tech methods and systems for monitoring environmental quality and biodiversity of the Volga-Kama basin;

Digitalization and integrated interpretation of the results of monitoring studies of anthropogenically modified locations of water bodies and territories in the Volga-Kama basin;

Research and development in the field of reducing anthropogenic load and design systems for new types of water protection and hydraulic structures in the Volga-Kama basin;

Creation of basic foundations for restoration and conservation of agro-ecosystems in dynamic environmental conditions based on the results of monitoring studies of their condition, bioindication and biotesting using digital systems, multi-level sensing;

development of equipment, methods of contact and remote sensing, including new systems of measurement and data processing for the development of network information systems of receiving, storage and interpretation of the results

4	Consortium "Ecology of the Volga River Basin"		<p>iving, storage and interpretation of the results of monitoring studies.</p> <p>The Consortium consists of the following members:</p> <p>Federal State Budgetary Educational Institution of Higher Professional Education "Samara State Technical University". (initiator of creation),</p> <p>Federal State Budgetary Institution "Institute of Ecology of the Volga Basin of the Russian Academy of Sciences",</p> <p>Federal State Budgetary Scientific Institution "Caspian Agrarian Federal Scientific Center of the Russian Academy of Sciences",</p> <p>The Caspian branch of the Shirshov Institute of Oceanology, Russian Academy of Sciences. The Caspian branch of the Shirshov Institute of Oceanology named after P.P. Shirshov of the Russian Academy of Sciences</p> <p>Federal State Budgetary Educational Institution of Higher Professional Education "Astrakhan State University".</p> <p>In 2020 together with the members of the Volga River Basin Ecology Consortium:</p>
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			<p>online meetings were held;</p> <p>An application for a grant from the Russian Science Foundation was submitted jointly with SamSTU;</p> <p>15 areas of interaction were identified, the main of which are: "Research and development aimed at reducing the anthropogenic load on the ecosystems of the Volga-Kama basin", "Creating a scientific and technological foundation for the development of "green chemistry" areas, "Development and creation of an autonomous robotic underwater hydroacoustic monitoring system for water areas", and others;</p> <p>formation of the project "Ecosystems of the Caspian Sea".</p>
			<p>The consortium of leading universities that provide training and research in the shipbuilding industry was created on September 19, 2018 on the basis of the St. Petersburg State Maritime Technical University (SPbSMTU). At present it includes 12 educational and scientific organizations.</p> <p>The Consortium was created due to the need to implement innovative developments in production, as well as to improve the ratings of</p>

5	Consortium "Shipbuilding and Marine Facilities"	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>production, as well as to improve the ratings of universities.</p> <p>The goals of the Consortium are: joint development, promotion and licensing of new technologies; conducting open innovation projects in equipment development; joint performances at Russian and international exhibitions, congresses, symposia; creating joint international educational programs, for students, graduate students, young scientists, teachers, engineers; joint projects supported by international funds.</p> <p>Together with the members of the Shipbuilding and Marine Engineering Consortium the project "Development of Marine Robotic Technologies in the Caspian Sea Region" will be implemented.</p> <p>Interaction within the consortium will provide scientific and technical expertise for the strategic project. It will form production ties and scientific collaborations with leading industry enterprises: Shipbuilding and Ship Repair Technology Center JSC, Concern MPO-Gidropribor JSC, Laser Technology Center LLC, Concern Oceanpribor JSC, Inteltek PJSC. Within the framework of interaction with the Universities included in the consortium, it will provide building of all-round cooperation in the field of science, innovations and education from building of network educational</p>
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		<p>programs, academic mobility to joint holding of marine robotics competitions.</p> <p>As part of the implementation of the strategic project, testing of marine robots in the test water area "Unmanned" is required. The key founder of the consortium, St. Petersburg State Marine Technical University, will provide the research infrastructure for the testing period.</p> <p>The creation of distributed research teams among the consortium members will allow the training of highly qualified personnel. And the availability of dissertation councils will provide the opportunity to defend candidate and doctoral dissertations.</p>
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6	Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<p>The consortium was created on the basis of the Moscow State University of Technology and Management named after K.G. Razumov (Moscow). The Consortium was established on the basis of the K.G. Razumovsky Moscow State University of Technology and Management (Moscow), with the focus on food and nutrition industry.</p> <p>In cooperation with young researchers, research staff, professors, graduate students of universities and research institutes of the Consortium, it is planned to implement the strategic project "Caspian incubator of agro-bio-technologies".</p>
			<p>The aim of the Consortium is to form a modern and effective system of training qualified personnel to fulfill the tasks of socio-economic development of Russia, as well as to create a world-class research and educational cluster in the field of ocean and coastal zone studies.</p> <p>Priority areas of the University Consortium are: implementation of joint educational programs, scientific and practical conferences, seminars, competitions and exhibitions; use of scientific potential of universities to solve complex problems in natural sciences, medicine and engineering, including innovative projects in developme</p>

7	Consortium "University Consortium for the World Ocean Studies"	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>nt of advanced technologies in the field of artificial intelligence and robotic devices for research in the Greater Mediterranean Caspian and Mi</p> <p>The priorities of the university consortium will be:</p> <p>Implementation of joint educational programs; creation of joint international educational programs and projects, for students, graduate students, young scientists, teachers, engineers, including the support of international funds; organization and conduct of scientific and practical conferences, seminars, competitions, contests and exhibitions; formation and implementation of programs to support talented youth; encourage students demand in technological and science-based entrepreneurship without interruption of the educational process through, "startup as di</p> <p>nteraction within this consortium is focused on the educational part of the strategic project. Cooperation will provide implementation of network educational programs on priority directions of training within the framework of the strategic project 27, 15 and 9 USS.</p> <p>In partnership with the participants of this consortium it is planned to implement the strategic project "Development of marine robotic technologies in the Caspian region "Marine robot" in te</p>
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			<p>rms of the use of universities of the participants as infrastructure sites for testing marine robots in different water areas as part of the tasks in the field of education and science on the basis of network interaction.</p>
8	<p>Consortium "The Caspian Macroregion Societal Security"</p>	<p>Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"</p>	<p>On May 20, 2020, under the signed agreement, it was created a consortium of universities and research centers of the Russian Caspian Region . It included: "Astrakhan State University" as the parent organization of the consortium, Federal State Budgetary Educational Institution of Higher Education "Kalmyk State University named after B. B.Gorodovikova", Dagestan Federal Research Center of the Russian Academy of Sciences.</p> <p>The basis for the creation of the consortium was an intensified scientific cooperation in science in order to prepare an application for the Russian Science Foundation (RSF) competition. In the context of the implementation of the activities within the strategic project it is expected further joint activities such as "Development of a Societal (Integrated) Security System of the Caspian Macroregion (the Greater Caspian Region)"</p> <p>The objectives of the consortium are:</p>



