Roadmap for bilateral research cooperation

The Research Council of Norway


Photo: Beautiful Norway disc

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Research cooperation with **Russia**

The Research Council has drawn up roadmaps for cooperation with eight priority countries outside of the EU/EEU: Brazil, Canada, China, India, Japan, Russia, South Africa and the US.

The roadmaps contain background information about the research policy and the research and innovation systems in the priority countries, Norway's cooperation with these countries, and an assessment of areas of and opportunities for cooperation. The roadmaps are intended to provide a basis for setting priorities and encourage more targeted cooperation with the selected countries.

The roadmaps are a follow-up of the white paper on research, Meld. St. 18 (2012–2013) *Long-term perspectives – knowledge provides opportunity*, which identifies these eight priority countries.

The roadmaps for international cooperation were approved by the Executive Board of the Research Council on 28 September 2014. More information about the Research Council's international cooperation is available at www.forskningsradet.no/internasjonalt

1. Key data and summary of conclusions

KEY FIGURES		
Population in 2013	Inhabitants (mill.)	143.7
Gross Domestic Product (GDP) per capita in 2013	EUR pr. capita	10 639
Growth in Gross Domestic Product (GDP) in 2012	Per cent	3.4

R&D EXPENDITURES		
R&D expenditures as a percentage of GDP in 2012	Per cent	2.76
Change in R&D expenditures 2002–2011	Per cent	140.7

INTERNATIONAL COOPERATION		
Joint grant proposals with Norway submitted to FP7	Number	236
Overall success rate FP7	Per cent	17

TRADE AND INDUSTRY		
Import of goods and services as a percentage of GDP	Per cent	22
Norwegian goods exports to Russia in 2012	NOK mill.	8 482
Norwegian goods imports from Russia in 2012	NOK mill.	10 311
Norwegian direct capital investments in Russia in 2011	NOK mill.	1 874
Ranking in the Global Innovation Index in 2013		62

Russia is an important priority country for Norway, particularly in terms of the countries' common strategic interests in the northern areas. A productive climate of cooperation and a common knowledge base are essential if we are to work together to find joint solutions with regard to natural resources and environmental protection. There is a longstanding tradition of Norwegian-Russian research cooperation, e.g. related to fisheries management in the Barents Sea.

Research has traditionally been the domain of the Russian Academy of Sciences, whereas the universities have been oriented towards education. In recent years Russian authorities have implemented reforms and established schemes, e.g. national research universities and the Technology Platforms Initiative, to promote closer cooperation between research, education and industry, as well as to strengthen research and innovation. Russia takes active part as a third country in EU research cooperation.

Russian research and innovation is facing many challenges with regard to recruitment (the population of scientific staff and engineers is aging), restrictive regulations, and the legal status of property rights. The international orientation of Russian research, measured by the number of publications and citations in international scientific journals, is below the global average. Russian researchers have a high level of specialisation and expertise within a number of areas of great importance for and interest to Norway. The following research fields are especially relevant for cooperation with Russia:

- Polar research
- Marine research
- Petroleum
- Social science and humanities
- Health
- Nuclear physics
- Space research
- Nanotechnology
- Aquaculture and marine technology

Key instruments in Norwegian-Russian cooperation are:

- The Research Council's Programme on Russia and the High North/Arctic (NORRUSS);
- The Norwegian University Center in St. Petersburg;
- Cooperation on project funding between the Research Council and the Russian Foundation for Basic Research, as well as the Russian Foundation for Humanities, based on bilateral agreements;
- Institutional cooperation between universities in Norway and Russia;
- The UTFORSK Partnership Programme, which links higher education and research in international collaboration;
- Funding for institutional cooperation on research.

The EU Framework Programme for Research and Innovation (Horizon 2020) is also an arena for Norwegian-Russian cooperation. The ERA.Net RUS Plus initiative and the Strategic Forum for International Science and Technology's (SFIC) Working Group on Russia have been especially important arenas.

2. Brief description of Russia's research policy and R&D system

Russia is undergoing a protracted transition process from the old Russia and the Soviet social system to a future political system that is not yet fully defined. The crisis in and around Ukraine highlights the Kremlin's dualistic approach to the Federation's problems: We see a partial regression to a nostalgic Russian nationalism, which includes a desire to regain the country's strong international position. At the same time, extensive efforts are being made to develop a more market-oriented economic system – which is dependent on open borders and mutual contact with other countries. Russia's behaviour in the Ukraine crisis in the spring/summer of 2014 is not in conformity with full participation in the international exchange of political ideas and of material and intellectual

goods. Nor does it achieve the expressed objective of modernising Russian society.

