

Federal State Autonomous Educational Institution of Higher Education “M.K.
Ammosov North-Eastern Federal University”



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PROGRAM
of Development of Federal State Autonomous Educational Institution of
Higher Education “M.K. Ammosov North-Eastern Federal University”
for 2021-2030

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1. Current Status and Development Results in 2010-2020.

Target Model and Its Key Characteristics

1.1. Key Results of Development in the Previous Period and Current Capacity

Federal State Autonomous Educational Institution of Higher Education “M.K. Ammosov North-Eastern Federal University” (hereinafter – the NEFU, the University) was established by the Decree of the President of the Russian Federation dated October 21, 2009, No. 1172 “On establishing federal universities in the Northwestern, the Volga, the Urals, and the Far Eastern Federal Districts”. The NEFU has become a multi-level and multidisciplinary scientific and educational facility (18 institutes and departments, five research institutes, three branches, two colleges, three subdivisions of continuing vocational education, SESC-University Lyceum), where approximately 19 thousand students from 42 subjects of the Russian Federation and 35 foreign countries study.

The NEFU activities aim to implement the concept of a “**regionally engaged university**”, based on the idea of forming a scientific and innovative center of the macroregion, providing high-level educational process, research, and technological solutions.

The program was developed based on the experience of implementing the NEFU development program in 2010-2020 and the accumulated scientific and educational potential. In the course of implementation of the previous stages of the program, **the University ensured progress in the following priority areas:**

– *the number of available basic academic programs of higher and secondary vocational education has grown* (from 90 in 2010 to 435 in 2020), with significant growth achieved in the number of master’s programs (from 4 in 2010 to 125 in 2020), residency (from 20 in 2010 to 36 in 2020), and secondary vocational education (hereinafter – SVE) (from 1 in 2010 to 12 in 2020);

– *the number of available extended training programs was increased six-fold* (from 68 in 2010 to 389 in 2020), the number of trainees at upskilling and reskilling courses increased 3.7 times and amounted to 9,716 people in 2020 (compared to 2,638 in 2010);

– *a system to identify, support, and develop the abilities and talents of children and youth in the macroregion has been set up*: the “North-Eastern University Educational District” Association was established, which incorporates 118 educational institutions of the Far Eastern Federal District (hereinafter – the FEFD), in 2011 the North-Eastern Olympiad for Schoolchildren was launched; in the 2019-2020 academic year it brought together over 14 thousand schoolchildren from 63 regions of Russia and five countries to compete in 18 disciplines and profiles;

– *the University’s scientific and innovative potential has significantly grown* – there is an up-to-date fleet of training and scientific equipment, research teams have been formed in relevant scientific domains. 17 scientific schools, four dissertation boards, 37 training and scientific laboratories, 16 scientific and educational centers, three expert centers for fostering and assisting research and development works (hereinafter – R&D), two centers for collective use of scientific and experimental equipment, and four test sites were created;

– *a state-of-the-art scientific, technological, and innovation infrastructure has been built up*, including "Arctic Innovation Center" multi-sector facility, centers for collective use of scientific equipment, intellectual property center, and OREH student business incubator. More than 50 agreements on disposal of intellectual property have been registered, 25 small innovative enterprises have been created in vital high-tech areas of economic development in the macroregion. Summarizing the results of 2020, the NEFU ranked among the top 25 Russian universities as for inventive activity rate, according to the “Expert” Analytical Center, and among the top 15 centers that support technologies and innovation in the Russian Federation;

– *the University is implementing an Educational Activity Concept* aimed at providing conditions for successful socialization and self-fulfillment of students;

there are more than 20 public associations, 230 scientific circles, 32 sports clubs, 40 artistic clubs; there is a favorable environment for social, project, and entrepreneurial activities; 97-98% of graduates are employed in their study areas annually.

Over the first decade of the NEFU development as a federal university, there have been **positive changes in the supporting areas of activity**:

- *in managing human capital*: as a result of the “Investment in NEFU Human Capital” project implementation, the share of teaching staff with academic degrees increased from 59.7% to 70.2%; the share of faculty members below 35 years – from 14.8% to 17.5%, and the mean age of lecturers decreased from 50 to 48 years (in 2010 and 2020, respectively);

- *in integration and cooperation with scientific, educational, and other organizations*: the University has long-term cooperation agreements with more than 500 scientific and educational organizations, 744 real sector enterprises, and 145 foreign organizations; cooperation with youth organizations is expanding (“Russia - the country of opportunities” organization, the Youth Resource Center, the Agency for Strategic Initiatives, the Youth Parliament of Yakutia, etc.);

- *in strengthening infrastructure, facilities, and resources*: since 2009, the campus area has expanded 2.8 times, reaching 120 hectares, the area of land property makes 227,728 sq. km.; new spatial solutions are being introduced, creating conditions for the intellectual and creative self-fulfillment of students and staff; work on implementing sustainable campus concept has been commenced;

- *in financing the University’s development*: in 2020, the University’s income per 1 faculty member increased 3.1 times and amounted to RUB 5,344.15 thousand (656.12). The share of income from R&D in the total incomes of the University in 2020 made 6.28%. The University’s endowment fund was created, making RUB 634 million at the end of 2020; the income transferred to the NEFU for 2020 amounted to RUB 45 million;

- *in the University governance system*: the shared governance model is being implemented; a corporate culture code was adopted; a Balanced Scorecard is used to monitor and evaluate the efficiency of governance;

- *in the digital transformation of core processes*: the NEFU digital ecosystem, functioning based on a “one-stop” principle, embraces 23 information services; monitoring of the effectiveness of educational and scientific processes based on a digital footprint is being introduced.

Unique resources:

- 17 schools of science that carry out research following the priorities of the scientific and technological development of Russia;
- an up-to-date scientific and innovation infrastructure facilities that meet international standards for research and development: five research institutes, 37 educational and scientific laboratories, 16 research and educational centers, three expert centers for R&D development and support, two centers for the collective use of scientific equipment and experimental installations, four test sites, two business incubators, 11 scientific journals;
- scientific cooperation and collaboration in priority areas of science and technology (see Section 4.1.).

Key competitive advantages

Programs implemented:

- the comprehensiveness of the University allows for a balanced combination of natural science, engineering and technical, socio-humanitarian education, and interdisciplinary research;
- over 50% of educational programs implemented at the University are Arctic-oriented, accounting for over 60% of students at different levels of higher education;
- the NEFU is the only university in Russia that trains professionals for the entire diamond pipeline segment and engineers for intra-permafrost operations;
- the NEFU is the only higher educational institution of the Russian Ministry of Education and Science in the Far East that trains doctors of various specializations;
- the NEFU is one of the leading centers in the Far East and Russia for training personnel for the IT domain and the digital economy;

– 17.6% of offered educational programs focus on the digital economy and ICT;

research activity:

– the expert community recognizes the NEFU's contribution to the achievement of the UN Sustainable Development Goals: for the second year, the University is among the 800 best universities in the world and is ranking 18th in Russia as per the THE University Impact Rankings, which evaluates the universities around the world in terms of their impact on the sustainable development of society; the NEFU is one of the organizers of the Northern Sustainable Development Forum;

– the NEFU became a platform for organizing a UNESCO international expert center for linguistic and cultural diversity: the NEFU is the initiator and the key venue of UNESCO international conferences on preserving linguistic and cultural diversity in cyberspace; an Arctic Multilingual Portal (www.arctic-megapedia.ru) about languages and cultures of the indigenous peoples of the North, Siberia, and the Far East of the Russian Federation was launched;

– the scientific groundwork for fundamental and applied research of nature and society: as part of the Program of Multidisciplinary Scientific Research in the Sakha Republic (Yakutia), aimed at the development of its productive forces and social domain in 2016-2020, the NEFU has implemented over 50 projects to solve the issues of sustainable development in Yakutia;

– integration with the international academic community, long-term experience of scientific collaboration with Russian and foreign universities and research centers;

digitalization and digital transformation of the University:

– the results of an external expert review in 2020 indicate that the NEFU has reached the first level of digital maturity;

expert and analytical activity of the University:

– over the past five years, 27 programs of the socio-economic development of regions, municipal districts, economic sectors, and enterprises of the Far Eastern Federal District have been developed; a “Foresight of the Sakha Republic (Yakutia)

until 2050” research has been implemented, embracing a set of research and project works to outline possible scenarios of the republic’s future.

Thus, the necessary conditions are in place for the further progressive development of the NEFU and the implementation of large-scale scientific, educational, and innovative projects enhancing its impact on the development of the Far East and the Arctic Zone of the Russian Federation.

1.2. The Mission and the Strategic Goal

The program aims at achieving the national development goals of the Russian Federation until 2030, approved by the Decree of the President of the Russian Federation No. 474 dated July 21, 2020.

The program has been drafted in line with the federal laws “On education in the Russian Federation”, “On youth policy in the Russian Federation”, the strategies of the Russian Federation on National Security, Scientific and Technological Development, Spatial Development until 2025, state-run programs of the Russian Federation “Scientific and Technological Development of the Russian Federation”, “Development of Education”, “Information society”, and the National Technology Initiative.

The program is aimed at implementing the Decrees of the President of the Russian Federation No.427 “On Measures for the Socio-economic Development of the Far East”, dated June 26, 2020 and No.645 “On the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security until 2035”, dated October 26, 2020; solving the tasks outlined in the National Program for the Socio-Economic Development of the Far East until 2024 and further until 2035 and the “Socio-Economic Development of the Arctic Zone of the Russian Federation” State-run Program. The program is coordinated with the strategic planning documents for the development of the Far East and the Arctic Zone of the Russian Federation and strategies for the socio-economic development of the Sakha

Republic (Yakutia), the Magadan Region, the Kamchatka Territory, and the Chukotka Autonomous District.

The core activities of the program are implemented in light of the provisions of the “Digital Economy” National Program and “Education”, “Science and Universities”, “Healthcare”, “Demography”, “Ecology”, “Culture”, “Housing and Urban Environment” national projects.

The mission of the NEFU is to bring up a new generation of professionals ready to achieve the goals and follow the principles of sustainable development; to carry out research, implement innovative solutions and social initiatives that ensure the achievement of national goals and the solution of geostrategic tasks in the Far East and the Arctic Zone of the Russian Federation.

The strategic goal is to develop the University as the leading scientific, educational, expert, analytical, and cultural center of the Far East and the Arctic Zone of the Russian Federation, providing a high-quality education, research, and development, contributing to the solution of global issues of humanity.

The program is based on the sustainable development ideology proclaimed by the United Nations Organization (hereinafter – the UN), evidenced in 17 Sustainable Development Goals. The program is built around the following areas of science and education, which correspond to the priority development avenues of science, technology, and engineering in the Russian Federation and the world research agenda, leveraging socio-economic development of the Far East and the AZRF, in line with the missions of national projects:

1. Sustainable economy: economic development and well-being;
2. Quality of life;
3. Sustainable society: social justice;
4. Favorable environment;
5. Sustainable nature: ecological well-being;
6. Sustainable use of natural resources;
7. Digital technologies (see Appendix 8).

The process of becoming the academic leader of the territory will envisage two stages:

Stage I – 2021-2025, the goal is to make the University more competitive and consolidate it as a leading scientific, educational, expert-analytical, and cultural center of the Far East and the Arctic Zone of the Russian Federation.

Stage II – 2026-2030, the goal is to strengthen the position among the Arctic and Asia-Pacific universities in terms of the quality of education, research, and development.

1.3. Key Characteristics of the University Target Development Model, Benchmarking Against the Target University Model

In 2021-2030, the North-Eastern Federal University will be implementing its mission as:

- *a university with an innovative environment*, high scientific, teaching, and student potential to generate new knowledge, ideas, and initiatives to achieve Russia's national goals;
- *a university with competitive scientific and academic personnel*, world-class research and project teams, recruiting leading Russian and international researchers and practitioners to implement breakthrough ideas in science and technology;
- *a scientific and educational center focused on solving global problems of humanity*, uniting the world expert community to discuss new problems and challenges, generate new ideas, goals, and objectives for the development of society;
- *a center for comprehensive research* of long-term trends and priorities of socio-economic and socio-cultural development of the Far East and the AZRF;
- *an integrator of international and interregional cooperation*, developing and implementing joint educational programs and research with leading Russian and foreign universities and research and educational centers on sustainable development agenda;

- *a platform for innovative solutions* and research in various fields of science and technology, a platform for their testing and mainstreaming;
- *an organization that introduces end-to-end digital technologies* and platform solutions, supplies competitive human resources for the digital economy, and transforms priority sectors of the economy and social sphere of the macroregion and the country;
- *an organization that provides scientific, analytical, expert, and consulting support* for the advanced development of the Far East and the Arctic Zone of the Russian Federation;
- *a center of continuous education*, offering lifelong learning for the population of the macroregion;
- *a university with an effective system for identifying, supporting, and developing the abilities and talents* of children and youth, aimed at their self-identification and career guidance;
- *an educational organization promoting traditional spiritual and ethical values of Russia*, creating the environment for nurturing civic consciousness and patriotic education of youth;
- *an open organization* that ensures the availability of information about its activities and their results, broad participation of public organizations and professional communities;
- *an organization that has physical, technological, and data infrastructure adequate to the tasks of development*, as well as modern mechanisms of allocating resources for its development.

The implementation of the NEFU academic leadership model envisages an exponential growth of key quantitative indicators of the University's activities, outlined in Appendix 9.

To obtain a synergistic effect and increase the level of the University's influence on the macroregion, the target model for the NEFU development is based on the following **dominant aspects**:

- a) *dominant aspects of educational policy*:

- enhancing the mechanisms to identify, support, and develop skills and talents of children and youth, as well as providing assistance in self-identification and career guidance;

- introducing new programs in the most significant areas and majors for the advanced socio-economic development of the Far East and the Arctic Zone of the Russian Federation;

- customizing the learning tracks, adjusting them to the individual educational needs through the development of future-proof skills and additional qualifications;

- developing new formats for interaction within the “student-teacher” system, including through project activities;

- upgrading the digital skills of the graduates and training personnel for the digital economy;

- forming universal skills to provide sustainable development, including the skills received through selectable educational standards;

- focusing on the research master’s degree programs, introducing “Master’s-to-Postgraduate” integrated programs based on the cooperation with the universities and scientific institutions within the “Sustainable Development of the North-East of Russia” Consortium;

- exploring new segments of the SVE market and initiatives to educate the population.

b) dominant aspects of policies in research, innovation, and commercialization of developments:

- developing interdisciplinary research defined by the scientific and technological development priorities and focused on broad international collaboration;

- creating attractive conditions for research by the leading world-class scientists;

- transferring scientific knowledge and technologies into the real sector of the economy and commercializing the developments;

- creating new world-class scientific infrastructure facilities: expanding the network of collective use centers, creating new unique scientific installations, testing, scientific, and production facilities;

c) dominant aspects of youth policy:

- creating the environment for civil formation, cultural, moral, and patriotic education of the students;

- expanding opportunities for the students' research work;

- improving the system to identify and support talented youth;

- involving students in the socially significant projects related to the ideas of social responsibility;

- promoting intergenerational interaction, in particular, through mentoring and partnership;

d) dominant aspects of human capital management policy:

- developing a corporate culture that will contribute to increased employees' and students' motivation and commitment to the implementation of the University's development strategy;

- forming an internal competitive environment and introducing organizational and economic mechanisms that ensure the efficiency of the staff's performance; building a system to stimulate the academic staff to be interested in constantly improving the scientific and educational processes;

- developing an addressed system for the academic and administrative staff upskilling and reskilling and increasing their academic mobility;

- recruiting the leading Russian and international lecturers, researchers, and practitioners. The research teams supervised by the leading scientists should become the key drivers for enhancing competitiveness;

- improving the quality of training senior scholars that will provide a highly qualified academic staff and prospective candidates' pool;

e) dominant aspects of campus and infrastructure policy:

- using a cluster-based approach to the campus's spatial layout;

- creating comfortable living, working, and recreation spaces for the students and the staff and enhancing accessibility of the educational environment;
- increasing the utilization efficiency of the available academic and laboratory floors;
- applying sustainable campus standards complying with the Assessment System for Sustainable Campus criteria;

f) dominant aspects of digital transformation policy:

- customization of the educational process by offering a choice of educational units, content, and lecturers, based on the individual learning tracks with digital footprint analysis;
- digital support for the research ;
- improving the staff's digital skills and their proficiency in using the digital and analytical tools (benchmark – third level of digital maturity as per external assessment);
- developing a digital “one-stop” ecosystem based on the digital solutions, services, and information systems with further integration into the state information systems;
- transferring to the digital management platform using data-based practices;

g) dominant aspects of open data policy:

- tailoring standards for publication and exchange of high-quality data;
- generation of the University's digital profile, improving the accessibility and quality of open data;
- upskilling employees in applied data analysis;
- improving cooperation with the authorities, research, educational, and public institutions in terms of submitting and analyzing data: (integrating data at the unified information portals; creating virtual communities where the stakeholders can have an opportunity to analyze the performance of the University);
- expanding cooperation with educational and research organizations that carry out fundamental and applied research in the field of big data collection and analysis;

h) dominant aspects of the University governance:

- broadening powers and extending responsibilities at all levels of management, increasing the involvement of the core personnel in the activities of the task teams and commissions steering various University activities;
- migration of as many management processes as possible to the “one-stop” service model with online access;

i) dominant aspects of internationalization policy:

- expanding the international footprint, finding new educational and scientific markets in the Arctic and the Asia-Pacific regions;
- developing export capacity and internationalizing the educational process;
- promoting the Russian language in the East Asian countries (benchmark – to launch at least ten Russian language and culture centers at the partner universities of the APR countries);
- recruiting the leading foreign lecturers and experts (benchmark – to increase the share of international students threefold; to increase the share of international lecturers and researchers working at the University for at least one semester twofold);
- improving the level of teaching foreign languages and embracing more students and staff in the international certification of foreign languages proficiency;
- strengthening the NEFU’s stand as a center for holding international events on sustainable development;
- developing electronic internationalization.