		<ul style="list-style-type: none"> <li>• conducting research on a specific topic;</li> <li>• creation of a stable collaboration for the development of a joint scientific platform for the study of the Caspian Sea region;</li> <li>• combining efforts to obtain a systematized database on the Northern Caspian Sea;</li> <li>• development of a cognitive model for identifying alert zones and forecasting problem situations in the Northern Caspian region.</li> </ul> <p>In the future, it is planned to expand the consortium and include all active representatives of the Caspian Macroregion interested in research and analysis on this topic.</p>
		<p>The University Consortium of Big Data Researchers has been operating since 2017 on the basis of Tomsk State University.</p> <p>The University Consortium of Big Data Researchers is an association of educational organizations that implement fundamental and applied researches in the field of big data collection and analysis, as well as leading the development of products and tools for working with big data.</p> <p>The consortium conducts researches on a wide range of socially significant areas, including education, public safety, economics, and politics.</p>

9	Consortium of Big Data Researchers	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".,</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<p>The consortium is open for other members to join.</p> <p>A collaboration formed with the University Consortium of Big Data Researchers has focused on research in the field of artificial intelligence, processing data obtained by marine robots for resolving functional tasks such as: industrial monitoring, bioresources, ecology, geophysics, marine archaeology, etc.</p> <p>Within the framework of this consortium, it is planned to implement the strategic project "Development of Marine Robotic Technologies in the Caspian region "Marine Robot" by following directions:</p> <ul style="list-style-type: none"> <li>• filling the database on the bottom of the Caspian Sea by collecting new and updating previously obtained information with the use of the developed technologies for performing underwater technical works of various types with the use of robotic complexes, in order to have an effective approach for forecasting the economic activity;</li> <li>• collaboration of universities to create analytical systems based on artificial intelligence and robotic devices capable of collecting and transmitting data offline;</li> <li>• stimulating the demand of Russian businesses</li> </ul>
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s communities for solutions of University startups in the field of artificial intelligence; joint development, promotion and licensing of new technologies in the field of artificial intelligence and robotic devices;

- organization, implementation (including participation) in open innovative projects in the field of development of the latest technologies in the field of artificial intelligence and robotic devices;
- joint performances at Russian and international exhibitions, congresses, symposiums; consolidation on the creation of joint international educational programs and projects for students, postgraduates, young scientists, teachers, engineers, including with the support of international foundations.

The priority areas of the university consortium will be:

- development and implementation of joint educational programs;
- organization and holding of scientific and practical conferences, seminars, contests, competitions and exhibitions;
- formation and implementation of programs to support talented youth;
- stimulating the demand of students for technological and knowledge-intensive entrepreneurship.

			reneurship without interrupting the educational process through the "startup as a diploma".
10	World-Class Scientific and Educational Center "Innovative Solutions in the Agro-Industrial Complex"	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<p>"Innovative solutions in agriculture" was created as part of the "Science" national project established by Decree of the President of the Russian Federation No 204 "On national goals and strategic objectives of the development of the Russian Federation for the period up to 2024". The mission of the center is to actively participate in ensuring the competitiveness of the Russian Federation as a world scientific power and a leader in the field of agricultural science, strengthening food security and independence of the country, expanding its presence in the world food markets, increasing the level of well-being and improving the quality of life of Russian citizens.</p>
			<p><b>The scientific and educational center "Engineering of the Future"</b> was established in the Samara region in 2019 on the initiative of the Governor of the Samara Region Dmitry Azarov.</p> <p>The purpose of the REC is cooperation of science, education and business to create world-class commercial projects in demand and develop hu</p>

11	The scientific and educational center "Engineering of the Future"	<p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR"),</p> <p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p>	<p>man resources to solve major scientific and technological problems.</p> <p>For a year and a half of the activity of the REC "Engineering of the Future", it has established cooperation with industrial partners, including Group of Companies "Rostec", Group of Companies "Roscosmos", Open Joint-Stock Company "Russian Railways". We are working hard to build relations with Rosatom, Sberbank, Gazprom and Novatek. In total, 50 organizations became members of the REC.</p> <p>The center's activities are focusing around the development of five areas including new-generation propulsion and fuel systems, artificial intelligence, smart transport systems, aerospace technologies, the sector of new engineering competencies, including high-tech medicine and digital agriculture.</p> <p><b>The scientific and educational center "Engineering of the Future"</b> was established in the Samara region in 2019 on the initiative of the Governor of the Samara Region Dmitry Azarov.</p> <p>The purpose of the REC is cooperation of science</p>
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		<p>e, education and business to create world-class commercial projects in demand and develop human resources to solve major scientific and technological problems.</p> <p>For a year and a half of the activity of the REC "Engineering of the Future", it has established cooperation with industrial partners, including Group of Companies "Rostec", Group of Companies "Roscosmos", Open Joint-Stock Company "Russian Railways". We are working hard to build relations with Rosatom, Sberbank, Gazprom and Novatek. In total, 50 organizations became members of the REC.</p> <p>The center's activities are focusing around the development of five areas including new-generation propulsion and fuel systems, artificial intelligence, smart transport systems, aerospace technologies, the sector of new engineering competencies, including high-tech medicine and digital agriculture.</p>
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**Information about participants of consortium(s)**