With 143 million inhabitants, vast natural resources, status as the world's second largest nuclear power and continued high aspirations to exercise leadership in the region that previously comprised the Soviet Union, Russia remains a major power in a European and global context today. To maintain its economic and political competitiveness in a globalised world, Russia must be a leader in research and development and seek out research cooperation with other countries.

Russia has longstanding traditions in science and education, as well as many centres of excellence in research. The country has an outstanding reputation internationally in critical scientific areas such as aviation and space travel, nuclear science and technology, and advanced software.

Activities related to science, technology and innovation have traditionally been, and are still, performed within the Russian Academy of Sciences' (RAS) network of research institutes and their affiliated branches, which are organised under various ministries. Science, technology and innovation are thus concentrated in larger enterprises, especially within resource-based industries. The universities have been responsible for higher education.

The former Soviet Union had a well-developed system of public science and technology institutes. Following the dissolution of the Soviet Union in 1991, Russia experienced a dramatic decline in Gross Domestic Expenditure on Research and Development (GERD) from about 2 per cent to a low of 0.74 per cent in 1992.

During the transition period in the 1990s, Russia experienced an economic collapse that caused serious problems for the science and technology sector, resulting in a significant decline in state financing, salary reductions for scientific personnel and engineers, and *de facto* stagnation in research and innovation[1]. From 1995 to 2009, the number of scientific personnel declined from 519 000 to 369 000[2]. This affected performance within science and technology.

In 2007, the use of research funding in Russia rose almost to the level in 1991. In 2009, however, the country was hit by the financial crisis, resulting in budget cuts within research and innovation[3]. In 2010, Russia's total Gross Domestic Expenditure on Research and Development (GERD) came to 1.16 percent, compared to Norway's 1.69 per cent[4].

The federal budget and funding of research and innovation

The Russian Ministry of Education and Science was established in 2004, when the Ministry of Industry, Science and Technologies was merged with the Ministry of Education to achieve better coordination. The Ministry of Education and Science is responsible for federal policy and prepares draft legislation related to education, research and innovation, nanotechnology and intellectual property rights (IPR).

The Ministry of Education and Science and the Ministry of Economic Development are the ministries that administer the most funding for research and innovation. The Ministry of Education and Science administers the Federal Targeted Programmes within Science and Technology and allocates funding via public competitive tendering (e.g. through the National Research University Programme). The ministry also administers the state university budgets, including the research and innovation budgets.

The ministries that allocate funding to research and innovation are the Ministry of Defence, the Ministry of Industry and Trade, the Ministry of Information Technologies and Communication, the Ministry of Health and the Ministry of Agriculture.

In 2012, the overall national budget framework for science and technology was NOK 89 billion, roughly three times Norway's national research budget[5]. According to ERAWATCH Platform on Research and Innovation policies and systems, the Russian Academy of Sciences had an overall budget framework corresponding to NOK 11 billion in 2010.

This funding has not been previously based on priorities or performance within research and innovation. An element of competition has increasingly been introduced into the funding process. The two main recipients of budget allocations are the Russian Academy of Sciences and the Russian Federal Space Agency.[6]

The share of public research funded by industry is slightly above the OECD average, but the relative number of patent applications submitted by universities and public laboratories is on a par with the weakest OECD countries. However, 22 per cent of PCT patent applications are produced through international collaboration, which is close to the OECD average[7].

At the end of 2008, investment in innovation was considered by the business sector to be more risky and less profitable than investment in mining and quarrying activities. The government has put innovation-oriented research on the agenda in order to diversify the Russian economy beyond primary goods production.

Development and coordination of governmental policy

The science and technology sector is undergoing reform. The government's High Technology and Innovation Commission, and the President's Commission for Modernisation and Technological Development of Russia's Economy have become important political decision-making bodies with the authority to draw up guidelines and coordinate factors related to research and innovation policy[8].