For a comparative analysis against **benchmarks**, the NEFU looks up to the world’s leading universities based on the specific features of its positioning (representation of the Arctic and Asia-Pacific regions, implementation of sustainable development goals programs), compliance with the development track (similarity of the key areas of scientific and educational activities, proportionality in the number of students and academic staff), available partnerships, joint projects, and programs (see Appendix 11):

1. Nanyang Technological University, Singapore (founding member of the World Union of Technological Universities, interdisciplinary research and technological entrepreneurship);
2. Hokkaido University, Japan (training professionals in sustainable development, Assessment System for Sustainable Campus);
3. Harbin Institute of Technology (HIT), PRC (multidisciplinary research in the Arctic, technologies for the development of the North, cold lands ecosystems' research);
4. Inha University, the Republic of Korea (new materials, information, bio- and nanotechnology, digital transformation of society, artificial intelligence);
5. Minerva University, USA (a startup university of a new type, digital educational solutions for the new generation, an analogue of the "University-360" model under development);
6. The Arctic University of Norway (UiT), Norway (an Arctic university model, climate research, telemedicine, medical biology, research on the quality of life in the North);
7. University of Turku, Finland (interdisciplinary research of the digital future, cultural heritage and social change, developing technologies for safeguarding health in the North).

1.4. Unique Aspects of Strategic Positioning and Growth Areas

The positioning of the NEFU in the scientific and educational space of the region, macroregion, federal district, country, and the world will be determined both by the internal environment factors (resourcing, scientific and innovative infrastructure, educational programs and technologies, the digital maturity level, the prevailing corporate culture), and the limitations of the external environment (natural and geographical conditions, demographic, social, and economic factors, ongoing socio-cultural and geopolitical processes).

Based on the geostrategic location, **two key vectors of the NEFU positioning** are identified, which delineate the space for its development in the long term:

the Arctic vector: Yakutia – North-East of Russia – Arctic Zone of the Russian Federation – Arctic region;

the Eastern (Asian) vector: Yakutia – North-East of Russia – Far East – Asia-Pacific region.

The location at the intersection of two priority vectors of Russia's development – Arctic and Eastern (Asian) – defines the variety of possible directions and opportunities for the NEFU positioning. Consequently, there are five levels of the University positioning:

I. *Regional level:* development of the NEFU as the core of the scientific and educational domain of the Sakha Republic (Yakutia). The activities of the University are aimed at building the intellectual, economic, and innovative capacity of the republic. The role of the NEFU in the region is outlined in the Strategy of Socio-Economic Development of the Sakha Republics (Yakutia) until 2032 with a target vision until 2050.

Priority areas of the NEFU positioning: improving the quality of education; scientific backing of the socio-economic development of the republic; preservation of the culture of Yakutia's peoples and Russia's traditional spiritual and moral values; spiritual and patriotic education of youth.

The NEFU will develop in the “Big University” format – as a consortium of educational and scientific organizations, development institutions, and Yakutia's real sector companies. Project-driven learning in the academic master's programs will be based on both the scientific and educational laboratories and research teams of the University, and the research institutes of the SB RAS and the Academy of Sciences of the Sakha Republic (Yakutia). In addition, project activities in the technological master's programs will be organized in such development institutions as the Arctic Innovation Center, “Yakutia” Technopark, “Yakutia” Development Corporation, “Yakutia” Venture Company, etc.

II. *Macroregional level*: the NEFU is the largest university in the North-East of Russia. The University and its branches are located in the territory of the Sakha Republic (Yakutia) and the Chukotka Autonomous District. The NEFU branch in Anadyr is the only university in the Chukotka Autonomous District. The scale of the geostrategic tasks solved by the University is determined by the fact that the joint territory of Yakutia and Chukotka makes 3,805 thousand square kilometers, occupying 54.7% of the Far Eastern Federal District territory and 22.2% of the entire territory of Russia.

The role of the NEFU in the macroregion is governed by the National Security Strategy of the Russian Federation and the Strategy of Spatial Development of the Russian Federation. The University shapes the future vision of the geostrategic territory and proactively creates points of future growth. Its mission is to generate new ideas, formulate new goals and objectives, and undertake research and development.

Priority areas of the NEFU positioning: environmental well-being of the population; climatology and permafrost science; conservation of biodiversity; human health in extreme conditions; “green” living space for people in the North; technologies and materials for the North.

III. *Interregional level*: following the Strategy for Spatial Development of the Russian Federation until 2025, the NEFU’s territory of responsibility embraces two major priority geostrategic macroregions: the Far East and the Arctic Zone the Russian Federation. The activities within the University’s development program aim to solve the tasks of the National Program for the Socio-Economic Development of the Far East until 2024 and further until 2035 and the “Socio-economic development of the Arctic Zone of the Russian Federation” state-run program of the Russian Federation.

Priorities: supplying human resources to the growing labor market; anchoring youth and reducing the population outflow; preservation of the languages and cultures of the indigenous peoples of the North; developing technologies and materials for the Arctic, including health-saving technologies; sustainable nature

management; expert and analytical support for the socio-economic development of the Far East and the Arctic Zone of the Russian Federation

A comparative analysis of missions, strategic goals, and key development indicators of the NEFU and universities located in the Far North is featured in Appendices 13, 14.

IV. *Federal level:* activities aimed at achieving the national development goals of the Russian Federation until 2030. The NEFU positioning is governed by the Concept of Establishing and Providing State Support for the Development of Federal Universities, which assigns them a responsibility to become centers of regional development and to build and develop competitive human capital in the federal districts.

The University takes part in the development and implementation of breakthrough research and development in the areas on the List of Critical Technologies of the Russian Federation:

V. *Global level:* the NEFU development as an authentic university of the Arctic and the Asia-Pacific regions. The University is focused on solving the global problems of humanity and achieving the UN Sustainable Development Goals – it formulates new problems and challenges, the answers to which are still to be found.

The NEFU is positioned as an international scientific and educational center and an expert platform for sustainable development matters: preserving minority languages and cultural diversity; improving the quality of life and well-being of the population; introducing green nature management technologies; inventing materials and technologies for extreme conditions. The University acts as a participant and initiator of international consortia and associations of scientific and educational organizations. The University also is a platform for expert discussion, research and analysis, design and creativity in the domain of global problems of humanity.

The implementation of the NEFU development program will enhance its **impact on the achievement of the national goals of the Russian Federation until 2030:**

- creating a system for identifying, supporting, and developing the abilities and talents of children and youth through the development of the North-Eastern University Educational District Association, expanding the geographical coverage and increasing the number of participants in the North-Eastern Olympiad for Schoolchildren: 30 thousand schoolchildren from 65 regions of Russia and five foreign countries by 2030, enhancing the activities of the Nikita Solomonov Scientific Collaboration House, junior academies, the introduction of digital services for career guidance and self-diagnostics;

- expanding opportunities for students’ research work by increasing the number of scientific and educational laboratories, student scientific circles, and student-friendly projects of scientific departments led by the top scientists, creating a digital platform of project offers for students;

- nurturing harmoniously developed and socially responsible youth, instilling a worldview and professional qualities that correspond to the ideology of sustainable development, through involving students in social projects, developing student volunteering, and increasing the share of graduates involved in the NEFU mentoring and loyalty programs;

- improving the living conditions of the population through the introduction of construction technologies and materials developed at the University;

- increasing the number of people employed in the field of small and medium-sized businesses through tailoring and implementing a program to foster youth entrepreneurship at the University;

- achievement of “digital maturity” of higher education through the University digital transformation program, increasing the digital skills of academic staff.

Impact on the national projects’ implementation:

- building the export potential of the Russian higher education system, including due to an increase in the number of international students and postgraduates from 3.1% in 2020 to 4.5% in 2024;

- providing attractive conditions for promising young researchers, which will affect the share of researchers under the age of 39 with an academic degree as per the “Science and Universities” national project; over the program implementation period, this indicator in the NEFU will grow from 26.5% in 2020 to 32% in 2024;

- increasing the digital acumen of graduates thanks to an increased number of graduates in areas and majors with two or more key skills in the digital economy, increased number of online courses developed and incorporated in educational programs, from five in 2020 to 100 in 2024;

- increasing digital literacy of the population, including through training at least ten thousand residents of the Russian North-East in additional professional programs in the field of digital skills in 2021-2024, as per the “Human Resources for the Digital Economy” federal project under the “Digital Economy” national project;

- graduation of at least 1,820 medical students in 2021-2024 following the “Providing medical organizations of the healthcare system with qualified personnel” federal project under the “Healthcare” national project.

Achieving the goal and the objectives of the program are aimed at **solving the tasks of the National Program for the Socio-Economic Development of the Far East and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security:**

- increasing the availability and scope of high-quality higher education for residents of the Russian North-East, graduation of at least 16.5 thousand students with higher education in 2021-2025, including 13.5 thousand full-time students;

- mainstreaming the areas/majors critical for the comprehensive socio-economic development of the macroregion as per the National Program for the Socio-Economic Development of the Far East and the Fundamentals of State Policy of the Russian Federation;

- reducing the shortage of doctors and nurses in the macroregion, enhancing the doctor training programs considering the specific aspects and adaptive mechanisms of human physiology in the Arctic; it is planned to train at least 4.5

thousand doctors in 2021-2030;

- increasing the share of graduates who were employed the year following the graduation in the total number of university graduates who completed higher education and did not continue studies at the next level, by at least 80%, in accordance with the National Program of Socio-Economic Development of the Far East;

- expanding the scope of the territorial studies and scientific and innovative support of projects implemented in the Far East and the Arctic Zone of Russia through the creation of consortia of scientific and educational organizations in the Russian North-East;

- improving the quality and efficiency of macroregion governance, including creating the NEFU Higher School of Management and implementing upskilling and reskilling programs for top and middle managers (Executive Education).

The University's impact on the achievement of sustainable development goals in the macroregion.

The first significant effect is directly related to the implementation of measures to reduce the level of pollutant emissions that negatively impact the environment and human health, as per the Paris Climate Agreement, including through the introduction of advanced facility managing technologies following sustainable development standards and Assessment System for Sustainable Campus criteria.

The second effect of implementing a university model focused on the goals and values of sustainable development of northern territories is the training of sustainable development experts in the regions of the Far East and North of Russia. This result will be achieved synthetically – through the implementation of RJE3 educational programs, the organization of national and international conferences and meetings to discuss the problems and prospects for the implementation of the principles and goals of sustainable development, and active participation in international educational and scientific projects on sustainable development.

1.5. Major Constraints and Challenges

Natural and geographic conditions and socio-economic situation in the Far East and the Arctic Zone of the Russian Federation will exercise a decisive influence on the progress and the outcomes of the program's implementation and the University's development:

- extreme natural and climatic conditions and growing anthropogenic impact on nature, small number and continued decrease in population, caused by the migration outflow, the overall instability of the socio-economic situation in the macroregion;
- a gap with the average national indicators describing the quality of life and low access to high-quality social services limit the inflow of new workforce;
- growing global interest in the macroregion's natural resources and large-scale investment projects require a new generation of professionals with higher education and scientific support for the accelerated socio-economic development of the macroregion;
- understudied potential of the territories, natural and climatic processes, and human life in the extreme conditions of the North;
- a growing threat of weaker social responsibility of youth, their separation from the ethnic culture, language, spiritual and moral values under the pressure of mass culture bring forth the problem of preserving the languages and cultural heritage of the peoples of the macroregion, as well as the problem of instilling civic-mindedness, patriotism, respect for the national history and traditions of the peoples of Russia;
- remoteness from the leading scientific, educational and cultural centers of the country, underdeveloped social, transport, information and communication infrastructure, and challenging logistics restrict the spatial boundaries of attracting talented youth and world-class researchers.

To mitigate the impact of the current conditions, it is planned to widely involve the leading Russian and international lecturers and researchers and to fully

integrate the University's scientific and educational divisions in the federal agenda (National Far East Development Program, "Socio-Economic Development of the Arctic Zone of the Russian Federation" State-run Program, national projects) to communicate and implement the key projects in distributed teams.

In the future, the following **factors of environment** will impact the University's development:

- growing uncertainty of social and political processes, challenges and unpredictability of the social and natural development;
- higher demand for a new generation of professionals with higher education and scientific support for the accelerated socio-economic development of the macroregion;
- multifold expansion of information flow, active development of digital technologies and platforms, and network communities that provide a new quality of communication and the ability to introduce new ways of personal and collective training;
- globalization of the educational market, competition of education programs and formats, formation of a broad non-university educational environment, refocusing on meeting the diverse and dynamically changing requirements of the labor market and educational needs of the population;
- higher demand for innovations aimed to solve the tasks of the country's intensive socio-economic and scientific and technological development.

In addition to the global external challenges, NEFU faces the following **intra-university constraints and challenges**:

- financial constraints preventing full-scale implementation of scientific and applied projects and research, social initiatives;
- an unstable procedure of recruiting young and qualified personnel from the Russian market, resulting in a slow rate of teaching staff rejuvenation;
- digital gap expressed in inadequate digital skills among many students from low-income families, rural and northern territories;

- student migration, the outflow of talented youth from the macroregion to the central universities.

2. Target Model Compliance Roadmap: the University's Policies in the Core Areas

2.1. Educational Policy

As of April 1, 2021, 17,902 students studied at the University, including 10,607 undergraduate students, 2,011 graduate students, 3,368 specialist students, 345 postgraduate students, 364 residency students, and 1,207 secondary vocational education (SVE) students.

The NEFU implements educational programs at all levels of education: general, secondary vocational, higher, extended, and extracurricular education for children. Thus, 12 University field-oriented preparatory classes have been opened, and the “North-Eastern University Educational District” Association has been established, uniting 118 educational institutions of the Far Eastern Federal District. The NEFU Specialized Educational and Scientific Center (SESC), or the University Lyceum, has won a competition in developing a network of SESCOs for basic training of highly qualified personnel for innovative development of Russia within the scope of the “Science and Universities” national project.

The NEFU, including its branches, provides education in 151 areas of education and majors, including 77 bachelor's degree programs, 47 master's degree programs, 18 higher education majors, and nine SVE majors. There are 355 basic academic programs available: 342 programs of higher education and 13 SVE programs. Senior scholars are trained in 23 areas for postgraduates (including 50 basic academic programs) and 40 residency majors. Twelve academic programs are implemented in a networking form; 8 of them are implemented jointly with foreign partner universities.

The list of extended education and extended professional programs is expanding: in 2020, 9,716 people completed training in 87 programs of professional reskilling and 302 programs of upskilling.

The priority areas of training/majors correspond to the human resources' demand of the macroregion and the benchmarks of the strategy for the social and economic development of the Far East and the Arctic Zone of the Russian Federation. Over 50% of academic programs available at the University are Arctic-oriented. More than 60% of students at different levels study in these programs.

The next priority is to form universal skills to provide sustainable development of the society. In the 2020-2021 academic year, 4/5 basic academic programs of higher and secondary vocational education were available. These programs are focused on training personnel, taking into account the values and goals of sustainable development.

The high demand proves the quality of the programs offered at the University:

- *among applicants*: despite the objective problems, academic programs of the NEFU attract students from other regions and countries: in 2020-2021 academic year graduates from over 80 higher educational institutions of Russia enrolled in the NEFU Master's programs, more than 600 international students are taking academic programs of higher education;

- *among students from other universities*: in 2020, 1,707 students from other universities took online courses offered by the NEFU as a part of the “Modern Digital Educational Environment of the Russian Federation” priority project (hereinafter – MDEE). In 2020-2021, the NEFU faculty members designed more than 145 online courses in total. The courses were uploaded to the MDEE catalog at online.edu.ru; 15 of them aim to form students' digital skills.

The University has formed an educational environment that allows students to master the skills firsthand in companies. Long-term agreements have been signed with 744 enterprises. There are 19 basic departments, and 1,232 students studied there in the 2020-2021 academic year. In order to train personnel in compliance with the highest world-class standards and prospective vocational positions, the

University is cooperating with the “Young Professionals (WorldSkills Russia)” Union. As a result, 2020 saw 12 updated programs of SVE that train skills based on WorldSkills Russia standards.

Despite the results achieved and an active process of transforming the University’s educational environment, the need to solve **issues that hinder the implementation of program measures** is still relevant. First of all, it is the limited geographical coverage of admission (the number of students from other regions of Russia is half the number of international students – 253 and 619 students in major academic programs respectively, in 2020). Among other issues are the traditional method of teaching based on year-cohorts and groups persisting in most departments, low-demand and narrow-focus undergraduate programs still being offered, low variability of graduate programs, a small number of students, and a lack of a clear focus on specific segments of the labor market.

In this regard, when developing program measures, special attention is paid to ensuring variable and personalized education, a prompt adaptation of academic programs to new tasks, widespread implementation of the modular structure of academic programs, a platform-based teaching, including complete transfer of specific disciplines into online.

Key priorities and directions of educational policy

The specific nature of the NEFU activity as the “regionally engaged university” defines the development of its educational policy. The primary trend is to train competitive specialists for the macroregion – a new generation of professionals who will implement the values and goals of sustainable development of the Far East and the Arctic Zone of the Russian Federation and who will meet the requirements of the main stakeholders in the macroregion’s labor market.

Another critical factor is the University’s commitment to achieving the “Opportunities for Self-fulfillment and Development of Talents” national goal of the RF and the target indicator of “building an effective system to discover, support, and develop skills and talents of children and youth, based on the principles of fairness and universality, and aimed at self-identification and providing career guidance for

all students”, which is integral to one of the core principles of the University’s development – human-centered approach.

Based on the factors above, the **strategic goal of educational policy** has been determined: bring to date and personalize education based on the optimal combination of the principles of trans-humanistic, anthropological, and axiological approaches adapted to today’s digital environment.

The new educational paradigm will be built based on the value of a student as a human asset (trans-humanistic approach) and a personality, an individual (anthropological and axiological approach). Personalization will include discovering and developing the inner personal resources and adapting the educational process to individual needs, and therefore a variable educational environment will be built with individual learning tracks and enhanced project activity.

Transformation of the educational process also envisages:

- balance of fundamental (theoretical) and applied (practice-oriented) content of education;
- unbundling of educational programs, courses, academic, and other educational activities;
- student-centered educational activity;
- constructive nature of communication, empathic interaction, and cooperation of students and faculty members.