№	Full name of participant	TIN of participant	Participation in consortium	Role of participant in consortium	Strategic projects to implement jointly with participant	Role of the participant in the implementation of the strategic project (s)
1	Federal State Budgetary Educational Institution of Higher Education "Astrakhan State University"	3016009269	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	ASU is the initiator of the creation and coordinator of the implementation of the tasks of this consortium. organize interaction within the projects; organize interaction during implementation of the network educational programs; organize joint academic and scientific activities, conferences, seminars, symposiums, lectures	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies" Strategic Project No.3 "Development of a Social (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)" Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion". Strategic Project No.1 "Development of Marine Robotic Technologies in	The activities of ASU within the framework of the consortium are aimed at achieving the goals:  - providing research and development for the development of the Astrakhan region;  - obtaining new competitive technologies and products and their commercialization with subsequent transfer to organizations of the real sector of the economy;  - training of personnel to solve major scientific and technological problems of the development of branches of science and technology on the problems of the Astrakhan region to the benefit of the Russian Federation;  - export of education to the Caspian countries and attracting promising personnel from these countries to work in Russia;

					the Caspian Region" ("Marine robots – MR")	- consolidation of the potential of the Consortium members and the organization of their interaction for the joint use of intellectual, informational, material and other resources in the formation and implementation of joint interdisciplinary scientific, educational and other projects.
2	Federal State Budgetary Educational Institution of Higher Education "Ast	3016018094	Consortium of Educational Institutions of Higher Education and Scientific	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<p>The role of the member in the implementation of the strategic project (s)</p> <p>- creation and introduction of digital solutions, including the use of robotics and artificial intelligence systems to identify problem areas in agricultural fields and greenhouses;</p> <p>- meeting the personnel needs of key employers in the agricultural sector of the economy of the Caspian macroregion.</p> <p>- implementation of joint network educational programs; training and advanced training of specialists; conducting joint s</p>



	Astrakhan State Technical University		Public Organization of Astrakhan Region	<p>activities, conferences, seminars, symposiums, lectures, etc.;</p> <ul style="list-style-type: none"> <li>• develop human resources potential;</li> <li>• organize digital interaction.</li> </ul>	<p>Strategic Project No.3 "Development of a Social (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"</p> <p>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"</p>	<p>scientific research.</p> <ul style="list-style-type: none"> <li>- environmental monitoring of water areas using marine unmanned robots;</li> <li>- conducting comprehensive research in the field of security of the Caspian region;</li> <li>- creation of new educational programs.</li> <li>- environmental monitoring of water areas using marine unmanned robots;</li> </ul>
3	Federal State Autonomous Educational Institution for Higher Education "North-Caucasus Federal University"	2635014955	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".</p>	<p>Form the competencies in the training of the specialists in the operation of transport and technological machines and complexes</p>

4	Federal State Budgetary Educational Institution of Higher Education "Financial University under the Government of the Russian Federation"	7714086422	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	<ul style="list-style-type: none"> <li>• digitalize logistics processes and services,</li> <li>• study the impact of digitalization on transport and logistics systems of the Caspian bordering countries,</li> <li>• develop financial technologies in the implementation of logistics processes.</li> </ul>
5	Federal State Budgetary Educational Institution of Higher Vocational Education "Platonov South-Russian State Polytechnic University"	6150010834	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	form the competencies in the training of the specialists in the technologies of transport processes, in the management of the software projects development

6	Federal State Budgetary Educational Institution of Higher Education "Moscow Automobile and Road Construction State Technical University" (MAADI)	7714029600	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	form the competencies in the training of the specialists in the operation of transport and technological machines and complexes
7	Federal State Budgetary Educational Institution of Higher Education "Rostov State Transport University"	6165009334	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	form the competencies in the training of the specialists in the operation of transport and technological machines and complexes

8	Federal State Budgetary Educational Institution of Higher Education "Yuri Gagarin State Technical University of Saratov"	6454004110	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	optimize logistics business processes in the transport and logistics consortium basing on the mathematical models development
9	Federal State Budgetary Educational Institution of Higher Education "Dagestan State Technical University"	0562044246	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; train and conduct advanced training of the specialists.

10	State Autonomous Educational Institution of Higher Education "Daghestan State University of National Economy"	0541001971	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; train and conduct advanced training of the specialists.
11	State Budgetary Educational Institution of Higher Education "Daghestan State Agricultural University named after M.M. Dzhambulatov"	0560019653	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; train and conduct advanced training of the specialists.

12	Federal State Budgetary Educational Institution of Higher Education "Kalmyk State University named after B.B. Gorodovikov"	0814000257	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; train and conduct advanced training of the specialists.
13	Federal State Budgetary Educational Institution of Higher Education "Astrakhan State Medical University" of the Ministry of Health of Russia	3015010536	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	- development of alternative and low-cost sources of protein components for fodder in aquaculture; creation of a new generation of algicides, complex biological additives and microalgae using physico-chemical and genetic methods for assessing the quality of aquaculture products.

14	Federal State Budgetary Educational Institution of Higher Education "Kuban State Technological University"	2310018876	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; training and professional development of specialists.
15	Federal State Autonomous Educational Institution for Higher Education "Volgograd State University"	3446500743	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; training and professional development of specialists.

16	Federal State Budgetary Educational Institution of Higher Education "Volgograd State Agricultural University"	3446501024	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; training and professional development of specialists.
17	Municipal Budgetary General Education Institution for Higher Education "Volga Institute of Economics, Pedagogy and Law"	3435880613	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Geomarketing of transport and logistics services in the region; implement joint network educational programs; training and professional development of specialists.



18	Federal State Budgetary Educational Institution of Higher Education "Dagestan State University"	0562039983	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; training and professional development of specialists.
19	Federal State Budgetary Educational Institution of Higher Education North Ossetian State University after K.L. Khetagurov	1502009030	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	Implement joint network educational programs; training and professional development of specialists.

20	Federal State Budgetary Educational Institution of Higher Education Astrakhan State University	3016009269	Consortium "Ecology of the Volga River Basin"	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>	<ul style="list-style-type: none"> <li>- develop systems aimed at reducing the anthropogenic impact on the ecosystems of the Volga-Kama basin;</li> <li>- create a scientific and technical groundwork for the development of "green" chemistry areas of creation of biosimilar chemical technologies of materials;</li> <li>- develop and create an autonomous robotic above water and underwater hydroacoustic complex for water area monitoring;</li> <li>- develop equipment, methods of contact and remote sensing, including new systems of measurement and data processing for the development of network information systems for obtaining, storing and interpreting the results of monitoring studies.</li> </ul>
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21	Federal State Budgetary Educational Institution of Higher Education "Samara State Technical University"	6315800040	Consortium "Ecology of the Volga River Basin"	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize digital interaction.</li> </ul>		Initiator of the consortium creation and coordinator of the accomplishment of the objectives
22	Federal Publicly Funded Institution of Science Institute of Ecology of the Volga river basin of Russian Academy of Sciences	6320003869	Consortium "Ecology of the Volga River Basin"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>		<ul style="list-style-type: none"> <li>- digitalization and integrated interpretation of the results of monitoring studies of anthropogenic-transformed locations of water bodies and territories in the Volga-Kama basin;</li> <li>- scientific research and development in the field of anthropogenic impact reduction and design systems for new types of water protection and hydraulic structures in the Volga-Kama basin.</li> </ul>

23	FSBSI "Caspian Agrarian Federal Scientific Center of the Russian Academy of Sciences"	301100317097	Consortium "Ecology of the Volga River Basin"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>		<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>
24	Federal State Budgetary Educational Institution "Caspian Agrarian Federal Scientific Center of the Russian Academy of Sciences"	3011004193	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	- introduction of the advanced genetic technologies in the process of agricultural production.

25	The Caspian branch of Federal Publicly Funded Institution of Science P.P. Shirshov Institute of Oceanology	7727083115	Consortium "Ecology of the Volga River Basin"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>		<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>
26	Federal State-owned Publicly-funded Institution for Higher Education Saint-Petersburg State Marine Technical University	7812043522	Consortium "Shipbuilding and Marine Facilities"	<p>Initiator of creation.</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	- provide with the research infrastructure for the period of testing.
27	Federal State Budgetary Educational Institution of Higher Education Astrakhan State University	3016009269	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	Create an innovative product based on a complete scientific and technological cycle, ensuring global competitiveness in the field of marine robotics and creating an end-to-end training cycle for the robotics industry.

28	Federal State Autonomous Educational Institution for Higher Education Saint Petersburg Electrotechnical University "LETI"	7813045402	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>-promote and license new technologies;</li> <li>-conduct open innovation projects in the equipment development field;</li> <li>- create joint international educational programs.</li> </ul>
29	Federal State Budgetary Educational Institution of Higher Education Saint-Petersburg State Institute of Technology	7809012725	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>-conduct open innovation projects in the equipment development field;</li> <li>- create joint international educational programs.</li> </ul>
30	Federal Publicly Funded Institution of Science Institute of Macromolecular Compounds of the Russian Academy of Sciences	7801003479	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>-conduct open innovation projects in the equipment development field;</li> <li>- create joint international educational programs.</li> </ul>

31	Federal State Institution of Science of the Order of the Red Banner Institute of Chemistry of Silicates named after I. V. Grebenshchikov of the Russian Academy of Sciences	7801019101	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- conduct open innovation projects in the equipment development field;</li> <li>- create joint international educational programs.</li> </ul>
32	Joint Stock Corporation "Shipbuilding & Shiprepair Technology Center"	7805482938	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>
33	JSC "Concern "Sea Underwater Weapon - Gidropribor"	7802375889	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>

34	Federal State Autonomous Educational Institution for Higher Education "National University of Science and Technology MISIS"	7706019535	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>
35	Federal State Budgetary Educational Institution of Higher Education "Astrakhan State Conservatory"	3015010127	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize digital interaction.</li> </ul>	Strategic Project No.3 "Development of a Social (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	Participation in the modernization of the system of patriotic education of the region to form a stable positive attitude to the national, as well as regional history and culture, cultural heritage, cultural identity.
36	JSC "Laser Technology Center"	7804178565	Consortium "Shipbuilding and Marine Facilities"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>



37	Federal State Budgetary Educational Institution of Higher Education "K. G. Razumovsky Moscow State University of Technologies and Management» (First Cossack University)	7709125605	Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry	<p>initiator of creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<ul style="list-style-type: none"> <li>- implementation of joint network educational programs;</li> <li>- training and professional development of specialists.</li> </ul>
38	Federal State Budgetary Educational Institution of Higher Education «Voronezh State University of Engineering Technologies»	3666026776	Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry	<p>initiator of creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<ul style="list-style-type: none"> <li>- implementation of joint network educational programs;</li> <li>- training and professional development of specialists.</li> </ul>

39	Federal State-owned Publicly-funded Institution for Higher Education "Kuban State Technological University"	2310018876	Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry	<p>Initiator of creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<ul style="list-style-type: none"> <li>- implementation of joint network educational programs;</li> <li>- training and professional development of specialists.</li> </ul>
40	Federal State Budgetary Educational Institution of Higher Education Astrakhan State University	3016009269	Consortium of Educational, Scientific Organizations and Industrial Partners in the Food and Nutrition Industry	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<ul style="list-style-type: none"> <li>- develop and implement the latest genetic technologies, additives, feeds, algicides in the agricultural production process;</li> <li>- create and implement digital solutions using robotics and artificial intelligence systems to identify problem areas in agricultural fields and greenhouses;</li> <li>- meet the staffing needs of key employers in the AIC sector of the Caspian macroregion.</li> </ul>

41	Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University"	2536014538	Consortium "University Consortium for the World Ocean Studies"	<p>Initiator of the consortium creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- information interaction.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>The role of the consortium in the strategic project implementation</p> <ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations</li> <li>- implement the network research projects and expeditions.</li> </ul>
42	Federal State Autonomous Educational Institution of Higher Education "Sevastopol Federal University"	9201012877	Consortium "University Consortium for the World Ocean Studies"	<p>Initiator of the consortium creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- information interaction.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>The role of the consortium in the strategic project implementation</p> <ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations</li> <li>- implement the network research projects and expeditions.</li> </ul>

43	Federal State Autonomous Educational Institution of Higher Education "Immanuel Kant Baltic Federal University "	3906019856	Consortium "University Consortium for the World Ocean Studies"	<p>Initiator of the consortium creation</p> <ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- information interaction.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>The role of the consortium in the strategic project implementation</p> <ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations</li> <li>- implement the network research projects and expeditions.</li> </ul>
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44	Federal State Budgetary Educational Institution of Higher Education "Astarkhan State University"	3016009269	Consortium "University Consortium for the World Ocean Studies"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<ul style="list-style-type: none"> <li>- build digital twins of marine robots and conduct virtual tests;</li> <li>- conduct tests in the test water area to obtain certification and assignment of the level of autonomy;</li> <li>- design the marine robot MMBP-max in accordance with the rules of the Russian Maritime Register of Shipping;</li> <li>- develop and maintain software and hardware systems installed on the MMBP, in the control center for marine robots to ensure safe navigation conditions.</li> </ul>
				<p>The project initiator.</p> <ul style="list-style-type: none"> <li>• develop a societal security digital analytical model in the form of a software program to study interdependence of the factors which determine the Caspia</li> </ul>		<ul style="list-style-type: none"> <li>- develop a societal security digital analytical model in the form of a software program to study interdependence of the factors w</li> </ul>