Within the logic of prioritizing the human aspect and creating conditions for the fulfillment of talents (of both students and faculty members), the resources of the University and the efforts of the team will be concentrated on achieving the following **key results**:

- *developing systemic practices to identify, develop, and support the talented youth*, including assistance in self-identification and career guidance for children involving the University Educational District and the SESC;
- *updating available and tailoring new educational programs*, aimed to ensure scientific and technological development of the Far East and the AZRF,

including those implemented in networking with educational and scientific organizations and the enterprises of the real sector of the macroregion's economy;

- *incorporating universal skills into all majors and areas of education* in the digital economy and ensuring sustainable development of the society;

- *designing and implementing "Master's-to-Postgraduate" integrated programs*, including those based on selectable standards, that should focus on training qualified research staff for the research and development segment of the Far East and AZRF labor market;

- *digitalization of the educational process* that should ensure individual learning tracks, including the introduction of 2+2+2 programs, ensuring a possibility to choose an area (major) at least twice in the course of studying – during the second year and upon graduation from bachelor's program, including programs based on selectable educational standards;

- *introduction of micro-learning for programs of extended vocational education* that will allow students to acquire additional skills that will increase their competitiveness at the employment stage;

- *building a developed network for corporate training* focused on the needs of the main stakeholders of the macroregion, as well as branches of major Russian companies in the North-East of Russia;

- *ensuring continuing education for the population through* additional service programs, including implementation of programs for people of pre-retirement and retirement age (school of career longevity);

- *modernization of the education quality assessment system* by digitizing the assessment of the maturity and development of students' skills and adjusting their learning tracks, among others, through evidence-based approaches of neuroscience.

Expected internal outcomes:

at individual level –

1. *Enhanced availability of end-to-end digital technologies and tailoring of Future Skills* that will ensure competitiveness in a changing labor market and are crucial for working in an environment of growing natural and social uncertainty;

2. *An opportunity to choose various areas of studies and majors*, in-depth courses, subjects, disciplines, modules, building personal and social skills, and improving professional skills including via online courses of other educational institutions;

3. *Increased digital skills of graduates* thanks to a larger number of graduates in areas and majors with two or more key skills in the digital economy as per the “Human Resources for Digital Economy” federal project under the “Digital Economy” national project, as well as thanks to online courses, developed and incorporated in educational programs, the number of which will increase from five in 2020 to 100 in 2024;

at the University level –

1. *Improved quality of students* thanks to undertaking a variety of career guidance efforts in Russia and abroad (expanding geographical coverage and involving more participants of the North-Eastern Olympiad for Schoolchildren: over 150 thousand schoolchildren from Russia and the CIS in 2021-2030; increasing the membership of the FEFD educational institutions in the “North-Eastern University Educational District” Association from 112 in 2020 to 150 in 2030);

2. In the long run, until 2030, the NEFU will be using accumulated experience of networking and online learning resources to *update the content and use modern educational technologies* for existing educational programs and for tailoring new ones, aimed to ensure scientific and technological development of the Far East and the AZRF, including programs implemented as networking with educational and scientific institutions and enterprises of the real sector of the economy.

3. *Developing joint scientific and socio-humanitarian research and project activities* of the staff and the students. By 2030, at least five project offices (collective use centers) will have been created in the framework of key directions of the University’s development which will ensure the introduction of project-based learning and an opportunity for students to participate in collective (team) scientific, research, and sociocultural projects.

4. *Expansion of the educational programs' implementation network* will ensure *an increased share of specific categories by 2030*:

a) students:

foreign citizens and stateless persons pursuing higher education, up to 10%;

students from other regions of the Russian Federation, up to 8%;

students who received extended education free of charge, up to 30%;

b) graduates who completed higher education and were employed one year after graduation, by at least 80%;

5. By 2030, the new monitoring and assessing system of the University, based on the up-to-date measurement concept and evidence-based approaches of neuroscience, will provide *at least 80% of students with access to a dashboard containing full information about main metrics and indicators* that form the system of internal assessment of the education quality at the NEFU.

External effects:

1. *Increased availability and scale of high-quality higher education* for residents of the North-East of Russia, graduation of 35 thousand higher education students in 2021-2030, including 27 thousand graduates who studied full-time;

2. *Introducing the most significant areas of studies and majors for the integrated socio-economic development of the macroregion* as per the National Program for the Socio-Economic Development of the Far East and the “Socio-Economic Development of the Arctic Zone of the Russian Federation” state-run program;

3. *Ensuring a successful career for the University graduates* in leading Russian and international companies that ensure the socio-economic development of the Far East and AZRF, increasing the share of graduates who were employed the year following graduation at least by 80%, as per the National Program for the Socio-Economic Development of the Far East;

4. *Building the export capacity of the regional higher education system*, including increasing the number of international students and postgraduates from 3.1% in 2020 to 10% in 2030.

5. *Reducing the outflow of the population* from the Far East and the Arctic Zone of the Russian Federation, anchoring the youth in the macroregion.

6. *Increasing digital literacy of the population*, including through training at least 10 thousand residents of the North-East of Russia at extended professional programs in digital skills in 2021-2024 as per the “Human Resources for Digital Economy” federal project under the “Digital Economy” national project.

2.1.1 Conditions for Building the Students’ Digital and IT Skills, Including Students of IT Majors

The NEFU strategic priorities in providing conditions for building the students’ digital skills and proficiency in digital technologies are:

building digital skills and proficiency in digital technologies among students of all academic areas; building advanced and future-proof digital skills (including end-to-end technologies and Future Skills) among students of engineering and technical majors, including students majoring in IT.

The digital skills development model is being tailored to promote such skills as creating applicable algorithms and programs and using and learning new digital technologies. The digital skills development model has an open architecture and is based on the resources and tools of the “University 360” Consortium.

A list of disciplines (courses, modules) and online courses is formed that help build digital skills of creating applicable algorithms and programs and using and learning new digital technologies (Appendix 7). This list includes, among other things, educational products of extended professional education, developed and implemented in cooperation with industrial partners, technology and IT companies. Representatives of Yandex, Samsung, Huawei, MTS, MegaFon, MyTona, AEB IT, Avatek, the Republic’s ICT Center, Rostelecom, and others take part in external expert review of digital skills status.

As part of the digital skills development model, the designing of retraining programs will continue in cooperation with Samsung, Huawei, and Schneider

Electric leading technology companies within the framework of the University Consortium of Big Data Researchers based on the “Future Skills: NEFU” International Center for Advanced Skills Development and other NEFU technology centers and laboratories. The programs will be included in the major academic programs and will be used to form individual educational tracks (Appendix 7). The enrollment in these programs will be customized based on the students’ training profile and the terms of reference of employers that outline the requirements for the graduates’ skills.

The “Open” Institute for the Professional Skills and Qualifications Development is drafting “System Analyst”, “Text Data Analysis”, and other professional retraining programs. The implementation of the “Artificial Intelligence”, “Samsung IoT Academy”, and “Huawei Network Technologies and Devices” programs will continue together with Samsung and Huawei companies. In addition, the “Technical protection of restricted information that does not contain classified data” program will be implemented (Appendix 7). Based on the 3D modeling and virtual reality laboratory, the “Digital Museum Technologies: 3D Scanning, 3D Modeling, and Visualization” program will be implemented (Appendix 7).

The academic mobility and double-degree programs in major academic programs in non-core IT areas are being implemented. They will be expanded within the framework of the “University 360” Consortium, the “Modern Digital Educational Environment of the Russian Federation” (MDEE) priority project, and other mechanisms. An “Economics and Data Analysis” double-degree program will be implemented together with the Higher School of Economics National Research University. “Convergence: Business Management in the Digital Economy”, “Convergence: Culture in the Digital Age”, and “Convergence: Science-Intensive Technologies” international Master’s programs will be continued together with the universities of Russia and the Republic of Korea (Appendix 7).

To accelerate the building of digital skills, the NEFU regularly holds open and closed hackathons and various industry-specific project sessions. This teamwork

format ensures rapid solution development, the actualization of student initiatives, and the formation of professional communities. Among the annually held hackathons are the selection stages of the republic-wide “My Profession – IT” competition, “Digital Solutions Contest” data hackathon, information security hackathons, bio-hackathons, and hackathons in NTI domains. A project and educational crash course was held in the NTI 20.35 University model (Appendix 7). The “Tochka Kipeniya” (“Boiling Point”) collective workspace hosts project sessions, crash courses, lectures on the NTI areas and markets (Appendix 7).

The listed measures aiding the implementation of the mentioned priorities will increase the general level of the digital culture in the macroregion and provide it with personnel having advanced, future-proof digital economy skills and breakthrough technological solutions for dynamic and sustainable development of the Russian Federation.

2.2. Research Policy and Policy of Innovation and Commercialization of Developments

Over the past decade, the University has been focusing its scientific research support on pressing regional problems and related fundamental topics. At the same time, the growth of the NEFU scientific potential is hindered by the region’s undersized labor market and low mobility rate of human resources, resulting from the University's geographical location. In this regard, since 2010, systematic efforts have been carried out to upgrade the skills of the academic staff and develop own schools of sciences.

The NEFU has 17 schools of sciences. The University trains its own scientific personnel and has built a track of a scientific career from an undergraduate researcher to a promising young scientist. For this, 283 science circles are functioning now, embracing over 7,000 students. Postgraduate students are being trained in 23 areas; 4 dissertation boards are functioning.

Young scientists lead the laboratories in applied mathematics research, climate change, and ecology of the Arctic. In addition, young scientists are engaged in international projects in medicine, genetics, mathematical modeling, and theoretical physics.

Up-to-date scientific and innovative infrastructure facilities (see Section 1.1.) ensure the scientific potential growth rate.

The number of publications in journals indexed in the Web of Science *has increased* 35.5 times, and that indexed in Scopus –28 times. The results of focusing on the needs of the regional economy, with its clusters, are confirmed by the fact that from 2010 to 2020, the rate of R&D performed for organizations in various economic sectors increased 11 times, and their share increased from 7.7% to 16.9%.

Research and development play a special part in the University's efforts to achieve the UN Sustainable Development Goals. The health status of the region's population is monitored and investigated, methods for diagnosing rare genetic diseases, typical in the northerners, have been developed, as well as technologies for reclamation of territories affected by anthropogenic impact. Materials (rubbers, polymer nanocomposites, building materials, road surfaces) intended for northern climates were obtained. The NEFU UNESCO Chair deals with human and social adaptation issues in the Arctic regions in the context of climate change and globalization.

Significant progress has been made in the intellectual property domain. The Intellectual Property Center, established in 2010, has been ensuring the legal protection of the University's intellectual property items. In 2021, the NEFU ranked among the top 25 Russian universities by inventive activity rate, according to the "Expert" Analytical Center. Over the past three years, 403 new applications for intellectual property items have been filed, including 16 for obtaining Eurasian patents for inventions. During the period, the University obtained 385 supporting documents for intellectual property. As of the beginning of 2021, the total amount of intangible assets of the NEFU made RUB 29 million.

In 2010, the *Arctic Innovation Center* was created to transfer technologies to the real sector of the economy. Thanks to the Center's efforts, a NEFU innovative belt has been created, consisting of 14 operating economic entities with shared participation of the University (SIE) that use the University's intellectual property. The SIEs' average annual revenue makes RUB 400 million. At the pre-seed stages, technology projects and youth startups receive support from development institutions. These include the Arctic Innovation Center and the OREH student business incubator.

The policy in the field of science and innovation is built in the following **areas** following the priorities of scientific and technological development of Russia, the tasks of national projects, the markets of the National Technology Initiative, and the UN Goals of Sustainable Development:

1. *Sustainable economy*: economic development and well-being; the economy of the northern territories; energy sector and transport; connectivity of the territory;
2. *Sustainable use of natural resources*: green technologies of nature management; materials science for extreme conditions;
3. *Sustainable nature*: ecological well-being; ecology of the North; climatology and permafrost science; conservation of biodiversity;
4. *Favorable environment*: human health in extreme conditions; green habitat for people in the North;
5. *Sustainable society*: social justice; demography and migration processes; social processes in the North; preservation of languages and cultures of the peoples of the North;
6. *Quality of life*: human settlement in the North, the standard of living of northerners;
7. *Digital technologies*.

The scientific activity directions are consistent with the priorities of the Strategy of Scientific and Technological Development of the Russian Federation (Appendix 11). Innovation activities and applied research and development will be

aimed at solving problems and developing technologies for the markets of the National Technology Initiative: TechNet, FoodNet, EnergyNet, AutoNet, EcoNet, HealthNet, NeuroNet, SportNet, EduNet, GameNet, HomeNet, SafeNet. Coordination of the NEFU priority research directions for 2021-2030 with the UN Sustainable Development Goals, research and technology advancement priorities, national projects' milestones, and NTI markets is shown in Appendix 18.

Research activities in the above areas, activities in the field of innovation, and capitalization of research and development results will be **focused on the following frontiers:**

- *development of interregional and international cooperation*, expressed in building new and strengthening the existing ties with other scientific and educational organizations: the creation of consortia, research placements, drafting and examination of applications for participation in contests, joint research, training of senior scholars, use of scientific infrastructures of organizations;

- *creation of attractive conditions for research by leading world-class scientists*: the NEFU should become one of the centers of gravity for talented scientists from all over the world who will contribute to the development of the University and the macroregion as a whole. Working beside the leaders will boost the development of students and the University staff;

- *transfer of scientific knowledge and technologies to the real sector of the economy, commercialization of developments*: partnerships with organizations of the real sector of the economy, including scientific work done within budget funding and under assignments from the business community, practical application of the results of intellectual activity in the business processes of the University and business entities. Technologies that contribute to the achievement of the UN Sustainable Development Goals will be prioritized;

- *the synergy of research, educational, and innovative activities, fostering the scientific potential of researchers, supporting the scientific continuity, and building new research teams in promising areas*: upskilling of researchers,

development of the mentorship institution and schools of sciences, and supporting promising areas;

- *creation of new world-class facilities of scientific infrastructure*: the network of collective use centers will be expanded by creating new and developing existing CUCs; new unique scientific facilities for addressing the priority tasks of science and technology development as well as test sites and research and production facilities will be launched. The network of scientific infrastructure facilities of the NEFU will be combined into information systems to automate the processes of interaction with participants;

- *strengthening the University's stand in the Russian and international research space*, including: expanding activities from testing of ideas to implementation of results; capitalization of products that are marketable in the macroregion and demanded by business and society; quick response to forward-looking requests and development of new directions; activation and expansion of consortia and associations.

Interdisciplinarity, high standards of research activities, synergy, and continuity, will remain the leading principles that ensure the implementation of the above-mentioned frontiers of the University's research policy.

Expected outcomes:

at individual level:

- self-fulfillment as a competitive scientist and researcher, able to meet the global challenges;
- researchers will acquire the successful experience of the leading world-class scientists;
- an increased rate of satisfaction of the University's employees engaged in research and development (satisfaction assessed by standard methods will increase up to 60%);

at the University level:

- creation of a competitive research team to achieve world-class scientific results

at the macroregion level:

- building the knowledge of the territory, strengthening scientific and innovative support of projects, and solving the issues critical for the population of the macroregion;
- an increased scientific potential of the macroregion; consolidation of the intellectual potential, and the scientific and educational organizations of the macroregion, involving the international scientific community to solve urgent problems;
- development of the youth's creative potential, upgraded entrepreneurial skills of researchers, development of project management skills forwarding the introduction of high-end technologies (the number of the business incubator residents to grow up to 45 in 2030);
- increased labor productivity and competitiveness of the macroregion's economy through active practical application of the University's research results and solutions.

2.3. Youth Policy

The conditions for the students' successful socialization and self-fulfillment have been created during the first decade of the University's operation in the federal status:

– youth, public, and scientific associations are supported with funds and logistics. The NEFU Student Union, being Yakutia's largest youth public association, has 12 thousand members; Student Research Community counts up to over three thousand students in 230 scientific circles; there are three thousand youth leaders in the Student Coordination Council; over five thousand students are engaged in volunteering, more than 2.1 thousand of them assisted in combatting COVID-19 during the pandemic;

– favorable environment for social project activity and entrepreneurship has been created. For instance, in 2020, ten project-developing residents went through the pipeline of OREH student business incubator;

– access to sports and physical training is ensured: there are 32 sports clubs in 24 disciplines;

– the range of student-engaging socially significant initiatives is expanding. Over the last decade, the University has become a coordinator of more than 140 nation-wide and regional socio-humanitarian projects. In 2020, the members of the Student Work Teams Headquarters worked in 2,230 jobs;

– intercultural communication is developed through the “NEFU International” student organization of international friendship and intercultural communication, the “Buddy Team” international students’ adaptation program, “Tandem” project to improve foreign language speaking skills, and academic mobility programs;

– Career Center has been established to promote graduates’ employment and students’ temporary employment. The average 2010-2020 rate of graduates’ employment in their degree field makes 97.29%;

– cooperation with youth organizations is expanding: agreements have been signed with “Russia – the Country of Opportunities” Autonomous Nonprofit Organization on establishing a competence center, “Youth Resource Center” Federal State Autonomous Institution, Youth Parliament of the Sakha Republic (Yakutia), Small Business Development Fund of Yakutia on supporting the student initiatives.

Key priorities and avenues of youth policy

The strategic priority of the NEFU youth policy till 2030 is based on the ideas of student-centrism (the Student First principle). It implies **supporting two primary components of the students' self-fulfillment: their personal involvement and social integration in the training process at the University.**

Based on the socio-ecological and environmental approaches, the students’ self-fulfillment is seen as their self-transformation during the training process at the University, a sustainable socio-cultural space, matching the students’ interests and

needs. With a view of the competence-based approach, personalized technologies are actively used, particularly the STL (Student Team Learning) technology.

Understanding the self-fulfillment process as a logical interconnection of self-design, self-construction, self-expression, and self-development, the University's youth policy aims to create conditions for the following:

- intellectual and cognitive search (knowledge and competencies, personal meanings);
- communicative and dialogic activity (forging and testing one's own opinion, integration into shared activity, choosing one's own attitudes);
- emotional and personal expressions (creativity, leadership, and project initiatives).

The key measures to support self-fulfillment will be focused on the following:

- *development of social and humanitarian projects, scientific and applied research* (together with the lecturers and/or partner organizations) aimed at implementing the ideas of sustainable development and social responsibility;
- *supporting student initiatives* that promote the ideas of sustainable development;
- *promoting intergenerational interaction*, in particular, through mentoring and partnership. The “older” generation of students and the University alumni of different years will pass on to the “younger” generation (including the students of the University Lyceum and the schools of the “North-Eastern University Educational District” Association) the traditions and values of the University within the extracurricular social and educational projects, newly created teams of guideline developers and organizers;
- *involving students in the implementation of socially significant projects* related to the ideas of social responsibility – from solving student problems, organizing their everyday life and leisure to tackling pressing problems of the republic and the macroregion, including medical and intellectual volunteering, natural disaster cleanup operations, etc.