45	Federal State Budgetary Educational Institution of Higher Education "Astarakhan State University"	3016009269	Consortium "The Caspian Macroregion Societal Security"	<p>n region stability and development;</p> <ul style="list-style-type: none"> <li>• obtain scenarios of the Caspian region development on the basis of the model parameters variability;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>• organize joint research activities, technical and technological solutions development, implement scientific and technical programs;</li> <li>• exchange scientific and technical information, use data collection systems, databases;</li> <li>• develop human resources potential;</li> <li>• exchange information</li> </ul>	Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	<p>high determine the Caspian region stability and development;</p> <ul style="list-style-type: none"> <li>- obtain scenarios of the Caspian region development on the basis of the model parameters variability;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize joint research activities, technical and technological solutions development, implement scientific and technical programs;</li> <li>- exchange scientific and technical information, use data collection systems, databases;</li> <li>- develop human resources potential;</li> <li>- exchange information.</li> </ul>
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46	State Autonomous Educational Institution of the Astrakhan Region for Higher Education "Astrakhan State University of Architecture and Civil Engineering"	3016008360	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>• develop human resources potential;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	conducting joint scientific research

47	Federal State Budgetary Educational Institution of Higher Education "Kalmyk State University named after B.B. Gorodovikov"	0814000257	Consortium "The Caspian Macroregion Societal Security"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- interaction in the implementation of network educational programs;</li> <li>- exchange information.</li> </ul>	Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	<ul style="list-style-type: none"> <li>- develop a complex of new educational programs, including network ones, and flexible educational trajectories for IVE, bachelor's and master's degree programs and advanced training system.</li> </ul>
48	Federal State Budgetary Institution of Science the Daghestan Federal Research Center of the Russian Academy of Sciences	0560020659	Consortium "The Caspian Macroregion Societal Security"	<ul style="list-style-type: none"> <li>- project interaction;</li> <li>- exchange information.</li> </ul>	Strategic Project No.3 "Development of a Societal (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	<ul style="list-style-type: none"> <li>- participate in development of a societal security digital analytical model in the form of a software program that is meant to study interdependence of the factors which determine the Caspian region stability and development;</li> <li>- participate in obtainment of the Caspian region development scenarios on the basis of the model parameters variability.</li> </ul>
				<ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> </ul>		<ul style="list-style-type: none"> <li>• development of a digital logistics platform for a seaport and a digital port model;</li> <li>• approbation, testing and implementation of a digital log</li> </ul>



49	Federal State Budgetary Educational Institution of Higher Education "Astrakhan State University"	3016009269	Consortium of Big Data Researchers	<ul style="list-style-type: none"> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize joint research activities, technical and technological solutions development, implement scientific and technical programs;</li> <li>- exchange scientific and technical information, use data collection systems, databases;</li> <li>- develop human resources potential;</li> <li>- exchange information.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>istics platform in the practice of seaport management;</li> <li>filling the database on the Caspian Sea bottom by collecting new and updating previously obtained information using the developed technologies for performing underwater technical works of various types with the use of robotic complexes, in order to have an effective approach to forecast the economic activity; collaboration of Universities to create analytical systems based on artificial intelligence and robotic devices capable to collect and transmit data offline;</li> <li>a collaboration of universities to create analytical systems based on artificial intelligence and robotic devices capable to collect and transmit data offline.</li> </ul>
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50	Federal State Budgetary Educational Institution of Higher Education "Saratov State Technical University named after Yu. A. Gagarin"	6454004110	Consortium of Big Data Researchers	<ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations;</li> <li>- implement the network research projects and expeditions.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize joint research activities, technic and technological solutions development, implementation scientific and technical programs;</li> <li>- exchange scientific and technical information, use data collection systems, databases;</li> <li>- develop human resources potential;</li> <li>- exchange information.</li> </ul>
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51	Federal State Autonomous Educational Institution of Higher Education "Northern (Arctic) Federal University named after M. V. Lomonosov "	2901039102	Consortium of Big Data Researchers	<ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations;</li> <li>- implement the network research projects and expeditions.</li> </ul>
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52	Federal State Autonomous Educational Institution of Higher Education "Sevastopol State University"	9201012877	Consortium of Big Data Researchers	<ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize joint research activities, technical and technological solutions development, implement scientific and technical programs;</li> <li>- exchange scientific and technical information, use data collection systems, databases;</li> <li>- develop human resources potential;</li> <li>- exchange information.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations;</li> <li>- implement the network research projects and expeditions.</li> </ul>
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53	Federal State Budgetary Institution of Science N.P. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences	2901110813	Consortium of Big Data Researchers	<ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations;</li> <li>- implement the network research projects and expeditions.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>- organize joint research activities, technic and technological solutions development, implement scientific and technical programs;</li> <li>- exchange scientific and technical information, use data collection systems, databases;</li> <li>- develop human resources potential;</li> <li>- exchange information.</li> </ul>
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54	Federal State Autonomous Educational Institution of Higher Education "National Research Tomsk State University"	7018012970	Consortium of Big Data Researchers	<p>Initiator of the consortium creation</p> <ul style="list-style-type: none"> <li>- organize interaction within the projects;</li> <li>- organize interaction during implementation of the network educational programs;</li> <li>- organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.</li> </ul>	<p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>- integrate the research educational potentials of universities with participation of leading Russian research organizations;</li> <li>- implement the network research projects and expeditions.</li> </ul>
55	Federal State Autonomous Educational Institution of Higher Education "National Research Belgorod State University"	3123035312	World-Class Scientific and Educational Center "Innovative Solutions in the Agro-Industrial Complex"	<p>Initiator of creation and coordinator of problem solving.</p> <p>The partnership aims to combine efforts in science and education in order to create breakthrough technologies and competitive products for the agro-industrial complex.</p>	<p>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"</p>	<p>Scientific research in biotechnology, breeding and genetic research, cell technology and genetic engineering, digital transformation of agro-industrial complex and resource-saving technologies.</p>