– *introduction of modern technologies for informed career choice*, career growth, development of entrepreneurial competencies;

– *maintaining the students' physical health* and developing their emotional intelligence.

The priorities and values of the youth policy aim to promote the implementation of the Russian Federation's national projects:

1. *Building of soft skills and general cultural competencies* required for the graduates' successful employment: opening the Student Initiatives Center to coordinate project activities and the Competencies Center to develop individual educational, career, and social development tracks; implementation of the "Early Career Start" project to elaborate a student's individual development plan, with an account of the employer needs;

2. *Creating conditions for civil evolvement, spiritual, moral, and patriotic education of students*: development and implementation of such programs as "Citizenship, Patriotism, Service to the Country" to support the system of civil and patriotic education, "SDG-NEFU" to promote the sustainable development goals and priorities, "Adapter" to develop student mentoring, "Studying and Living in the Multinational Environment" to create a multinational environment at the University; supporting the "Motherland" Civil-Patriotic Education Center; expanding the areas of operation of student work teams.

3. *Installing environmental responsibility and culture*: introduction of "Green Skills" and "Environmental Responsibility" programs; opening a "green office"; supporting student environmental initiatives and environmental outreach projects.

4. *Installing healthy lifestyle culture, developing physical culture and student sports*: establishment of the Physical Education and Student Sports Development Center, the regional branch of the Student Sports Clubs Association; coordination of activities of student sports clubs and leagues in the republic and the region; studying and promoting ethnic sports in the higher education institutions.

5. *Improving the system of talented youth identification and support*:

expanding the network of intellectual and creative clubs and associations; promoting engagement in professional and creative competitions, sports competitions, scientific conferences, and olympiads; supporting the lecturers who train the winners of international and national competitions and olympiads.

6. *Enhancing opportunities for the students' research work* by increasing the number of research and educational laboratories, student scientific circles, and projects supervised by the leading scientists, creating a digital platform for project proposals for the students, supporting the activities of the Young Researchers Councils and the Student Research Community.

7. *Promoting innovative activity and employment, supporting entrepreneurial projects*: developing a student entrepreneurship development program, enhancing the activities of the Student Entrepreneurs Council, replicating the “Startup as a Diploma” project, supporting projects of OREH student business incubator, opening a youth social entrepreneurship accelerator and a “university job center” for the students' employment.

8. *Supporting volunteering, youth public associations and nonprofit organizations*: establishing the University's unified volunteering center; implementing the “New Image of the Northern Volunteer” project; consultancy, information, and methodic support of public and socially beneficial nonprofit organizations.

9. *Legal assistance and social support for students, youth public associations and young families*: implementing the “Responsible Parent School” and “Youth. Family. Sports – Healthy City”, and “Healthy Family – Healthy Generation” projects; free consultancy at the Legal Clinic, including on “Housing” and “Young Family” projects.

10. *Developing student self-governance, supporting ambitious youth*: the NEFU's involvement into a center of student public associations of the federal universities, integration into the platform of the National League of Student Clubs; implementing the “Leaders of the Future” projects.

11. *Making the student community international*: supporting the “NEFU

International” organization of international friendship and intercultural communication, implementing the “Buddy Team” international students’ adaptation program; developing academic mobility programs, joint programs and projects.

12. *Alumni empowerment*: supporting the projects of “Students vs Specialists” YSU-NEFU Alumni League, “NEFU Alumni Success Story”, intellectual and sports events, and programs for a more efficient use of alumni intellectual potential in implementing research and innovative projects.

Expected outcomes for supporting the students’ self-fulfillment:

- expansion of students’ powers and skills, developing confidence in their personal relevance and efficiency; higher motivation for training and mastering professional skills, a more conscientious attitude to developing one’s abilities;
- enhanced engagement of the University students, postgraduates, and young researchers in acceleration and incubation programs;
- support and pilot introduction of student technological and entrepreneurial solutions, budding their economic skills;
- shaping a socio-cultural landscape for the students’ comprehensive socialization and integration into the University’s social life;
- actualization of various forms of student self-governance;
- the opportunities of “social elevator” and targeted social support for low-income students.

Expected internal and external effects:

- ensuring social stability and increasing youth community commitment;
- enhanced engagement of students, postgraduates, and young researchers in undertaking research in the promising areas of science and technology, contributing to the achievement of the Russian Federation’s development goals and to solving the tasks included in the National Far East Development Program;
- increased share of researchers under the age of 39 with a degree, as per the “Science and Universities” national project;

- developing youth entrepreneurship, rise in the employment rate in small and medium businesses through tailoring and implementing the youth entrepreneurship development program.

2.4. Human Capital Management Policy

As of October 1, 2020, the NEFU headcount made 3,384 people, including 1,396 faculty members and 133 academic researchers. As a result of implementation of the “Investment in NEFU Human Capital” project the share of researchers with academic degrees increased from 59,7% to 70,2%; the share of faculty members under the age of 35 – from 14,8% to 17,5%; and the average age of lecturers decreased from 50 to 48 (in 2010 and 2020 respectively). At the same time, **the inherent limitations of the University’s human capital development** were identified, namely:

- remoteness from the leading academic and cultural centers of the country, poor transport accessibility;
- underpopulation and ongoing out-migration from the macroregion;
- a non-competitive and fragmented academic environment in the macroregion;
- lack of critical mass of world-class researchers.

Professional mental limitations and conservatism, and a lack of motivation for development still persist in a part of the academic corps.

To develop the University’s human capital, ensure the reproduction of managerial and academic personnel, and attract the leading researchers and practitioners, the strategic priority of the University's personnel policy has been defined as follows: **exponential personnel management with an expanded focus on the employees’ performance and individual tracks of professional and personal development.**

In developing the University’s human capital, the exponentiality envisages dynamic, flexible, adaptive solutions, quick impact, modeling of results, rejection of

outdated personnel policy traditions, and transition from the linear functional thinking to the corporate one.

Understanding the University's human capital as a talent pool, a resource for innovation, and implementing the NEFU mission, explains the focus on the employees' performance and individual development tracks.

The key trends of the exponential personnel policy are as follows:

- *providing models of skills for a successful professional activity and intense innovative activity* (with requirements specified as much as practical) for the academic and managerial staff;

- *system of assessing an employee's individual contribution* based on the skill profile and leadership support;

- *individual career planning* with an account of personal motives and goals: intra-university career paths development, creating a talent pool for the key management, research, teaching, and expert positions, forming project groups, assistance in defining a personal growth path using psychometrical tools for career opportunities testing;

- *targeted upskilling and professional development of staff, including* modern forms of intra-university training, such as soft skills training, facilitation sessions, etc.;

- *succession planning – mentoring*, tools for supporting talented staff, detection and support of high promise students;

- *flexible personnel management* (Flexibility and Help-management methods) – regular feedback collection, engagement in particular events, flexible work status (dual form, mobile work station, home office), promoting networking among the employees, consultancy;

- *grading as part of the staff moral and material support system*, public recognition, and meriting;

- *the “cluster recruitment” method* of hiring the leading Russian and foreign researchers and lecturers, which implies simultaneous recruitment of two or three leading professors from the same discipline;

- *automation of processes of interaction with the personnel*: using chatbots to reply to the typical questions about payroll, leaves, vacations, social benefits and staff rights; using cloud services for big data processing and reporting.

The implementation of new approaches to human capital development is aimed at ensuring the competitive edge of the academic staff and stimulating an increased efficiency of the staff's performance to ensure research, innovation, expert and analytical support for the advanced socio-economic development of the Far East and the Arctic Zone of the Russian Federation.

Expected outcomes:

- recruitment of leading Russian and foreign lecturers, researchers, and practicing experts: increased number of foreign professors, lecturers, and researchers, working at the University for at least one semester, from 50 in 2020 to 100 in 2030;

- the formation, support, and promotion of research and project teams within the priority areas of development of science and technology; this will ensure an increase in R&D rate per one academic staff member to RUB 438 thousand in 2030, while the number of researchers with articles published in the Q1 and Q2 scientific journals, indexed in the WoS/Scopus international databases, will reach 207 in 2030;

- tailoring of personal career development tracks and developing the academic staff mentoring system based on the latest HR tools, establishing the Advanced Educational Technologies Institute, a transition from advanced training once every three years to the annual upskilling of each employee using flexible modular systems and blended learning;

- deployment of instruments to support young researchers and lecturers, which will allow increasing the share of researchers aged 39 and younger with a Candidate of Sciences academic degree in the total number of researchers under the age of 39 from 26.5% in 2020 to 34% in 2030;

- establishment of a system to form the executive candidate pool, training of managerial staff that would implement sustainable development goals thanks to

establishing a Higher School of Management, implementing project management practices, and generating the candidate pool.

The measures taken will increase the attractiveness of the NEFU employment among the leading Russian and foreign scientists and promising young researchers, as well as increase the level of motivation of the employees and students to enhance commitment to the implementation of the University development strategy. Breakthrough groups will be formed thanks to the introduction of new formats and technologies, the building of a critical mass of the University's transformation leaders, and creating intra-university communities and groups of lecturers implementing innovative educational and digital practices.

2.5. Campus and Infrastructure Policy

The NEFU has an extensive well-established distributed infrastructure of the scientific and educational complex, modern equipment for organizing the educational process, and developing fundamental and applied research. As compared to 2009, the area of the campus has grown 2.8 times, making 120 hectares. New space planning solutions are being introduced; they create conditions for youth's intellectual and creative interaction. The University's current scientific, technological, and innovative infrastructure includes the "Arctic Innovation Center" multidisciplinary facility, a multiaccess scientific equipment center, intellectual property center, OREH student business incubator, 25 small innovative enterprises in vital high-tech areas of the macroregion's economic development. The instrumental fleet of the NEFU scientific infrastructure facilities incorporates at least 500 items of special-purpose scientific equipment, more than 60 of which have unique characteristics and are in collective use.

The University has developed the necessary infrastructure conditions for further progressive development and implementation of large-scale scientific, educational, and innovative projects aimed at the macroregion's sustainable development. Furthermore, based on the current trends in university campuses'

modernization in Northern Europe and East Asia, the implementation of a **sustainable campus concept** is underway. As part of the COPERA project, the NEFU sustainability has been researched as per the ASSC guidelines of the Hokkaido University.

In 2020, NEFU ranked 675th globally and 32nd in Russia in the UI GreenMetric world university rankings, which assess the campuses' sustainable development rate and energy-saving model of university management.

At the same time, **problems with the facilities and resources** persist, through which the quality of the property portfolio does not match the priorities of the NEFU development: 30 university buildings are scattered throughout Yakutsk; dormitories lack accommodation capacities (only 50% of students are accommodated in compliance with the specified standards); some of the University's buildings were constructed back in the 1960s-1970s and have significantly depreciated by now; engineering communications are also worn-out, mainly due to the extreme natural and climatic operating conditions; there is lack of space to accommodate innovative units, while no land plots are available for the construction of the new campus facilities.

In view of actualizing the concept of a regionally engaged university, the main **goal of the campus policy** is to create a high-tech multifunctional complex as an open innovative socio-cultural ecosystem and an attractive place for living, working, and spending leisure time for both students and staff of the University, and administrative, scientific and business community of the macroregion, capable of promoting their creative, technological, and economic development.

The key development trend of the created University campus is its **integration into the urban environment**. The high-tech scientific and educational environment will be open for other organizations in the Far East and the Arctic Zone of the Russian Federation, including spinoffs and startups where students are employed. At the same time, it will be accessible for the macroregion's population activities. The concept and the master plan of a multifunctional university campus, integrated with the IT-Park and the "Olonkho Center" Natural and Cultural Complex, were

supported by the Head of the Sakha Republic (Yakutia) and the administration of Yakutsk (Appendix 19).

The campus policy will develop in view of:

openness –

- of space: interactive educational spaces (co-learning space, Small Learning Community), free wi-fi zone with a virtual information system for different types of communication;

- of activity: options for social-humanitarian activities for the locals of the city and the macroregion's population;

multifunctionality –

- of space: convertible spaces, allowing for various configurations for specific activities; ergonomic design solutions, particularly for people with disabilities;

- of activity: providing infrastructure for individual and group project activities, offline, online, and mixed learning, events, and courses for both students and adults as part of lifelong education and executive education programs;

utilization efficiency –

- of space: remodeling of the available facilities for the new tasks (network-areas in the lobbies, cafes, canteens, coworking spaces in student lounges, assembly halls, etc.);

- of activity: creating comfort zones for psychological relief; introduction of the latest clean technologies as part of the “smart campus” concept, ensuring the expansion of the energy distribution system, including the use of renewable energy sources, lighting, heating, air conditioning, and ventilation control, safety provision, toxic emissions and waste management, noise and heat control of the available equipment, etc.

Key priorities of the campus policy:

1. Introduction of the cluster-based approach to the campus's spatial layout.

The University's educational, laboratory, and scientific facilities will be expanded

and brought in line with the up-to-date requirements thanks to creating new high-tech scientific and educational clusters, innovation and engineering centers.

2. *Searching for architectural and planning solutions for the campus development, taking into account the interests and needs of various intra-university groups:* designing new multifunctional and convertible scientific and educational spaces, ensuring accessibility for people with disabilities.

3. *Introduction of sustainable campus standards meeting the Assessment System for Sustainable Campus criteria.* Historically, the NEFU was constructed in the center of Yakutsk and is now located in restrained urban conditions. The green area is now only 1.04 hectares, or 14% of the campus area (7.3 hectares), resulting in 0.6 sq. meters of green area per person. Harmonizing the campus with the Assessment System for Sustainable Campus standards will include measures for energy conservation, waste sorting, energy audit of the buildings to assess electricity, heat, and water consumption. Comprehensive monitoring as per the ASSC guidelines of the Hokkaido University will continue as part of COPERA project.

The creation of a sustainable campus complying with the highest world and national standards for scientific and educational centers, the development of a unified property assets system, synchronized with the tasks of promoting the University's main activities, will be implemented in two interrelated stages:

2021-2025: introduction of the cluster approach to arranging the campus's spatial and technological pattern: expansion of the University's academic, laboratory, and scientific facilities; infrastructure development based on the latest facility management practices; introduction of a "smart campus" concept; design and construction of the new campus in Quarter 68 of Yakutsk;

2022-2030: construction of the new multifunctional University campus, integrated with an IT-park and "Olonkho Center" Natural and Cultural Complex, based on the high-tech special-purpose scientific and educational clusters.

Expected outcomes:

- *creation of new high-tech scientific and educational clusters* in medical and natural science domains and a teacher training facility (academic and laboratory building with Medical Institute's vivarium, academic and laboratory buildings of natural and pedagogical sciences, Transport Institute);

- *strengthening the appeal of the campus's planning solutions* (vast intra-campus public spaces, "public" zones, walking distance to the main facilities), integration of the campus and the surrounding urban environment (more green areas and areas with forest and planted vegetation);

- *creating comfortable coworking areas*: opening new coworking centers and spaces "Student Initiative Center", "Intellectual Growth Area", "Student Media Center"; compliance of the utility network with the Assessment System for Sustainable Campus standards.

- *broader access to the educational environment*, ensuring full integration of people with disabilities into all areas of the University's activity;

- *availability of conditions for continuous intellectual and innovative communication*, academic and creative self-expression, involving students in solving scientific and engineering problems arising from knowledge production;

- *increased attractiveness of the NEFU employment among the leading Russian and foreign scientists and promising young researchers* (increased number of foreign professors, lecturers, and researchers, employed at the University for at least one semester, from 50 in 2020 to 100 in 2030);

- *increased share of higher education students from other regions of the Russian Federation, in particular, thanks to the availability* of the campus's comfortable, safe, and enriching environment, promoting the actualization of creative, intellectual, and innovative potential of the students (students from other regions of the Russian Federation, up to 8%; foreign citizens and stateless persons taking higher education programs, up to 10% in 2030).

In the future, the NEFU distributed campus will develop both as Yakutsk cultural and educational center and the macroregion's knowledge production center,

promoting the inflow of investment to the partner organizations and growth of the University's capitalization.

2.6. The University Governance System

The NEFU implements a **shared governance** model through the following mechanisms:

- *accountability of the Rector* to the Supervisory and Academic Boards for the day-to-day management of the University and strategic aspects (annual reports on the achievement of sustainable development goals, progress and results of the development program implementation, results of self-inspection, implementation of plans for financial and economic activities);

- *self-governance of the divisions* in their scientific areas, there is a relatively free organization of the educational process with a vertical management model;

- *working out and adoption of decisions by collegial bodies* regarding the main areas of the University's activities (Budget Commission, Research and Development Board, Educational and Methodological Board, educational and methodological coordination boards in areas of knowledge, etc.);

- *participation of employees* in informal structures, project teams, and provisional commissions (standing bodies – the Panel of Professors, Mentors' Council, Young Scientists' Council, Humanitarian Knowledge Development Council) that hold limited powers for planning, solving day-to-day issues, and so on;

- *representation of students in the collegial management bodies of the University* (the Academic Board, the NEFU Conference, admission and qualification commissions, commissions for transfer to state-funded openings, nominations for increased scholarships, etc.) and take part in governing the University through public bodies (more than 20 student self-government bodies are functioning);

- *involving the graduates in the University's development projects, monitoring, and evaluation of its activities*: implementation of the YSU-NEFU Alumni League projects in the “specialist vs. student” format (project selection of

personnel and mentoring); graduates contribute to the NEFU Endowment Fund investment strategy expert review;

- *operational benchmarking of changes in higher education*: studying and transferring the best practices of the leading scientific and educational organizations of the country and the world, their adaptation to the NEFU conditions;

- *creation of a space for an open public dialogue* to involve the population in discussing the issues of the University's impact on the development of Yakutsk, to foster initiatives for developing urban spaces adjacent to the University;

- *legal and regulatory formulation of the University's governance priorities*: in 2011, the corporate culture code was adopted, the collective agreement for 2018-2021 is in force;

The principles of shared governance are implemented through target projects, united in “*project portfolios*”, such as “Investment in Human Capital”, “NEFU Digital Ecosystem”, “100-year Plan”, etc. Furthermore, the interrelation of projects within a “portfolio” allows solving problems at different levels and, eventually, obtaining an overall synergistic result, significantly superior to the effect obtained if unrelated projects were implemented individually.