56	Federal State Budgetary Educational Institution of Higher Education Astrakhan State University	3016009269	World-Class Scientific and Educational Center "Innovative Solutions in the Agro-Industrial Complex"	- project interaction; - exchange information.	Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"	<p>The role of the members in the implementation of the strategic project (s)</p> <ul style="list-style-type: none"> <li>□ development and implementation of the latest genetic technologies, additives, feed, algicides in the process of agricultural production;</li> <li>□ creation and implementation of digital solutions using robotics and artificial intelligence systems to identify problem areas in agricultural fields and greenhouses;</li> <li>□ meeting the staffing needs of key employers in the AIC sector of the Caspian Macroregion.</li> </ul>
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57	Astrakhan Branch of Federal State Budgetary Educational Institution of Higher Education "The Russian Presidential Academy of National Economy and Public Administration"	7729050901	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures, etc.;</li> <li>• create inter-university Career centre to deal with the issues of training in accordance with the current needs of the region as well as the employment issues;</li> <li>• organize digital interaction.</li> </ul>	Strategic Project No.3 "Development of a Social (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"	conducting joint scientific research
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58	Federal State Autonomous Educational Institution of Higher Education "National Research Samara State University"	6316000632	The scientific and educational center "Engineering of the Future"	<p>Initiator of the creation and coordinator of tasks.</p> <p>The partnership aims to combine efforts in science and education to create breakthrough technologies and competitive products in five areas, including next-generation propulsion and fuel systems, artificial intelligence, smart transportation systems, aerospace technology, the new engineering competencies sector, including high-tech medicine and digital agriculture.</p>	<p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p> <p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".</p>	Research studies in AIC, (digital) shipbuilding.
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59	Federal State Budgetary Educational Institution of Higher Education Astrakhan State University	3016009269	The scientific and educational center "Engineering of the Future"	- project interaction; - exchange information.	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region". Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")	<p>The role of the members in the implementation of the strategic project (s):</p> <ul style="list-style-type: none"> <li>• modeling management systems for port zones (Smart Port);</li> <li>• developing logistics strategy for the development of the organizations of sectoral areas;</li> <li>• studying the accelerators for the Special Economic Zone (SEZ) development – hubs, portals, intermodal container terminals;</li> <li>• creating an innovative product based on a full scientific and technological cycle that ensures global competitiveness in the field of marine robotics and creating an end-to-end training cycle for the robotics industry.</li> </ul>
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60	State Autonomous Educational Institution of the Astrakhan Region for Additional Vocational Education "Institute of Education Development"	3015106453	Consortium of Educational Institutions of Higher Education and Scientific Organizations of Astrakhan Region	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• participate in human recourse development</li> <li>• the creation of an interuniversity Career Center that will deal with issues not only training personnel for the actual needs of the region, but also employment issues</li> <li>• information interaction.</li> </ul>	<p>Strategic Project No.5: "Caspian Incubator of Agro-Bio-Technologies"</p> <p>Strategic Project No.3 "Development of a Social (Integrated) Security System for the Caspian Macroregion (Greater Caspian Region)"</p> <p>Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macroregion".</p> <p>Strategic Project No.1 "Development of Marine Robotic Technologies in the Caspian Region" ("Marine robots – MR")</p>	<ul style="list-style-type: none"> <li>• implementation of advanced training programs;</li> <li>• creation and implementation of additional educational programs.</li> </ul>
				Initiator of the consortium creation and coordi		

61	Federal State Budgetary Educational Institution of Higher Education "Astrakhan State University"	3016009269	Transport and Logistics Consortium of Caspian Higher Educational Institutions	<p>nator of the accomplishment of the objectives.</p> <p>- formation of competencies in learning English for logistics specialist;</p> <p>-implementation of educational programs of supplementary vocational education in the field of logistic to form the skills of effective communication and technological entrepreneurship;</p> <p>- implementation of academic mobility programs for research and teaching staff, students;</p> <p>- implementation of additional services for talented students in each area of study according to educational programs (the possibility of students' participation in project and scientific activities on the topics of le</p>	Strategic Project No.2 "Improving Environmental Safety and Conservation of Natural Systems in the Caspian Macro region".	<ul style="list-style-type: none"> <li>• organize interaction within the projects;</li> <li>• organize interaction during implementation of the network educational programs;</li> <li>• organize joint academic and scientific activities, conferences, seminars, symposiums, lectures.</li> </ul>
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				ading enterprises of the Volga-Caspian region).		
62	Federal State Autonomous E ducational Inst itution for Hig her Education "Southern Fed eral University "	616302781 0	Transport and Logistics Cons ortium of Casp ian Higher Edu cational Institu tions	<ul style="list-style-type: none"> <li>• organize interactio n within the project s;</li> <li>• organize interactio n during implement ation of the network k educational progr ams;</li> <li>• organize digital int eraction.</li> </ul>	Strategic Project No.2 "I mproving Environment al Safety and Conserva tion of Natural Systems in the Caspian Macro re gion".	Model management systems for port zones (Smart Port), develop logistics strategy for the develo pment of the organizations of se ctoral areas, study the accelerat ors for the Special Economic Zo ne (SEZ) development – hubs, p ortals, intermodal container ter minals.

## **Appendix №7. Information on establishing the necessary conditions for formation of digital competencies and skills of using digital technologies among students, including students of IT**

**Implementation of subjects that form digital competencies in creating algorithms and programs suitable for practical application and skills in the use and absorption of new digital technologies (including educational programs developed in line with the recommendations of the Reference Educational Centre for the Digital Economy) in the student's individual educational path within the main professional educational programs in non-IT-related areas**

The formation of digital competencies in the field of creating algorithms and programs suitable for practical application and the skills of using and mastering new digital technologies in an individual educational path (personal development path) of a student within the framework of basic professional educational programs in non-IT-related areas will be carried out gradually increasing the complexity of the level of formed digital competence, depending on the individual characteristics of students.