Currently, *digital solutions* come to the fore at different levels of governance. Digital transformation of basic processes has become a priority and a value basis for strategic decisions made at different levels of the University's management:

- *personalization of management through personal accounts for students and employees*: a personal account is created when an applicant submits their documents for admission (in 2020, applicants created more than 12 thousand personal accounts) and can remain active throughout life;

- *full transition of document flow, employee interaction, business correspondence, and reporting into the e-document flow system*;

- *using software solutions to automate management processes*: automated information systems have been developed, e.g., “Property Management” to collect and analyze readings from metering devices in the facilities, “University” to monitor the performance indicators of the University, “E-hostel” to keep records of students

staying at dormitories;

- *transferring a significant part of collegial governing bodies to the videoconference format*: since March 26, the Academic Board has completely relocated their meetings to the Zoom platform. This format of collegial governance bodies' operation remains valid to date.

The NEFU has developed a system of monitoring and assessing the effectiveness of managing the University's development. It is based on the *Balanced Scorecard*, centered around translating the entire University's strategic goals into a clear plan for the operational activities of divisions and employees, assessing the results of their activities using key performance indicators.

Achievement of the strategic goal of the University's development is based on the following **dominant aspects of managing the NEFU development**:

- *management of educational activities*: introduction of up-to-date technologies and strategies based on the experience of the world's leading educational centers. Considerable resources and time will be spent on tailoring a new portfolio of academic programs that would be in demand in the domestic and the international markets;

- *management of scientific activities*: concentration of resources on emerging promising domains focusing on the development of the most productive areas, interdisciplinary research, and international collaboration; exponential growth in the commercialization of solutions and technologies in priority areas of science and technology;

- *management of building human resources*: the creation of breakthrough groups, a critical mass of the University transformation leaders. The personnel policy will be based on a "cluster recruitment" strategy, which implies the simultaneous recruitment of leading professors from the same discipline;

- *management of the University's digital transformation*: upgrading the employees' digital skills and proficiency in digital and analytical tools; developing a digital ecosystem as a "one-stop" system based on digital solutions, services, and information systems and its integration with public information systems;

- *management of funding*: providing financial resources for the development of the University ensuring a dynamic and proactive financial stability and balance.

Given the identified dominant aspects, it is planned **to undertake the following measures** aimed at creating an open, flexible, and effective governance system that quickly responds to changing environment:

1. *Building of super teams*, in which the employees' efforts are supported by state-of-the-art technologies: artificial intelligence, machine learning, collaboration tools.

2. *Building a socially responsible university*, increasing the transparency of the University, providing the key stakeholders access to information based on which they can subsequently form their vision and make decisions. The public reporting system will comply with the ISO 26000:2010 "Social Responsibility Guidelines" international standard.

3. *Introduction of project management*: interdisciplinary teams and groups of students and staff will be lined up in promising areas of the University's development. The groups generate project portfolios; their scope will be updated based on the tasks of the University's development and the directions of scientific and technological development of Russia.

4. *Transition to data-based governance*: the use of methods and technologies for collecting, structuring, and analyzing data to build organizational and management models and their further application in socio-economic processes.

5. *New institutional solutions*: setting up of a *Program Office*, a *Center for Sustainable Development of the North* (the NEFU interdisciplinary center of excellence, coordinating the development and implementation of academic programs and research projects on the problem of sustainable development of the North), and a *Green Office* (center for the transfer of knowledge and technologies in the field of sustainable development of the University).

Administering the University's program implementation

The Supervisory Board and the Academic Board of the University are the

collegial bodies that administer the development of the NEFU, exercising public control and examination of program actions. Their role in administering the program will be increased by creating provisional commissions involving representatives of stakeholders interested in the results of the program implementation and their further use.

An analysis of the experience of North-European and American universities brings about a need to create an *International Advisory Board*, which will consist of the leading scientists and administrators from the world's leading universities, who can provide practical advice for transferring global experience.

Direct operational management of the program implementation will be carried out by the *Strategic Development Board* – a collegial body for making balanced decisions on the key mechanisms of program implementation, tactical steps, and assessing the progress and results of project work.

Based on a package of strategic documents and tactical tools, *the Program Office* carries out operational management of the program implementation, expert review, adjustment, and fine-tuning of activities in all areas of the University's development. The Office also coordinates the work of the newly created project offices and interdisciplinary project teams.

The management system of program activities implementation will be based on the principles of project management. *Interdisciplinary project teams* will be lined up in promising areas of the University's development.

The transition to *program-targeted financing* of crucial development projects will be carried out by integrating the financial system with the digital ecosystem of the University.

Integration of the University with other universities, scientific, medical, and other organizations is covered in Section 4.1.

2.7. Financial Model of the University

The NEFU's current financial model is based on the traditional budgeting system, ensuring the interrelation between the University's budget, its strategy, and long-term plans. The University's budgeting system was approved in 2015 and put into effect in 2016. The relevance of new approaches in financial management was reasoned by the changes in universities' financing system with a complete transition to normative per capita financing. The basic principles of budgeting, such as commitment to results and the delegation of authority and economic autonomy in exchange for the liability of executives of the financial responsibility centers, as well as task prioritizing under resource shortage, allowed the University not only to improve its financial standing without losing quality and preserving its unique human resources but also to achieve the strategic development goals and meet the roadmap targets in compliance with the May Decrees of the RF President.

The NEFU's final index as per the financial management quality ranking by the RF Ministry for Science and Higher Education grew from 51.61% in 2016 to 71.76% in 2019; its credit debt reduced 2.7 times (as of January 1, 2017, against January 1, 2021); the faculty members' salary increased 2.2 times (from RUB 63.02 thousand per month in 2016 to RUB 136.73 thousand in 2020); the salary of researchers grew 1.7 times (from RUB 81.17 thousand to RUB 134.89 thousand).

Throughout the implementation of the previous development program, the NEFU's income increased 1.6 times (from RUB 3,817,066.3 thousand in 2010 to RUB 6,101,266.2 thousand in 2020); income from business and other income-generating activities grew 1.7 times, from RUB 534,373.5 thousand in 2010 to RUB 917,724.8 thousand in 2020 (the pattern of annual non-budget income growth is featured in Appendix 21).

The structure of the University's income and expenditure

The University's annual income in 2020 made RUB 6,101,266.2 thousand, 61% of them being a state assignment subsidy, 23% – a subsidy for other purposes, 15% – funds from the income-generating activities, 1% – funds of the compulsory health insurance (see Appendix 22). The operation of the basic academic programs accounts for the bulk of receipts in the University's income structure (without other

subsidies and compulsory health insurance), making 86% of it, income from scientific research makes 8%, supplementary educational services – 2%, endowment income – 1%, other types of activity – 3% (see Appendix 23). The shares of the state assignment subsidy and the income from business and other income-generating activities make 80% and 20%, respectively.

The NEFU expenditure in 2020 made RUB 5,881,543.7 thousand; the state assignment subsidy accounts for 60% of them, the subsidy for other purposes – 24%, business and other income-generating activities – 15%, and compulsory health insurance – 1.5%. The NEFU expenditure without the subsidy for other purposes and the compulsory health insurance made RUB 4,406,115.4 thousand, the bulk of them spent for job compensations with payroll charges, making 75% or RUB 3,292,853.6 thousand, and property maintenance, making 9% or RUB 392,400.0 thousand (see Appendix 24).

Planned changes in the University's financial model

The financial model of the NEFU development until 2030 will be governed by the concept of a project-focused university management system based on large-scale breakthrough projects that embrace all key areas of activity. The model is based on a co-use of a successfully implemented system of budgeting and project management (matrix budgeting). This model will become a flexible tool for managing the University as a whole and, in addition to the traditional financial management tasks, will build an explicit model of integrating the University's strategic development goals, implemented in projects, with the financial status information.

The financial management model will be based on the following fundamental **principles**:

- *commitment to results*, clear definition of key financial and non-financial indicators, coordination of goals, objectives, and priorities of strategic development with the allocation of financial resources, a system for evaluating the performance of the financial responsibility centers' executives, projects, programs, and functional areas;

- *business activity*, including activities in three primary avenues: generating and active use of innovative ideas and projects (creative initiatives activity); building and productive use of own capital (resourcefulness of business); active marketing, innovative infrastructure, sales, availability of human resources, and others (organizational support);
- *principle of flexible parameters of the financial model*, ensuring the University's target profitability and financial sustainability;
- *priority investment in the strategic breakthrough projects*;
- *principle of integration of breakthrough projects into the functional areas*, which amalgamates the project management business processes and financial planning, consolidation of the projects' financial flows into the overall financial balance, allowing for a precise assessment of each project's impact on the current and expected financial status of the University.

On the one hand, strengthening the University's financial position requires expanded reproduction and a significant increase in non-budget income; on the other hand, it requires new reserves to increase value for money and profitability for subsequent reinvestment in development.

Achieving the goals requires new organizational formats of managing the non-budget income. Business activity as a separate cross-cutting functional subsystem, representing a fusion of innovative, investment, and marketing efforts, will embrace all areas of activity, demonstrating effective organizational and innovative behavior of the team, motivated to generate income, nurture creativity, and reach success.

The breakthrough projects of the development program will also boost business activity in all current areas at all management levels. The breakthrough projects will allow the University to increase the growth rate of the non-budget sources, mostly through building income from research, innovation, technology transfer, and offering continuing professional education programs, including thanks to strengthening partnerships with the municipal and regional authorities in the priority sectors of the economy, developing cooperation with industrial partners, and entering international markets.

The educational policy measures are aimed to improve the quality and transform the process through personalized education, updating the existing and elaborating the new academic programs, and digitalizing the processes. Due to harsh climatic conditions and the remoteness of the territory, the extensive development of educational activities will be limited. Nevertheless, until 2020 it is planned to increase the student population within basic academic programs by 2-3%; at that, it is intended to expand into the international market – the share of international students will increase from 3% to 10%. The highest income growth rates from the income-generating activities are expected from the R&D, continuous professional programs, and basic academic programs.

As for the research domain, the income will grow due to grants supporting fundamental research, multidisciplinary regional research commissioned by the region and the municipalities, and expansion of contract applied research commissioned by the corporate partners. As a result, the non-budget income of the NEFU flagship university from R&D will increase 2.9 times, from RUB 167,744.5 thousand in 2020 to RUB 491,563.9 thousand in 2030 (hereinafter the values are given for the flagship university).

As for continuing education, growth is planned from using modern teaching tools and methods, networking with government authorities, enterprises, regional, Russian, and international educational organizations, and a broader range of continuing education programs. As a result, income from the continuing professional and basic academic programs will increase 3.4 times (from RUB 61,761.3 thousand in 2020 to RUB 207,348.3 thousand in 2030).

By 2030, the income from using the endowment fund will grow by 21% and make RUB 54,807.2 thousand. At year-end 2020, the amount of money in the NEFU endowment fund makes RUB 634 million.

The annual growth rate of non-budget income will make 6-8%, which will ensure the growth of the indicator 1,9 times till 2030, from RUB 849,469.5 thousand to RUB 1,609,044.9 thousand. The structure of the non-budget income by years broken down by the areas of activity is featured in Appendix 25.

The value for money will be improved through increased flexibility of the financial model with a given target margin for all activities with further breakdown to the financial structure units with more flexible spending parameters, depending on the performance and security of interdependent financial resources by area. Measures aimed at cost optimization will envisage further implementing the energy efficiency and energy-saving program, abandonment of non-core activities, project management, and a flexible employee incentive scheme.

As for basic academic programs, the model envisages an increased economic efficiency of educational activities due to institutional changes, optimization of the educational programs' portfolio, digitalization of the educational process, use of new educational technologies, and further allocation of funds into development to improve the quality of education and foster the breakthrough areas of R&D and innovative activity.

Until 2030, the University's aggregate income will grow by 26%, from RUB 5,643,229.2 thousand in 2020 to RUB 7,102,903.4 thousand in 2030. At that, the non-budget funds' growth rate will outstrip that of the state assignment subsidy. Thus, the growth of the University's non-budget income will make 89% during the development program implementation, and the growth of the state assignment subsidy will make 16%. As a result, the ratio of the non-budget income to the state subsidy will change from 20% and 80% to 29% and 71%, respectively.

The annual co-funding of the development program from own funds is planned at RUB 125,000.00 thousand till 2025; starting from 2026, the co-funding will be increasing proportionately with the growth of the non-budget income and will make RUB 225,000.00 thousand, or 14% of revenue from the income-generating activities in 2030. Thus, a total of RUB 1,570,000.00 thousand of own funds will be allocated as co-funding during the implementation of the development program; RUB 700,00.00 thousand will be allocated from the regional budget.

The structure of income by type of activity and expenditure structure of the University's financial model till 2030 are featured in Appendix 26 and Appendix 27.

Total income and expenditure, off-budget income, and integral financial indices are planned as per the current status of the higher education system functioning.

2.8. Digital Transformation Policy

The University has laid the foundations for a digital ecosystem to ensure the quality and accessibility of education, integration into the international scientific, educational, and expert community, and the University's impact on the sustainable development of the Far East and the Arctic Zone of the Russian Federation.

The assessment of the NEFU digital maturity as per the guidelines of the Center for Advanced Governance and Moscow Institute of Physics and Technology, conducted in 2021, has confirmed the following conclusions about the digital solutions' impact on the fundamental processes' efficiency:

- *personalization of the learning process based on digital technologies*: a system of e-learning has been introduced at the University to implement blended learning. At present, all 22,179 disciplines, taught in 154 higher education programs, are equipped with electronic teaching aids and placed in the e-learning system. The e-learning system and the e-library are integrated with the student accounts;

- *support of inclusive learning* for the students with special educational needs to create comfortable conditions for their adaptation at the University and teach digital skills, securing their job market competitiveness: the North-Eastern Scientific and Innovation Center for Inclusive Learning is functioning; mobile hardware and software packages have been developed; adaptive computer technologies are introduced;

- *improvement of the students' digital acumen*: in 2020-2021, 17.6% of the implemented educational programs were dedicated to the digital economy and ICT. The "Introduction to End-to-end Digital Technologies" subject has been incorporated into the major professional academic programs. In collaboration with the universities of the Republic of Korea, the "Convergence" Master's program has been launched; it trains specialists in modern digital technologies. Elective courses

in end-to-end technologies of the digital economy (wireless communication, blockchain, artificial intelligence, Internet of things) have been developed;

- *digitalization of the student development tracks*: information systems for automating the following processes have been developed: admission to the University (Admissions Office, Applicant's Personal Account), learning process organization (Educational Program Passport, Plans), administering student affairs (Student Body Management Information System (SBMIS), Orders of the SBMIS, Perevod (Transfer)), and graduates' employment monitoring (Graduates' Employment Monitoring Information System);

- *scientific research in digital technologies* is undertaken based on six education and research laboratories and "Computer Technologies" research department;

- *organizing remote work through digital services*: a VDI system of virtual desktops was deployed. During the COVID-19 pandemic, over 500 employees were transferred to remote work through the ServiceDesk system. In 2020, more than 13,700 educational, research, and managerial videoconferences were arranged;

- *improving the staff's digital skills*: in 2020, every one in three employees completed advanced training courses on digital technologies use and e-learning introduction. Involving a large number of lecturers in digital products' creation has incentivized the search for convenient digital services and information systems, as well as their proactive approach to mastering the new skills;

- *optimization of the basic processes through the development and introduction of digital tools*: the NEFU digital ecosystem incorporates 23 information services.

- *a wider range of digital tools available for organizational units*: optimization of the basic processes, development of new digital solutions (for learning, research, and enrollment campaign). The services of the electronic document flow system have been extended, now embracing business correspondence, reporting, approval, and signing of internal acts, which allowed to

improve the systematization, processing, and quality of data and accelerate the interaction between the different levels of the University's management;

- *enhanced interaction in the digital technologies domain*: the NEFU is a member of the Association for Digital Transformation of Scientific and Educational Organizations and a co-organizer of the University Consortium of Big Data Researchers. The Consortium frameworks the implementation of data analysis projects to address the macroregion's sustainable development issues.

The results of the abovementioned external expert review, conducted by the Center for Advanced Governance, prove that the NEFU has reached Level 1 of digital maturity. The University received the maximum points in the following: remote workplace arrangement, development of digital services for staff in "Infrastructure and Tools" block; digital products requirements management in "Products" block; data quality in "Data" block; interim control and performance measurement in "Organizational Culture" block.

The digital transformation will aim to develop the University's "one-stop" unified digital ecosystem, using end-to-end technologies for advanced research and educational activity based on the information systems and digital microservices.

The customization of the basic processes' arrangement, underlying the digital transformation, is aimed at actualizing the principles of transhumanistic and anthropological-axiological approaches and creating conditions for the students' and employees' self-fulfillment and self-organization:

a) in organizing the learning process: student-centered education based on the system of individual educational tracks. The "Education as a Service" model is designed to adapt educational programs to the rapidly changing job market requirements and the students' needs/capabilities, while maintaining a high level of fundamental training.

The digitalization of student development tracks will rely on the digital footprint analysis and monitoring of current academic achievements. There will be an opportunity to choose the area (major) while studying within the 2+2+2 model and get additional qualifications. The development of the digital profiles system and

the use of the data obtained will ensure the transition to building flexible learning tracks.

In the future, the customized approach will require a gradual transition from academic groups to dynamic and individual schedules for each student and university lecturer.

b) in youth policy: using the digital footprint to study the students' social and cultural experiences, identify the "risk groups" to provide preventive support and guidance, analyze the social environment and student interaction outside the University.

c) in organizing research activities – providing scientific and technical interaction, arrangement and holding of remote joint research, in particular:

- *digital support for the research* conducted by the "North: the Territory of Sustainable Development" world-class scientific and educational center;
- integration into the created Unified Digital Platform of scientific and technical collaboration;
- supporting the activities of virtual teams and virtual collaboration while implementing the multidisciplinary scientific and technical projects of complete innovation cycle in compliance with the goals and objectives of the Scientific and Technological Development Strategy;
- organizing research on the northern regions' sustainable development, based on the analysis of data arrays accumulated in specific domains.

d) in human resource management – transition to the Human Resource Management ideas based on digitalizing hiring, selection and recruitment of staff, training and development, performance assessment, compensation defining, motivation, and labor safety provision by using AI-based HR and HR-analytics programs and recommenders.

e) in the University's development management: transition to a digital management platform using data-based practices.

This area's priority is to form super teams, where an employee's activities are supported by modern technologies: artificial intelligence, machine learning, collaboration tools.

The University's digital maturity will be monitored and assessed in the following blocks: digital culture, staff skills, basic processes, digital products, models, data, digital infrastructure, and tools.

Modernization of the University's IT infrastructure: actualization of the "smart campus" concept, ensuring information security and data protection.

The University's digital transformation will be organized through implementing portfolios of system projects (see Section 3.3.):

The "University 360" project portfolio aims to introduce a hybrid university model based on shaping a lifelong learning ecosystem. As per this model, students articulate their own educational demand, accommodated by the University's relevant educational offers in the form of lectures, disciplines, and modules supplied by various content providers.

The consortium's technological core will be the "University 360" multi-service platform – an aggregator of educational products and services, ensuring the interaction of educational content providers with the students. In addition, the technologies of a digital portfolio and individual educational tracks, as well as the models of academic mobility and networking will be implemented on its basis.

"North-East" Technopolis project portfolio is focused on building advanced and future-proof digital skills in the students of engineering, technology, and IT majors. The Technopolis will comprise such structures of the NEFU innovation infrastructure as the "Future Skills: NEFU" International Center for Advanced Skills Development, the NTI "TechNet" University Mirror Engineering Center, and others.

The expert and analytical activities of Technopolis will stem from the research of the "Future Skills: NEFU" International Center – analyzing the education and technologies market, searching for the breakthrough points in the international education and technology markets.

Expected outcomes:

at individual level:

- the customization of the educational process by ensuring the choice of educational units, content, and lecturers, based on the individual learning tracks with digital footprint analysis, will create conditions for the students' self-fulfillment and self-organization, consistent with their knowledge and skills in various fields of study, and their learning progress;
- the launching of "North-East" Technopolis will result in exponential development of the staff's and students' skills;

at the University level:

- the key outcome of the digital transformation is the improvement of the University's digital maturity in the main areas of its activity;
- the digitalization of the educational process will ensure a dynamic digital environment enabling the use of active and interactive forms of education;
- a school of technological entrepreneurship and a school of hybrid intelligence and data analysis will be established during the Technopolis "North-East" project implementation;
- new educational standards in the Future Skills domain will be elaborated, including the digital ones;
- the number of staff that have taken additional professional development training in digital skills will grow from 661 in 2020 to 1,000 in 2030;
- the number of services integrated into the NEFU "one-stop" digital ecosystem will increase from 23 in 2020 to 50 in 2030. The number of locations connected to a unified digital monitoring and control system ("smart campus") will reach nine in ten years;
- the NEFU ecosystem will be integrated with the state information systems, including the "Modern Educational Environment" GIS;

at the macroregion's level:

- providing the Far East and the Arctic Zone of the Russian Federation with specialists having advanced and future-proof digital economy skills; creation of new

high-tech markets; higher employment rate among the digitally-skilled citizens; enhanced geopolitical stability;

on a global scale:

- the NEFU digital transformation and the implementation of the “University 360” and “North-East” Technopolis projects will ensure progress towards the Sustainable Development Goal 4: ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all.

2.9. Open Data Policy

The open data policy of the University is based on the principles of social responsibility: publicity, transparency, and accountability of the University’s activities, responsibility for the results of the impact on society and nature, taking into account ethical norms and possible social, economic, and environmental consequences of decisions made – and has a significant impact on optimization of the University’s activities:

- *the basic principles for working with open data are being formed*, ensuring the relevance and timeliness of their presentation, reliability, quality, legal compliance, and technological accessibility for machine processing;

- *the University’s code of corporate culture has been adopted*, where principles and ethical restrictions for collecting, processing, publishing, and using the University’s open data are among the priorities;

- data on the University’s activities are published *in an open format at the University website* with a sufficient level of detail (about competitions, grants, entrance exams, decisions, regulations, documents), which ensures their availability for various groups of stakeholders;

- *annual financial and social reports of the University are published in an open format* (reports on the achievement of sustainable development goals, the implementation of the development program, implementation of the business plan, self-examination reports, etc.);

- *each educational, scientific, administrative and managerial, auxiliary, and service unit has its own section at the University website, where regulatory, legal, and contact information is published, as well as open information about employees, news, announcements, reports on the results of scientific, educational, innovative, and socio-cultural activities of the structural unit;*

- *information about the current activities of the University is published in popular social media in the shortest possible time, which ensures openness, accessibility of information, and feedback for all stakeholders (Instagram - 15,918 subscribers; Twitter - 2,853; VK – 13,830; YouTube – 4,830; personal Instagram page of the NEFU rector – 1,777; “Our university_online”/NEFU – 1,002 subscribers); in 2021, the University was awarded the prize of the Association of Scientific Communicators of Russia for successfully mainstreaming the scientific results of researchers in the media and social networks of the University;*

- *to inform foreign stakeholders about the activities of the University, versions of the University website in English and Chinese are functioning;*

- *since 2012, the University’s repository base has been developing, which is a unified recording and archiving system of electronic versions of reports designed to support the processes of managing the University’s functioning and development and to promptly provide reporting information to users, subject to confidentiality of data exchange and hierarchical access. The repository materials are the basis for monitoring and assessing the effectiveness of the University and are used in budgeting and planning the University’s development in the medium term;*

- *data about the University, depending on their purpose, are presented in machine-readable formats both as datasets and through software API interfaces;*

- *the Laboratory for the development and testing of data analysis tools was created. In 2020-2021, the University initiated the “Subjective Assessment of the Quality of Life of the Sakha Republic (Yakutia) Population” and “Big Data for Solving the Problems of the University Endowment Fund” research projects;*

- *the University is one of the co-organizers of the University Consortium of Big Data Researchers, focused on undertaking joint scientific and applied research*

and solving socially significant problems using the collection and analysis of data from social networks, university learning management systems (LMS), and open platforms;

- *the automated information system “University” has been developed and implemented*, which provides an automated collection of data from databases used to monitor the achievement of the University’s performance indicators. Based on the system, an open data section is planned for implementation, which shall contain reliable and real-time data in machine-readable formats;

- *efforts are being made to improve employee literacy* as for open data and to incentivize application developers to reveal the value of open data;

- *in 2020, a special section “NEFU in the Context of Preventing the Spread of the New Coronavirus Infection” was launched at the official website of the University*, where students and staff can find the hotline contacts, regulatory documentation, and all the relevant updates regarding the epidemiological situation, organization of the educational process, prevention, vaccination, medical care, etc.

The assessment of the NEFU’s open data policy, undertaken in 2021 by the Center for Advanced Governance, confirmed the results of work to provide access to the necessary data in real-time with the required level of security, completeness, and quality for decision-making. The NEFU received the highest rating for such parameters as the data systematization rate and the data quality.

The factors limiting the availability, quality, and relevance of the published NEFU data, are the underdeveloped analytical tools and the employees’ data handling skills, the absence of a sectoral base of datasets, and an underdeveloped system of datasets covering the University’s fundamental processes.

The critical goals of the effective open data policy are linked to the goals of the educational and campus policy of the University (providing conditions for self-fulfillment, integration into the international educational environment, creation of an open scientific and educational space) and are defined as follows: developing a culture of open data handling, creating an effective system of communication

between data market stakeholders, and introducing data-driven management practices.

The University prioritizes the following areas focused on improving efficiency:

data handling:

- *developing standards for the publication and exchange of high-quality data*, regulations of the University's data flow policy, and corporate data model; teaching students to design segments of the global database and create sets of open linked data, building their skills of working with the web of linked data;

- *launching the "Education Sector Transparency Initiative" project* – a federal sectoral data management standard designed to promote open governance and accountability in education – in cooperation with the University Consortium of Big Data Researchers;

- *creation of the Center for Applied Data Analysis*, which will develop standards for data publication and exchange, the University data flow policies, and a corporate data model;

data collection, processing, and exchange:

- *improving the quality of open data at the University website*: ensuring the completeness, antecedence, accessibility, and timeliness of the posted data; compatibility of published data; developing mandatory requirements for the data to be posted; posting more open data in the English and Chinese versions of the site;

- *creation of the University-based platforms for collecting, processing, and exchanging data*, including open data. Providing access to open data generated by the University through an open API architecture and machine-readable datasets;

- *improving interaction with authorities, scientific and educational organizations, and public institutions as for providing and analyzing data*: integrating data at unified information portals; creation of virtual communities where stakeholders can get an opportunity to analyze the performance of the University;

- *upskilling employees in the field of applied data analysis* using software tools (methods and technologies for collecting, processing, and storing social media data; planning study design using big data; text analytics using partner tools; introduction to Social Network Analysis, construction and analysis of social graphs; application of machine learning algorithms to classify text content, etc.);

data use:

- *conducting data-based applied research and implementing data-based projects with research and educational centers, industrial partners, development institutions:* in the field of permafrost research, creative R&D industry, data-driven management (CDO). The open data policy will apply to the “University 360” project portfolio;

- *enhancing cooperation within the framework of the University Consortium of Big Data Researchers:* implementing networking scientific and applied projects based on data collection and analysis;

- *using crowdsourcing methods* to develop new services based on open data;
- *introducing training courses on the basics of using LOD* (as modern high-demand skills) in the learning tracks of students majoring in humanities and in continuing education programs.

Expected outcomes

at individual level:

- building the employees’ skills in the field of applied data analysis and data-driven management, the culture of data handling;
- providing open and convenient access to information that is genuinely critical for all stakeholders of the University;
- increasing the involvement of employees and students of the University in research and project activities;
- improving the quality of scientific publications thanks to the use of an extensive pool of open data;
- improving the quality of teaching thanks to the use of research results;

at the University level:

- transparency of work, creation of the University's digital profile, the University becoming the operator that generates reliable datasets in the field of science and education;

- increased accessibility of the NEFU scientific data for search engines and web browsers thanks to publishing interrelated scientific data using Linked Data technology: conversion from PDF to XLS, CSV, RDF (Resource Description Framework) and creating a data portal of the University's most significant scientific achievements;

- the transition from a text-based structure of presentation to a machine-readable structure compatible with the Semantic Web;

- enhanced involvement of stakeholders in the activities of the University due to the maximized timeliness and accessibility of information;

- expanding cooperation with educational and research organizations that carry out fundamental and applied research in the field of big data collection and analysis;

at the macroregion level:

- solving research, applied, and socially significant problems of the macroregion based on the results of *network projects on data analysis* within the University Consortium of Big Data Researchers;

at the global scale:

- openness and accessibility of data, catering to the needs of different groups of stakeholders based on gender, ethnicity, and geographic representation, are the resources for achieving sustainable development goals.

2.10. International Cooperation Policy

A unique geopolitical location and the accumulated experience of interaction with foreign partners allow the NEFU to build "Arctic – Asia" vectors of international cooperation and bridge the researchers and the leading scientific and educational institutions of the Arctic and the Asia-Pacific countries. As of the end

of the 2020/2021 academic year, there are agreements with 145 foreign organizations, including 116 universities and 29 research centers.

The key NEFU international cooperation projects are directly related to the *sustainable development of the northern regions*, first of all, responses to the challenges of life in the North, solving problems of ecology and climate change, improving the quality of life of the indigenous peoples of the North and preserving their linguistic and cultural identity:

- the University annually hosts over 20 international events on sustainable development of the North and the Arctic; it is a co-organizer of the Northern Sustainable Development Forum and the main venue of major international UNESCO conferences on the preservation of linguistic and cultural diversity in cyberspace;

- every two to three years, the University holds an international conference on the epic heritage of the peoples of the world under the auspices of UNESCO;

- the issues of preserving the cultures of the peoples of Siberia and the Arctic are in the focus of the projects “Peoples of the Northeastern Russian Federation: Choosing a New Adaptive Strategy Under Conditions of Globalisation” and “Digitalization of Linguistic and Cultural Heritage of the Indigenous Peoples of the Arctic” .

The next priority is to *promote the Russian language in East Asian countries*, improve the quality of teaching Russian to foreign citizens, and develop good-neighborly relations with strategic partners determined by the geopolitical location of the NEFU:

- over ten years, the number of international students has increased 12 times (from 74 in 2010 to 836 in 2020). The number of foreign citizens studying in basic academic programs increased from 4 people in 2010 to 619 people in 2020;

- the “Russistics in the North-East of Russia and the Countries of the Asia-Pacific Region: Traditions and Innovations” International Conference (2017) and “Russistics in Russia and China: Innovative Practices” forums (2018, 2019) were held on the initiative of the NEFU;

- the University has opened Russian language and culture centers at the Heilongjiang University, the Changchun University of Science and Technology, and the Jilin University of the PRC.

More than 1,370 migrants have learned the Russian language in the Russian language teaching center for foreign citizens living in the northeastern regions of the country. In addition, the “Language training, socio-cultural adaptation, and integration of foreign citizens and their children” project is being implemented.

As an active member of leading international university associations and consortia, the NEFU was one of the *initiators of the University of the Arctic network* and currently takes part in 19 of its 47 operating networks, four of which were created under the leadership and co-leadership of the NEFU. The Russian-language information and resource support centers for the University of the Arctic are functioning. In 2021-2023 the NEFU is co-chairing the Association of Sino-Russian Technical Universities, which will allow expanding the Arctic agenda significantly.

Universities of China, Japan, and South Korea are very active as for the *Arctic avenue of the NEFU international cooperation*. The University takes part in the work of the International Joint Research Center for the Arctic Environment and Ecosystem, based in the Harbin Institute of Technology. The following are being implemented together with the Hokkaido University: the Expert Training Program for Leadership in Ecology, Culture, and Sustainable Development in the Far East and Arctic Regions (RJE3 Consortium), “Features of the Biogeochemical Circulation of Substances in the Cryolithozone, as One of the Mechanisms Determining Global Climate Change”, “COPERA: C Budget of Ecosystems and Cities and Villages on Permafrost in Eastern Russian Arctic” projects and others. The problems of the Arctic ecosystem are studied within the framework of cooperation with the Alfred Wegener Institute for Polar and Marine Research – the Helmholtz Centre.

One of the most promising research projects is the “Development and Implementation of Cell Cultivation Technologies using Degraded Tissues of Fossil

Animals to Optimize Cloning Techniques” implemented jointly with the Soom Biotech Research Foundation (the Republic of Korea).

A promising area of international cooperation is the *implementation of joint projects in end-to-end digital technologies and digital skills*. In 2019, the “Convergence” Master’s program in English was launched in cooperation with Korean universities to train a new generation of highly qualified digital experts with knowledge and skills at the intersection of natural sciences, humanities, and social sciences. The NEFU project “Mathematical Modeling, Inverse Problems, and Big Data” brings together scientists from Russia, China, Kazakhstan, Singapore, Vietnam, and others. “Samsung IT School” (basics of mobile development), “Samsung IoT Academy” (Internet of Things), and “Huawei ICT Academy” (switching and routing technologies and AI) educational projects are being implemented together with the world’s leading tech companies. The Junior Computer Academy has a standing collaboration with robotics schools in the Republic of Korea.

In 2021, the good traction of the international cooperation policy was underpinned by the annual Eastern European University Association award for the Internationalization of Higher Education.

Key goals and areas of international activity

The NEFU is positioned **as a unique international scientific and educational platform** *tackling issues of sustainable development of the North and the Arctic, minority languages, historical and cultural heritage of the indigenous peoples of the North; it also acts as a platform for expert discussion, research, analytics, projects, and creativity.*

The University’s international strategy aims to promote Russia's national interests in the educational domain, internalize and implement scientific outcomes and best practices in Russia through interaction with foreign partners and international organizations, and participation in international projects and networks. The strategy embraces the following main directions:

1. *Building of export capacity and internationalization of the educational process*: launching new joint programs and programs in English, upgrading marketing to increase the enrollment of foreign students.

2. *Expansion of international scientific and technical activities* in priority areas of the NEFU development, including within the framework of the “North: the Territory of Sustainable Development” World-class Scientific and Educational Center; increasing the scale of the University’s participation in international associations and consortia; development of partnerships with leading foreign universities and research centers, international organizations.

3. *Widening the University’s international footprint*: enhancing the system of pre-university training for foreign applicants, creating a network of the NEFU offices abroad, updating the existing and opening new centers of the Russian language and culture based on foreign partner universities.

4. *Improving conditions for greater academic mobility of teaching staff and students*: creating joint scientific and educational projects, introducing compulsory exchange education in priority areas, developing digital mobility, improving language skills among teaching staff and students, recruiting the leading foreign specialists.

5. *Strengthening the NEFU’s stand as a center for holding international events on sustainable development of the North and the Arctic*. Large forums and scientific conferences are planned to be held within the framework of the NEFU’s chairmanship and membership in such university associations and consortia and as part of cooperation with reputable international organizations – the Northern Forum, UNESCO, the Russian Council on International Affairs, etc.

6. *Developing electronic internationalization*: to undertake efforts, including marketing, to ensure the maximum representation of the NEFU on leading international online platforms; improving, enhancing the content, and promoting non-Russian language versions of the University website, mainly in English and Chinese; launching of a Spanish-language version of the site; developing non-

Russian language accounts and subscription channels in popular social networks (Facebook, Telegram, WeChat, etc.).

Expected outcomes:

By 2030, the NEFU will have asserted itself as one of the leading universities in the Arctic and Asia-Pacific regions, contributing to the solution of global problems of humanity, which will be manifested through the following indicators:

- an increased number of export-oriented programs and research projects implemented with foreign universities and research and educational centers, from 15 in 2020 to 35 in 2030;
- an increased share of international students from 3.2% in 2021 to 5% in 2030;
- an increased number of leading foreign lecturers and researchers employed at the University for at least one semester from 50 in 2020 to 100 in 2030;
- an increased number of academic staff who have confirmed the level of foreign languages proficiency by international tests (B2 and above), from 10 in 2020 to 85 in 2030, on an accrued total basis;
- an increased number of international conferences and forums, summer and winter international schools held jointly with foreign universities and research and educational centers, from 15 in 2020 to 30 in 2030;
- ensuring the maximum representation of the NEFU on the leading international online platforms (including non-Russian language versions of the University website and non-Russian language accounts and subscription channels in popular social networks), from 10 in 2020 to 20 in 2030, on an accrued total basis.