For example, a special preliminary teaching course "Me and "Digit" will be implemented to all students in non-IT-related areas (Bachelor's and Specialist's levels), the mastering of which will be preceded by the distribution of students into basic digital skills groups (through publicly available services "Digital Dictation" (<https://digitaldictation.ru>), "Digital Citizen" (<https://it-gramota.ru>), and the "Student's digital level" service developed by ASU). The dynamic results of these tests will be reflected in the student's personal profile as part of their e-portfolio. There are two tests: an entry test and a final test. Professors will make recommendations based on the results of the final test on how to develop the digital competencies within the elective subjects of the educational program.

The subject "Information Technology in Professional Activity" will also be implemented in all fields of study and its content will be differentiated according to the level of higher education. This course is a logical extension of the course "Me and "Digit" for Bachelor's and Specialist's Programs. The aim of the implementation of this subject into the Master's program is to adjust digital competencies to technological changes and current economic trends.

A special educational module "Digital Education Technologies " will be implemented in the Bachelor's degree program in an integrated group of training areas 44.00.00. An obligatory general professional competence (GPC) related to digital skills will be implemented in the learning outcomes of the subjects "Psychology" and "Pedagogics".(GPC-9. To be able to understand the principles of modern information technology and use it to solve professional problems).

**Plan for the implementation of subjects that form digital competencies in creating algorithms and programs suitable for practical application and skills in the use and absorption of new digital technologies (including educational p**

programs developed in line with the recommendations of the Reference Educational Centre for the Digital Economy) in the student's individual educational path within the main professional educational programs in non-IT-related areas

Plan for the implementation of subjects that form digital competencies in creating algorithms and programs suitable for practical application and skills in the use and absorption of new digital technologies (including educational programs developed in line with the recommendations of the Reference Educational Centre for the Digital Economy) in the student's individual educational path within the main professional educational programs in non-IT-related areas

	2021	2022	2023
<b><i>preliminary teaching course "Me and "Digit"</i></b>			
Digital competences that are planned to be used to develop and implement subjects (modules, courses)	<ul style="list-style-type: none"><li>– Able to make sound economic decisions in different areas of life</li><li>– Able to understand the principles of modern information technology and use it to solve professional problems</li></ul>		
Training fields (specialities) that will include the subjects (courses, modules)	integrated group of training areas, 06.00.00, 21.00.00, 35.00.00, 36.00.00	integrated group of training areas 06.00.00, 21.00.00, 35.00.00, 36.00.00, 40.00.00, 41.00.00	integrated group of training areas 06.00.00, 21.00.00, 35.00.00, 36.00.00, 37.00.00, 39.00.00, 40.00.00, 41.00.00, 42.00.00, 44.00.00, 45.00.00
Number of students	235	304	1,504
Scope of subjects (courses, modules) (minimum 72 hours)	2 credits	2 credits	2 credits
Requirements for the assessment, including independent assessment, of digital competences after subject (courses, modules) mastery and results capturing	Existence of certification standards for the level of digital competences Availability of a free online service to assess the level of digital competences Capturing results in a competence profile and personal development path		
<b><i>Information technologies in professional activities (except for 44.03.01, 44.03.05)</i></b>			
Digital competences for the formation of which the development and implementation of subjects (modules, courses) are planned	<ul style="list-style-type: none"><li>– Able to understand the principles of modern information technology and use it to solve professional problems</li></ul>		
Training fields (specialities) that will include the subjects (courses, modules)	35.03.04, 37.03.01, 39.03.02, 39.04.01, 40.03.01, 44.03.02, 44.03.03, 44.04.01, 54.03.01, 07.03.01, 06.04.01, 20.04.01, 06.04.02	all those mentioned in the previous column, plus: 20.03.01, 21.03.02, 36.05.01, 35.03.06, 35.03.07, 39.04.02, 41.03.04, 41.04.04, 41.03.05, 45.03.01, 45.03.02, 45.03.02, 45.04.02, 45.05.01, 46.04.01, 44.04.03, 45.04.02, 51.03.03	all those mentioned in the previous column, plus: 40.04.01, 47.04.01, 48.04.01, 49.03.01, 49.04.02
Number of students	325	463	706
Scope of subjects (courses, modules) (minimum 72 hours)	3 credits	3 credits	3 credits
Requirements for the assessment, including independent assessment, of digital competences after subject (courses, modules) mastery and results capturing	Existence of certification standards for the level of digital competences Availability of a free online service to assess the level of digital competences Capturing results in a competence profile and personal development path		
<b><i>Module "Digital Education Technology" (for integrated group of training areas 44.00.00)</i></b>			

	2021	2022	2023
		44.04.03, 45.04.02, 51.03.03	

Number of students	325	463	706
Scope of subjects (courses, modules) (minimum 72 hours)	3 credits	3 credits	3 credits
Requirements for the assessment, including independent assessment, of digital competences after subject (courses, modules) mastery and results capturing	Existence of certification standards for the level of digital competences Availability of a free online service to assess the level of digital competences Capturing results in a competence profile and personal development path		
Module "Digital Education Technology" (for integrated group of training areas 44.00.00)			
Digital competences that are planned to be used to develop and implement subjects (modules, courses)	GPC - 9. To be able to understand the principles of modern information technology and use it to solve professional problems		
Training fields (specialities) that will include the subjects (courses, modules)	44.03.01, 44.03.02, 44.03.03, 44.03.05	44.03.01, 44.03.02, 44.03.03, 44.03.05, 44.04.01, 44.04.02, 44.04.02	44.03.01, 44.03.02, 44.03.03, 44.03.05, 44.04.01, 44.04.02, 44.04.02
Number of students	-	1,000	1,200
Program (courses, modules) volume (minimum 72 hours)	-	3 credits	3 credits
Requirements for the assessment, including independent assessment, of digital competences after subject (courses, modules) mastery and results capturing	Existence of certification standards for the level of digital competences Availability of a free online service to assess the level of digital competences Capturing results in a competence profile and personal development path		
The subjects "Pedagogics" and "Psychology" (for integrated group of training areas 44.00.00)			
Digital competences that are planned to be used to develop and implement subjects (modules, courses)	GPC - 9. To be able to understand the principles of modern information technology and use it to solve professional problems		
Training fields (specialities) that will include the subjects (courses, modules)	44.03.01, 44.03.05	44.03.01, 44.03.05	44.03.01, 44.03.05
Number of students	800	1,000	1,200
Scope of subjects (courses, modules) (minimum 72 hours)	10 credits	10 credits	10 credits
Requirements for the assessment, including independent assessment, of digital competences on program outcomes and the recording of results	Availability of certification standards for the level of digital competences Availability of a free online service for assessing the level of digital competences Recording of results in the competence profile and personal development pathway		

**Implementation of professional retraining programs for students in non-core IT fields in main educational programs, aimed at developing digital competencies and skills in the use and mastery of digital technologies required to perform a new type of professional activity, considering the possibility of students simultaneously obtaining several qualifications.**

In order for students in non-IT-related areas to acquire the digital technologies required to perform a new type of professional activity, the university will offer vocational retraining programs that form digital competencies and skills to use and master digital technologies from the 2nd year.