3. The Strategic Projects to Achieve the Target Model

3.1. Strategic Project No.1. The University's Digital Ecosystem.

3.1.1. Strategic Project Goal

To transform the University's role as per the digital ecosystem model – adaptive, self-regulating, open for cooperation, integrated into the human life cycle, and focused on their maximum self-fulfillment.

3.1.2. Strategic Project Objectives

- to develop a system of students' digital profiles and use the obtained data to improve the quality of educational services;
- to organize training for the students and staff and develop their skills using a free of charge verified educational content through the digital educational services;
- create a dynamic digital environment empowering the use of offline and online education.

3.1.3. Expected Outcomes of the Strategic Project

Internal (personal) outcomes:

- a person changes attitude towards their development: instead of consuming an end-product and “being trained as per a program/standard”, they make their own development decisions;
- the learning outcomes are now assessed by a person's digital profile, allowing a real-time assessment of the entire digital footprint;

External outcomes:

- improving the efficiency of intellectual property use to exchange digital services ensuring the availability of educational content;
- student-centering of education based on a system of a student's individual educational tracks. “Education as a service” model of education;
- development and implementation of a “Hybrid University” model based on creating a continuing education ecosystem, where the University offers relevant forms of education (lectures, disciplines, modules) from various content providers that meet a student's demand;
- R&D to develop the “University 360” multiservice platform – an aggregator of educational products and services that ensures interaction between the educational content providers and students;

- lining up teams of engineers and researchers focused on finding ways to develop higher education in the environment of uncertainty;

globally:

- efforts to achieve the Sustainable Development Goal 4: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”;

- being a linchpin, the strategic project has an impact on all the University’s policies and transforms all its activities;

- the implementation of the strategic project brings the University closer to the target model of an organization mainstreaming the end-to-end digital technologies and platform solutions and providing the training of competitive personnel for the digital economy, as well as the transformation of priority sectors of the economy and social sphere of the macroregion and the country.

3.1.4. Strategic Project Outline

In the context of the rapidly changing world, the growing heterogeneity of the environment, and the uncertainty of social and political processes, on the one hand, and limited resources, challenging logistics, and remoteness from the leading research and educational centers, on the other hand, the University’s digital transformation becomes essential for improving the quality and accessibility of education and making the research more efficient via personalized educational tracks. Therefore, the “Student First” principle is becoming critical – each student’s training must be personalized.

The implementation of this principle requires non-conventional approaches and solutions in the educational process, digitalization of the fundamental processes of the University development, the evolution of the digital educational environment that ensures high-quality, accessible education, a wider range of online learning programs, planning the steps towards digital maturity through the development and distribution of promptly updated guidelines (targeted for the departments at different stages of digital maturity and in differing activity contexts), and upgrading the digital environment for sharing experience.

The strategic project also takes into account the targets of the “Digital Economy” national program (training of qualified personnel for the priority sectors of the digital economy) and the strategic targets of the “Education” and “Science and Universities” national projects (achieving high quantitative and qualitative parameters of the universities’ digital maturity).

The essence of the strategic project is to develop and implement a model of the University integrated into a person’s life cycle and focused on their maximum self-fulfillment to ensure that a person (a consumer) is involved in managing the digital educational content. Creating a dynamic digital environment makes it possible to use offline and online learning and allows to ensure the following:

- access to the curricula, steering documents of the disciplines (modules), practical tasks, e-library publications, and e-learning resources, envisaged in the curricula;
- keeping records of the learning progress, the interim assessment results, and the results of mastering the basic academic programs;
- giving all types of classes and assessments available in e-learning format;
- generating a student’s electronic portfolio, containing the works, reviews, and grades from any stakeholders of the learning process;
- communication between the learning process stakeholders, both synchronous and (or) non-synchronous, via the Internet.

The NEFU digital ecosystem is designed to meet the information needs of all stakeholders of the personnel training process and should become a full-fledged communication tool. The ecosystem is a data environment supporting the scientific and academic process, consisting of the following structural elements: information and telecommunication system; information systems, software applications, personal computers, mobile devices of students, parents, the University staff, and employers.

The purpose of the system is to embrace all categories in information relations that allow them to fulfill their functional responsibilities, both within the current

educational activities and for improvement, development, and innovation in their fields.

The digital ecosystem will be developed in all the following avenues:

- creating a cloud infrastructure that ensures the operation of all educational and administrative services and information systems, data storage and transmission;
- development of “target paths” (personal accounts of students and employees) within the digital ecosystem; mainstreaming online services for educational and extracurricular activities; bringing the proportion of active users to 70%;
- gaining access to a digital platform that hosts self-assessment tools and the best practices of the digital transformation for the main blocks of the digital university model;
- gaining access to the data collection services, formulation of the requirements for digital educational products, searching for partners, and quality evaluation;
- developing the digital ecosystem components: chatbots, common ontology and glossary, master data, an application programming interface (API) for data handling, a system for sharing data access rights, a system to control the data integrity, consistency, reliability, accuracy, completeness, and origin;
- development of hardware IT infrastructure (computer hardware, multimedia, and peripheral equipment).

The strategic project consists of two interrelated subprojects.

Subproject 1.1. University 360

The “*University 360*” subproject aims to introduce a hybrid university model based on shaping a lifelong learning ecosystem. As per this model, students articulate their personal educational demand, accommodated by the University's relevant educational offers in the form of lectures, disciplines, and modules supplied by various content providers.

The consortium's technological core will be the "University 360" multiservice platform – an aggregator of educational products and services, ensuring the

interaction of educational content providers with the students. Furthermore, the technologies of a digital portfolio and individual educational tracks and the models of academic mobility and networking will be implemented on its basis.

To implement the subproject, a consortium is established that consolidates the resources and potential of the universities, educational content providers, and educational organizations. As of now, Yandex, Mail.ru Group, Element, IPR Media, Autodesk CIS, and AEB IT have agreed to join the NEFU-initiated consortium.

The Subproject includes:

- personalizing the learning process (student-centered education) based on a system of individual educational tracks. “Education as a service” model of education;
- development and implementation of a “Hybrid University” model based on creating a continuing education ecosystem, where the University offers relevant forms of education (lectures, disciplines, modules) from various content providers that meet a student’s demand;
- implementing measures for more efficient use and exchange of intellectual property for digital services ensuring the availability of educational content;
- R&D to develop the “University 360” multiservice platform – an aggregator of educational products and services that provides interaction between the educational content providers and students;
- efforts to achieve the Sustainable Development Goal 4: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”.

Subproject 1.2. “North-East” Technopolis

“North-East” Technopolis project is focused on building advanced and future-proof digital skills in the students of engineering, technology, and IT majors. The Technopolis will incorporate such structures of the NEFU innovation infrastructure as the “Future Skills: NEFU” International Center for Advanced Skills Development, the NTI “TechNet” University Mirror Engineering Center, and others.

The expert and analytical activities of Technopolis will stem from the research of the “Future Skills: NEFU” International Center – analyzing the education and

technologies market, searching for the breakthrough points in the international education and technology markets.

The project envisages interaction with the macroregion's external and internal market players based on the u2b, u2g, and u2c formats superposition principle, with the following priorities:

- *u2g format*: achieving the sustainable development goals and Russia's national development goals through introducing the end-to-end and new production technologies, implementing the programs for the macroregion's territories development in collaboration with tech companies and development institutions;

- *u2b format*: providing industrial companies and corporations with professionals with future-proof skills and additional qualifications; launching of new industries and technologies by the alumni; introduction of the Industry 4.0 elements in the macroregion's corporations and industrial companies;

- *u2c format*: building future-proof skills and additional qualifications demanded by the digital economy. A mechanism to achieve this goal is unbundling educational content with competitive and future-proof skills for the students.

The expert and analytical activities of Technopolis will stem from the research of the "Future Skills: NEFU" International Center – analyzing the education and technologies market, searching for the breakthrough points in the international education and technology markets (similar to FutureSkills initiative within the WorldSkills International), but with the subsequent tailoring of own educational standards.

The project envisages:

- introducing the NTI and Future Skills markets into the educational process as per the high-tech market development roadmap;

- introducing CDIO, WorldSkills, and Future Skills standards for all groups of technical and non-IT majors;

- improved vendor certification for IT majors to narrow the gap between the industry and the education;

- redesigning the content of educational programs to suit the current objectives and processes of the R&D labs (organization of applied R&D to develop new devices, information systems, and technologies in the relevant industries);
- introducing a “Startup as a Curriculum” practice, where the University acts as an accelerator and focuses on developing the skills required for business development;
- developing new and promising skills, tailoring and offering new programs for training highly qualified research and industrial personnel in the promising areas of the macroregion’s industry.

The key science and technology products of Project No.1:

- applied products of hybrid education development;
- a range of scientific research aimed at tackling the topical issues of higher education development under the growing uncertainty of the environment;
- guidelines on the integrated systems of internal assessment of education quality in compliance with the Federal State Educational Standard 3++ for the University’s divisions.

3.2. Strategic Project No.2.

Sustainable Technologies to Develop Northern Territories.

3.2.1. Strategic Project Goal

To come up with safe and resource-saving technologies for the development of natural resources of the North, Arctic, and Subarctic, based on knowledge and compliance with the core principles of natural configuration of the biosphere.

3.2.2. Strategic Project Objectives

- training of qualified and in-demand human resources, including those with the highest qualification, in sustainable nature use, reproduction of natural resources, and environmental safety of the Russian North-East, as well as in the field of materials science and new science-intensive technologies;

- elaboration and implementation of breakthrough research and solutions in the areas on the List of Critical Technologies of the Russian Federation;
- technologies for environmental monitoring and forecasting, prevention and elimination of environmental pollution;
- technologies for prospecting, exploration, and development of mineral deposits and their extraction, prompt practical application of such technologies in operations;
- computer modeling of nanomaterials, nanodevices, and nanotechnologies; nano-, bio-, informational, cognitive technologies; new and renewable energy technologies; technologies for obtaining and processing structural nanomaterials; technologies for obtaining and processing functional nanomaterials; technologies for creating energy-saving systems for transportation, distribution, and use of energy;
- organizing interregional and international cooperation with the leading scientific and educational organizations and industrial enterprises to initiate and coordinate educational programs, additional professional programs, and for successful employment of the graduates;
- integration of scientific, educational, and industrial potential to interact with the state and local authorities in shaping the relevant agendas affecting the sustainable development of the Russian Federation’s North-East.

3.2.3. Expected Outcomes of the Strategic Project

At the global level:

- contribution to safeguarding the national interests of Russia in environmental protection, preservation of natural resources, sustainable nature use, and climate change adaptation;
- assisting the country and the macroregion in achieving Sustainable Development Goals.

The following results will be achieved at the research, practical, and educational levels:

project 2.1.:

- introduction of new and improved academic programs of higher education;
- non-destructive technologies and methods of prospecting and exploring minerals;
- a network of interagency research laboratories; the share of highly qualified researchers under the age of 39 to increase up to 40%;
- more publications indexed in Web of Science Core Collection and Scopus databases;
- research-based initiation of legal acts and recommendations providing for higher living standards and sustainable development of the North, Arctic, and Subarctic;
- transformation of educational and scientific programs of the engineering departments, as well as creative activities of the University staff;

project 2.2.:

- transition to new technologies, materials, and engineering methods for the extreme conditions of the North;
- integration of research results into existing and new “2+2+2” educational programs ensuring quality education in modern materials science and engineering, including remote and project learning technologies with practical training at existing facilities in the Arctic regions of the Russian North-East. Among such master’s degree programs are: “Modern Materials in Energy Sector and Renewable Energy”, “Convergence: Science-Intensive Technologies” (taught in English), “Molecular Biotechnology” and “Bioinformatics and Bioengineering”;
- special upskilling courses for young researchers and personnel specializing in cell biology, molecular biotechnology, bioinformatics, and genomics, as well as for real sector enterprises engaged in design technologies, construction and operation of buildings in the arctic and northern conditions;
- increased income from implementing extended training programs and basic academic programs at RUB --- thousand per one academic staff member;

- new facilities (climatic test site in Tiksi; “Future Skills: TechNet. North-East” NEFU NTI Engineering Center);
- Engineering Center for introducing information modeling technologies, digital twins, and managing buildings' life cycle in the North and the Arctic;
- new scientific knowledge on fundamental principles of materials science and engineering;
- technologies to obtain new materials with improved operating characteristics, biotechnologies for medical and biological purposes;
- new solutions for sustainable power supply in the isolated northern regions;
- technologies for designing, construction, and installation of engineering networks for energy-efficient buildings with the “smart house” elements in the arctic and northern regions of the RF;
- sustainable international and nationwide educational and scientific collaborations with a high rate of academic mobility;
- reaching the level of the leading Russian universities in terms of publications in the scientific journals indexed in the Web of Science Core Collection and Scopus;
- revenues from R&D contracts to increase to RUB 300 thousand per one academic staff member;
- the share of researchers under the age of 39 to reach 40%;
- incomes from intellectual property sales to reach RUB 50 thousand per academic staff member.

It is planned to obtain Russian and Eurasian patents. The commercialization of intellectual property through license sales will ensure the reproducibility of the results of the strategic project upon completion of the program funding.

A page of SP No.2 will be launched at the NEFU portal and updated regularly. It will contain information on underway scientific projects and educational programs, international and all-Russian scientific and technical events.

The strategic project will be implemented by a consortium of leading scientific and educational centers and real sector enterprises right at the unique and significant minerals deposits and natural objects for the North-East of Russia.

The strategic project is implemented under several development policies of the University: educational, campus, infrastructure, youth, research, innovation and commercialization of developments, international cooperation, and open data policies.

The implementation of the strategic project will ensure the territorial and sectoral leadership of the NEFU in sustainable nature management and sustainable development of northern ecosystems. Furthermore, it brings the University closer to the target model in terms of positioning the University as a scientific and educational core at the regional and interregional levels, which impacts the socio-economic development of the macroregion.

The strategic project will have the following transformative impact on intra-university development: arranging interaction between academic and scientific structural units under joint research projects and integrated educational programs; modifying the engineering departments of the University by introducing new and improved curricula of higher education, additional professional programs, including networking programs, taking into account the requirements of today's labor market and employers; integration of the obtained intellectual products into the basic academic programs and additional professional education programs.

3.2.4. Strategic Project Outline

The North-East of the Russian Federation has significant natural resource potential; it provides 98% of diamonds, 15% of gold, 100% of antimony, and 40% of tin production. In addition, oil and gas (35% of oil and natural gas in Eastern Siberia and the Far East), coal (47% of proven coal reserves), groundwater (22% of Russia's water resources), and construction materials are produced massively, as well as other types of minerals for the international and domestic markets. In terms of the estimated value of all explored reserves of raw minerals, the northeastern territories dominate in the Russian Federation.

The macroregion's unique natural ecosystem is sensitive to the intensive development of natural resources, increased anthropogenic impact, and global climate change. Therefore, according to the Strategy of Scientific and Technological Development of the Russian Federation, this macroregion is in the area of interference of two Major Challenges - **depletion of natural resources and environmental degradation** (Clause 15c) **and development of the country's territory, the oceans, the Arctic and Antarctic** (Clause 15g)

The strategic project includes two subprojects that, in response to these major challenges, will ensure the development of innovative technologies to facilitate efficient human-nature interaction, sustainable development and use of vast spaces, and sustainable and dynamic socio-economic development of the Russian North-East, Arctic, and Subarctic.

Subproject 2.1. Sustainable Nature Use and Sustainable Development of Northern Ecosystems

To reach the objectives of the strategic project, the following will be implemented:

- safe resource-saving technologies for prospecting and development of natural mineral and biological resources;
- research aimed at obtaining new knowledge about structure and formation of the strategic mineral deposits, the evolution of living organisms, mechanisms of biodiversity formation, functioning and behavior of northern ecosystems under the global changes on the Earth (in particular, climate change and anthropogenic impact);
- new technologies of forecasting of major challenges and early warning of threats to the environmental safety of the northern regions (natural disasters); monitoring of environmental status and changes; new interdisciplinary educational programs of different levels, aimed at safeguarding and reproducing fragile, vulnerable northern ecosystems, including: technologies for environmental monitoring and forecasting, prevention and elimination of environmental pollution; technologies for prospecting, exploration, and development of mineral deposits and

their extraction, including joint educational programs with academic and industrial partners – Diamond and Precious Metal Geology Institute SB RAS, Melnikov Permafrost Institute SB RAS, Institute of Biological Problems of Cryolithozone SB RAS, Shilo North-Eastern Interdisciplinary Scientific Research Institute FEB RAS, ALROSA, Tas-Yurakh Neftegazodobycha (Rosneft), etc.

The developed safe resource-saving technologies for developing natural mineral and biological resources and new knowledge about environmental changes' status and patterns will be **the key intellectual products**.

Subproject 2.2. New Materials and Technologies for Extreme Northern Conditions

The field of research in the project framework is connected to global challenges such as: energy transformation, the global industry's growing demand for critical materials and technologies, climate change, uncontrolled changes in the permafrost, unconventional energy development.

This project includes the following activities:

- *conducting theoretical and experimental research on new materials* that have improved characteristics to be used in the extreme climatic conditions among others;
- *developing innovative technologies for the North*, first of all, in material engineering: micro-structure materials, nanomaterials, graphene, transition metal dichalcogenides, quantum calculations, including *ab initio*, polymer composites and industrial rubber goods for the Arctic, renewable energy, smart cities;
- *providing personnel* and scientific guidance to develop chemical-engineering facilities for hydrocarbon and biofeedstock processing in the North-East of Russia.

The project will involve:

- updating of bachelor's degree programs as the fundamental basis for modern materials science and engineering, master's and postgraduate programs directly related to materials science and engineering, and developing of online courses that will be available at various popular platforms;

- creation of new facilities of scientific and innovative infrastructure, such as:
 - the climatic test site in Tiksi;
 - “Future Skills: TechNet. North-East” Engineering Center at the Neryungri Technological Institute;
 - Engineering Center for introducing information modeling technologies, digital twins, and managing buildings' life cycle in the North and the Arctic;
 - international projects of training experts in modern materials science within networking and other programs jointly with international partner universities (including non-Russian language programs), and postgraduate programs with double scientific supervision.