An approximate list of retraining programs:

- Infographics design of a digital educational product;
- Artificial intelligence and machine learning without programming;
- Cybersecurity and social skills in a digital learning environment;
- Ensuring information security when working remotely;
- Fundamentals of animation design;
- Computer programming and IT product development;
- Development and implementation of artificial intelligence in mobile applications;
- Mobile app development;
- Project management in the digital age;
- Digital logistics;
- Digital design; Visual and linguistic aspects of communication;
- Digital tools for pedagogical design;
- Digital counsellor: emergency psychological help;
- Digital marketing and media.



- Digital marketing and media;
- Digital patent; Instruments for the registration and protection of intellectual property rights in electronic form;
- Digital tools for building a culture of healthy eating;
- Digital technologies in veterinary medicine;
- Digital technologies in crop production.

The duration of the retraining programs is 1 year. Mixed-format teaching: 30% face-to-face contact, 20% self-study, 50% project work in offline and online modes. The final work is a project focused on the subject area of the chosen professional field or a new subject area.

Mastering digital competencies within the framework of retraining programs imply participation in at least two educational intensive courses of 3-4 days (6 class hours a day). The aim of the educational intensive courses is to meet the real needs of employers and to develop project solutions for their implementation.

**Plan for the implementation of academic mobility programs for students in core professional education programs in non-core IT fields at leading universities for the development of digital competences**

Programs duration	2021	2022	2023
	1 term	1 term	2 terms
Specialities and training fields to be covered by the programs	Integrated group of training areas 35.00.00, 36.00.00, 37.00.00, 39.00.00, 44.00.00, 45.00.00	Integrated group of training areas 35.00.00, 36.00.00, 37.00.00, 39.00.00, 44.00.00, 45.00.00	Integrated group of training areas 06.00.00, 21.00.00, 35.00.00, 36.00.00, 37.00.00, 39.00.00, 40.00.00, 41.00.00, 42.00.00, 44.00.00, 45.00.00
Partners among universities that are leaders in building digital competences	National Research University Higher School of Economics (HSE) Financial University under the Government of the Russian Federation D.Mendelev Russian University of Chemical Technology K.G. Razumovsky Moscow State University of Technology and Management North Caucasus Federal University Southern Federal University	all those listed in the previous column, plus:  Far Eastern Federal University Immanuel Kant Baltic Federal University Belgorod State National Research University Yu. Gagarin Saratov State Technical University Saratov State National Research University named after N.G. Chernyshevsky Russian State Social University Vyatka State University Kostroma State University	all those listed in the previous column, plus:  O. Kutafin Moscow State Law University Samara National Research University named after Academician S. Korolev National Research University National Research Technological University (NRTU) MISIS Kazan Federal University

## **Conducting intensives, project sessions, modules, hackathons, competitions, etc. to accelerate the development of digital competences**

The events planned for the next three years include the "Data-Driven Culture Case Championship" aimed at humanities, natural sciences and pedagogical students. At the first stage of the project launch, teams will be formed only of students from the humanities, in 2022 there will be mixed teams of students from the humanities and the sciences,

and in 2023 there will be teams of students from the humanities, the sciences and the pedagogical faculties. The purpose of the case-championship is to solve more general business tasks, which are suitable for students of non-IT profiles, but requiring mastery of digital competences. Representatives of employers and senior students in IT sphere will act as experts in the case championships. The Championship is held once an academic year. Teams are formed of 3rd-4th year students.

In addition, a "Digital Marathon" hackathon will be launched to provide non-IT students with key skills in interacting with the digital environment: mastery of big data tools and visualisation tools, database skills, understanding of cybersecurity basics, understanding the opportunities and risks associated with the application of new technologies, a thorough understanding of their field, and knowledge and experience in related areas ("T-like specialist"). The hackathon is held during the intersessional period and is aimed at 1st-2nd year students.

Plan for intensives, project sessions, modules, hackathons, competitions, etc. to accelerate the development of digital competences

	2021	2022	2023
Duration of activities	<b>Case-championship on Data-Driven Culture</b> for students in the <i>humanities</i> (duration - 1 month, labor intensity - 6 credits; format - team competition)	<b>Case-championship on Data-Driven Culture</b> for students in the <i>humanities</i> and <i>natural sciences</i> (duration of each championship - 1 month, labor intensity - 6 credits; format - team competition)	<b>Case-championship on Data-Driven Culture</b> for students in the <i>humanities</i> , <i>natural sciences</i> , and <i>pedagogical training areas</i> (duration of each championship - 1 month, labor intensity - 6 credits; format - team competition)
	<b>Hackathon "Digital Marathon"</b> for students in <i>pedagogical training areas</i> (duration - 1 week, labor intensity- 1 credit; format - project work)	<b>Hackathon "Digital Marathon"</b> for students in the <i>humanities</i> (duration - 1 week, labor intensity- 1 credit; format - project work)	<b>Hackathon "Digital Marathon"</b> for students in the <i>natural sciences</i> (duration - 1 week, labor intensity - 1 credit; format - project work)
Digital competencies, the formation of which is planned as a result of the activities	- Able to develop algorithms and programs suitable for practical application in professional area - Able to use big data tools and visualization tools - Able to apply mathematical models, methods and means of design of information and automated systems according to the subject area of professional area		
Partner universities	Southern Federal University North Caucasus Federal University National Research University Higher School of Economics (HSE) Moscow State Pedagogical	all those mentioned in the previous column, plus: Vyatka State University Kostroma State University Far Eastern Federal University Immanuel Kant Baltic Federal University	all those mentioned in the previous column, plus: O. Kutafin Moscow State Law University Samara National Research University named after Academician S. Korolev National Research