3.3. Strategic project No.3.

Human in the Extreme Conditions of the North

3.3.1. Strategic Project Goal

Increasing life expectancy and improving the quality of life of the northerners.

3.3.2. Strategic Project Objectives

- to support cultural and linguistic diversity as a factor of socio-cultural stability in the North in the context of digitalization;
- to develop and introduce new and promising health-protecting technologies and effective practices safe for natural and human ecosystems, based on unique scientific knowledge, global breakthroughs, and biological resources of the North;
- to build a system of methods and models of strategic planning, optimization of the territorial and sectoral structure of the economy to steer sustainable socio-economic development of geostrategic regions.

3.3.3. Expected Outcomes of the Strategic Project

The results of the strategic project implementation fully comply with the spatial development strategies of Russia, programs for the socio-economic

development of the Far East and the Arctic Zone, and the priorities of scientific and technological development of Russia and are mainly aimed at developing future-proof skills in young people and involving them in science and project activities.

Implementing the strategic project will ensure Russia's global leadership in medicine, including biotechnology, genetics, and the biopharmaceutical industry.

The following results will be achieved at the research, practical, and educational levels:

Subproject 1:

innovative technologies and models of preservation, development, and promotion of cultures, languages, and the epic heritage of the peoples of the North, based on digitalization and artificial intelligence (developing electronic resources on the languages and culture of the peoples of the North and services for using them); programs and recommendations for improving the state linguistic and cultural policy in the macroregion, preventing interethnic and interlingual tension; higher education curricula and additional professional programs that provide individual tracks and training of highly qualified personnel highly demanded in the labor market of the Far East and the Arctic Zone of the Russian Federation, including lifelong learning programs (in the areas of digital humanities, computer and corpus linguistics, neurolinguistics, big data processing, civilizational studies, global studies, etc.), tailoring of authentic educational courses and programs at various educational web platforms, including collaborations with Russian and international partners;

Subproject 2:

an increased population of highly qualified medical personnel in the medical organizations of the Russian North-East; the number of Doctors of Sciences with highly competitive results and developments in medicine, biotechnology, and pharmaceuticals to increase by 15 people by 2030; the volume of biotechnological/bio-pharmaceutical production and introduction rate will have grown ten times by 2025 and 15 times by 2030; international market launch of at least five products by 2025, and at least ten products by 2030; improved quality of

life in the North by developing, implementing, and mainstreaming the new health-protecting technologies and practices developed at the NEFU.

Subproject 3:

introduction of new and improved higher education academic programs; environmentally friendly technologies and methods of prospecting and exploring mineral resources; non-destructive technologies used by the newly established network of interagency research laboratories; the share of highly qualified researchers under the age of 39 increased up to 40%; more publications indexed in the Web of Science Core Collection and Scopus databases; research-based initiation of regulatory legal acts and recommendations ensuring a high quality of life and sustainable development of the North, the Arctic and Subarctic; transformation of academic and scientific programs of engineering departments, as well as creative activities of the employees.

For details of the project, see Appendix 29.

3.3.4. Strategic Project Outline

The strategic project aims to develop the most effective mechanisms for ensuring human well-being and success in the North and incorporates three subprojects.

Subproject 3.1. Cultural and Linguistic Diversity in the North

Target 4.7 of Sustainable Development Goal (SDG) 4, formulated as per Article 55 of the UN Charter, focuses on ensuring sustainable development through global citizenship and appreciation of cultural diversity. Therefore, the protection of traditional spiritual and moral values, culture, and historical memory is one of the priorities of the National Security Strategy of the Russian Federation.

At the same time, as shown by the results of comprehensive studies of the development of the northeastern region and the Sakha Republic (Yakutia) Foresight, there are threats of cultural assimilation, loss of ethnic and cultural identity by young people, a crisis of the institutions that reproduce culture and languages in the context of intensifying globalization and urbanization.

In these conditions, fostering and promoting the polylogue of cultures is becoming more relevant. Such polylogue is not confined to horizontal interaction but involves complex cross-links that form a network of information and communication. To switch from a dialogue of cultures to networking between various cultures is the idea and the modern paradigm of developing cultural and linguistic diversity in the North.

The expertise and leading position of the NEFU in the preservation, revitalization, and development of minority languages and cultures of the peoples of the North and existing scientific, innovative, and educational groundwork allow implementing initiatives in the field of cultural and linguistic diversity in the North.

The subproject involves:

- *deployment of the NEFU “breakthrough” projects* aimed at achieving adequate progress in preserving and promoting the historical and cultural heritage of the peoples of the North, developing cultural and linguistic diversity, including the “Digitalization of the linguistic and cultural heritage of the indigenous peoples of the Arctic” international project, supported by the Arctic Council;

- *a multidisciplinary study* of the fundamental mechanisms of generation of Russia’s identity and cultural potential as one of the leading countries of the global Arctic, including theoretical and applied research of the changing sociolinguistic situation and cultural and historical heritage of the North;

- *updating educational activities*, namely: developing and implementing unique educational programs in cooperation with leading Russian and foreign universities; expanding the range of export-oriented programs; introducing new online courses to develop digital academic mobility of students; launching of continuing education programs and additional service programs for groups previously not covered, including for middle-aged and older adults.

An interdisciplinary scientific approach will be implemented, including analytical methods of various humanitarian disciplines (linguistics, cultural studies, history, ethnography, psychology, etc.), case-study methods, comparative studies, and natural science methods in the social and humanitarian sciences.

As part of breakthrough research, the following will be carried out:

- *mathematical modeling of socio-humanitarian processes*: assessment of the current state of socio-humanitarian processes in the macroregion, forecasting and drafting possible scenarios of preserving and developing linguistic situations and cultural diversity, developing new maps of linguistic areas, etc.;

- *computer processing of the linguistic heritage of the peoples of the North*: a collaboration of scholars and IT experts will aim at developing electronic corpora for the languages of the peoples of the North, morphological analyzers, speech synthesizers, machine translators, Internet services, etc.;

- *digitalization of the cultural and linguistic heritage of the peoples of the North and creation of a database of the ethnocultural heritage of the North* using interdisciplinary methods and IT technologies, digital design, artificial intelligence, and big data processing methods, including a multidisciplinary study of archaeological and written sources, etc.;

- *building knowledge in Altaistics*: reconstruction of the historical development of the Turkic, Mongolian, Tungusic, Korean, and Japanese languages.

The strategic project will be implemented with the participation of more than ten educational divisions, two research institutes, two universitywide departments, two museums, 16 research and educational centers, ten research laboratories, eight schools of science, two dissertation boards, the “Exhibition and archive of linguistic diversity, cultural, and historical heritage of the peoples of the North-East of Russia” Center for Collective Use of Scientific Equipment and Experimental Installations, the Institute of Continuing Professional Education, three thematic networks of the University of the Arctic: Arctic Lingua, World Images of Indigenous Peoples of the North, and Human Adaptation in the Changing Arctic, and others.

Subproject 3.2. High Technologies for Preserving and Strengthening Human Health in the North

The subproject is driven by the need to build new skills and elaborate effective, safe technologies highly demanded in medical and pharmaceutical fields

and develop and substantiate alternative approaches for healthcare and prevention system organization in the North.

The subproject envisages:

- development of laboratory and testing infrastructure, as well as skills in prospective areas of medical science, including the cell biotechnology, tissue and gene engineering domains;

- initiating and conducting applied research, design, and experimental works to develop new medical equipment, information systems, and techniques of treating, preventing, diagnosing, and obtaining medical substances from local raw materials;

- initiating comprehensive research of health indicators of the consortium regions' population, in-depth study of hereditary diseases, and the northern peoples' gene pool to design new models for health care improvement and development of personalized medicine;

- building new skills, developing and implementing new programs to train highly qualified scientific and industrial personnel in prospective areas of medicine.

Activities under the subproject are broken down into two segments:

- educational activities segment (interdisciplinary academic programs will be developed and implemented, residency and a master's degree program will be launched in the new major of "Medical Microbiology", multi-specialty doctors and medical equipment engineers will be trained, etc.);

- the segment of breakthrough research and development, to be implemented in an integrated manner (creating innovative methods of the DNA diagnostics of the hereditary diseases; new methods of immune therapy of cancer and some infectious diseases based on monoclonal antibodies; multicomponent cancer vaccines based on the oncogene-induced activity of phagocytosing cells; special composite or auxiliary bio-artificial human organs).

The subproject implementation will combine the resources of the scientific infrastructure and the intellectual potential of the NEFU researchers and consortia of various domains: medicine, biotechnology, genetics, biology, botany, physics,

chemistry, mathematics, and experts in the field of physical education and sports, prevention, etc.

The NEFU's expertise in administrating medical research and its scientific capacity, the research fleet with the appropriate instrumentation for laboratory tests, manipulations with living systems, clinical medical research, and certified medical infrastructure will make it possible to achieve high rankings as early as during the 5th year of the strategic project implementation, given a properly built system of relationships and priorities.

Key research and technological products of the project:

- new cellular biomedical products;
- new pharmaceutical substances based on natural medicinal materials;
- new medical devices and technologies for automation and robotization of industrial processes will be in demand in medicine, and their commercialization will provide further promising research after the completion of the strategic project.

Subproject 3.3. The Sustainable Economy of Russia's Geostrategic Territories

The paradigm of spatial development, based on the vital role of Russia's northern geostrategic territories, requires brand new principles and mechanisms of government regulation of the economy that will ensure sustainable development of these territories.

At the same time, the existing methodology to manage the emerging processes in socio-economic systems has not been adjusted to the arctic and northern regions in the context of the "eastern vector" of the Russian Federation development.

The northern regions of Russia show an extreme territorial disparity of the socio-economic development, hyper-concentration of the economy around large mineral projects, imbalanced labor market, decentralized energy sector, and underdeveloped transport infrastructure.

The subproject incorporates the following scientific and academic priorities of the University in this domain:

developing tools, methods, and technologies to tackle the challenges of effective and sustainable economic development and organize the economic environment and interregional cooperation of the northern regions; *developing the public administration methods* that will ensure human well-being in the North and creating highly efficient infrastructure in the geostrategic territories of the North and the Arctic; *implementing “breakthrough” projects* aimed at studying the issues of living in the North and the Arctic using the big data analysis tools; upgrading the traditional methods of analyzing the standards and quality of life by introducing digital technologies and tools for analyzing big data from social networks. Based on these improvements, it is planned to offer the executive authorities a system of methods and models for assessing standards and quality of life, strategic planning of the northern and arctic regions' socio-economic development, and new extended education curricula.

4. Key Characteristics of Inter-Institutional Networking and Cooperation

4.1. Structure of Key Partnerships

An extensive network of partnerships with the leading national and foreign scientific and educational centers, federal and regional authorities, development institutions, and industrial partners has developed during the implementation of the first stages of the NEFU development program. The University has long-term cooperation agreements with more than 500 scientific and educational organizations, 744 real sector enterprises, and 145 foreign organizations. In addition, the NEFU is a member of 12 international associations and consortia.

Joint activities are carried out at all levels of the NEFU positioning (regional, macroregional, interregional, federal, and global) in the critical areas of its activities:

cooperation in talented youth identification and support:

- 118 educational organizations of general, supplementary, vocational, and higher education from five regions of the Far Eastern Federal District are joined in

the “North-Eastern University Educational District” Association; the North-Eastern Olympiad of Schoolchildren is held with support from 11 leading universities of Russia and educational institutions of Kazakhstan, Tajikistan, Uzbekistan, Kyrgyzstan, and Mongolia;

integration in the educational domain:

– twelve educational programs are implemented in networking format, eight of them with foreign partner universities; seven double degree programs with foreign universities are implemented, including three bachelor’s degree programs and four master’s degree programs; nineteen industrial chairs have been opened; 1,232 NEFU students studied there in 2020-2021;

research collaboration:

– the NEFU is a party of the core group of the member organizations of the “North: the Territory of Sustainable Development” Scientific and Educational Center together with 11 research institutes, five higher education institutions, 21 schools of science, and ten industrial partners. Currently, there are over 70 joint projects with foreign research institutions; 14 educational programs and 48 research projects on the development issues of the Far East and the Russian Arctic are implemented in collaboration with the international universities and scientific and research centers; the NEFU has 255 scientific cooperation contracts and agreements with Russian higher education institutions and organizations; there are cooperation agreements with 103 foreign universities and 29 research centers; in particular, joint research and development is undertaken with 34 organizations;

implementation of youth projects and initiatives:

– the NEFU has organized over 140 nation-wide and regional socio-humanitarian projects in cooperation with universities and youth organizations;

joint projects in the digital transformation of science and higher education:

– the NEFU is a member of the Russian Association of Digital Transformation of Scientific and Educational Organizations and a co-organizer of the University Consortium of Big Data Researchers; Yandex, Mail.ru Group, Element, IPR Media, Autodesk CIS, and AEB IT have agreed to join the NEFU-

initiated consortium that brings together the resources and potential of the universities and educational content providers; “Transparency Initiative in Education” project elaborating the federal industry standards for data management in education has been initiated together with Tomsk State University;

initiatives in Sustainable Development Goals:

– the University annually holds over 20 international events on the sustainable development of the North. It is a co-organizer of the Northern Sustainable Development Forum that convened nearly 2,500 experts from 36 countries in 2020; the NEFU is an initiator and a key platform for the UNESCO conferences on the preservation of linguistic and cultural diversity in cyberspace, involving experts from over 60 countries; a project on introducing the sustainable campus standards, meeting the Assessment System for Sustainable Campus criteria, is implemented together with the Hokkaido University.

Educational, scientific, and innovative international partnerships facilitated the NEFU’s engagement in promoting the macroregion’s socio-economic development, joint development of managerial solutions, and defining the development prospects given the global trends and the local context; they have ensured the dissemination of the best practices and introduction of the achieved practical results in the social and economic domains of the regions of the North-East.

For more information about the partners, see Appendix 28.

4.2. Description of the Consortium(a) Established (to be Established) as Part of the Development Program

The NEFU is an initiator and a stakeholder of a number of consortia implementing joint projects in education, science, commercialization of new developments, innovations, and expert analytics.

At the regional level, the NEFU, as the republic’s flagship university, unites scientific and educational organizations, authorities, and real sector enterprises to increase Yakutia’s intellectual, economic, and innovative capacity. In 2021, the

NEFU initiated the medical consortium of Yakutia, comprising the region's healthcare organizations and scientific institutes.

At the macroregional level, the NEFU engages in the consortia through its “third mission”. Along with the governments of the Russian North-East regions, the Siberian Branch of the Russian Academy of Sciences, ALROSA, and Element, the NEFU initiated the establishment of the “Sustainable Development of Russia's North-East” consortium. The consortium aims to combine efforts for scientific, educational, and innovative backing of the sustainable development of Russia's North-East as the country's geostrategic territory and improving the quality of life in extreme conditions, based on the development and implementation of new technologies.

At the interregional level, the NEFU engages in the consortia through implementing the tasks of the National Program for the Socio-Economic Development of the Far East until 2024 and further until 2035 and the “Socio-Economic Development of the Arctic Zone of the Russian Federation” State-run Program:

a) Arctic vector of cooperation: the National Arctic Scientific and Educational Consortium, the “Future of the Arctic Architecture and Climate Pattern” Scientific and Educational Consortium;

b) Eastern vector of cooperation: a consortium to research the challenges of economic development and international cooperation in the Far East, the “Far East: a Space of Opportunities” consortium, the Council of University Rectors of the Far Eastern Federal District, and others;

At the federal level, the NEFU's engagement in consortia aims to solve the priority tasks of the scientific and technical development:

a) digital transformation of the society: the University Consortium of Big Data Researchers for fundamental and applied research in big data collection and analysis and development of products and tools for big data handling; the consortium of the National Technology Initiative Center at SPbPU; the Association for Digital Transformation of Scientific and Educational Organizations;

the NEFU has initiated the establishment of the “University 360” consortium to develop and implement the “Hybrid University” model, based on building a lifelong education ecosystem. The initiative was supported by Yandex, Mail.ru Group, AEB IT, Element, IPR Media Group, SkyEng Online School of English, and Autodesk CIS;

b) scientific consortia in various research domains: SecNet consortium (Siberian Environmental Change Network);

c) associations of Russian universities that exchange the best practices in organizing scientific and educational activities and joint implementation of educational and academic exchange programs for students and lecturers: “The Club of Ten” Network of Federal Universities, the Association of Classical Universities of Russia, the “Green Universities of Russia” Association, the “Siberian Open University” Association, and the Association of Construction Universities.

The global (international) level of cooperation involves the priorities of the NEFU scientific and educational activity:

a) sustainable development of northern regions in the context of globalization, urbanization, and climate change: “East Russia–Japan Expert Education Program” (RJE3) (2017). The NEFU has initiated the international associations of scientific and educational centers, such as a consortium for studying the epic heritage of the world, the PaleoMIR international consortium for the multidisciplinary study of Eastern Siberia’s Ice Age mammals and their habitat, and the “Cultural and Linguistic Diversity, Sustainable Development of the Arctic and Subarctic” consortium;

b) development of the Arctic and the Asia-Pacific regions: the Northern Forum, the Arctic Council’s Indigenous Peoples Secretariat, the Association of World Reindeer Herders, the University of the Arctic, the Association of Universities of the Far East and Siberia of Russia and Northeastern Provinces of China (AVRIC);

c) scientific-technical and scientific-educational cooperation of the universities: the Russian-Kyrgyz Consortium of Technical Universities, the

Association of Classical Universities of Russia and China (AKURK), the “Dialogue Russia – Republic of Korea” Forum, the Network of Partner Universities of the Embassy of France, the Association of Institutions of Higher Education of the Russian Federation and Japan, the UNESCO Chairs Network, and others. The NEFU is co-chairing the Association of Sino-Russian Technical Universities (ASRTU) in 2021-2023, which will allow to considerably expand the Arctic agenda;

d) internalization of education: the Association of International Students of Russia, the TESOL International Association.

All the consortia are open. They are scientific-educational and project-based. For more detailed descriptions of consortia, see Appendix 28.