In September 2013, a bill to reform the Russian Academy of Sciences (RAS) was approved by the upper house of Russia's federal assembly and signed into law by President Vladimir Putin, thus entering into force. The main provisions of the law transferred the management of most academic property to the new Federal Agency for Scientific Organisations (FANO) and

merged three academies that previously focused primarily on general science, medicine and agriculture. The research-performing sections have been transferred from the RAS to the FASO, which has been charged with managing the properties that have been organised under the RAS and issuing public funding announcements.

As a result of the reforms, institutions under the RAS must compete for research funding based on grant proposals submitted to the new research foundations. It is still too early to say how the individual institutes and branches under the RAS will structure their activities.

The universities have traditionally been responsible for education, and education alone. Research has not been a part of their activities. This is now changing. Federal legislation on the integration of research and education (2007) aims to boost research and technology activities at the higher education institutions and establish closer ties between the educational and research institutions[9]. Since 2009, universities have been able to participate in competitions to be selected by the government as "national research universities" for a 10-year period. These national research universities are to link research and education. The outcome of the competition is published by the Ministry of Education and Science, and the "winners" may be of interest as partners for Norwegian universities and research institutions.

Federal innovation policy is focused on measures to 1) dismantle administrative barriers and improve framework conditions (including taxation and customs regimes) to stimulate innovation and 2) require large, state-owned enterprises to formulate and implement innovation development strategies (a process introduced as part of the Innovation Enforcement Initiative in 2011–2012)[10].

Government measures include:

- The establishment of basic research programmes and state programmes for science and technology from now until 2020;
- Reforms within the educational sector, development of federal universities, national research universities, closures and mergers of research and educational institutions, and development of cooperation with private enterprises;
- Selection of five universities to become among the top 100 in the world (international ranking) by 2020;
- Innovation development programmes in state-owned enterprises;
- The establishment of technology platforms and local innovation clusters;
- Mapping of the national research and innovation sector, followed by a reorganisation of the sector (centres of excellence in research).

Federal strategy for the development of research and innovation 2014–2020

In 2013, the Russian Government approved the Federal Targeted Programme on research and development in

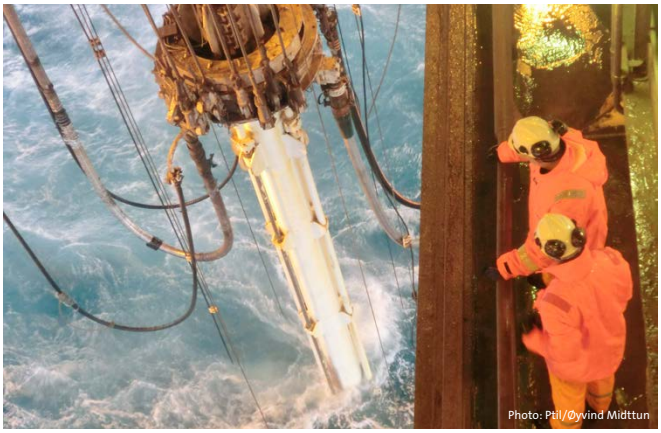


Photo: Ptil/Øyvind Midttun

prioritised areas of science and technology in Russia for the period 2014–2020[11]. The programme has a budget framework corresponding to NOK 2.8 billion and includes a gradual increase to NOK 4.4 billion by 2020[12].

This is one of the government's instruments used to implement the Strategy for Innovative Development of the Russian Federation 2020. The research and innovation sector is to become a key driving force in the modernisation of the economy, including priority technology areas and inter-sector science and technology infrastructure[13]. The aim is to develop an innovation-based economy within the context of globalisation, open up the Russian economy and integrate it in the global value chain at all levels[14]. Special importance is attached to international research cooperation.

A number of federal laws have been passed with the aim of expanding cooperation between science, education and industry. The purpose of the laws is to encourage spin-offs across universities and research institutes, provide co-funding of research cooperation between companies and universities, and support the development of the universities' innovation infrastructure. The Technology Platforms Initiative (2011) seeks to encourage companies, research institutes, universities and experimental design bureaus to exchange knowledge and establish consortiums prior to entering into competition for funding[15]. The implementation of institutional changes is also a formidable challenge.

The objective of the federal law on the integration of science and education (2007) is to strengthen research and innovation at higher education institutions and to establish closer ties between higher education institutions and research institutions[16].

A presidential decree in 2011 (nr. 899, 7) gave priority to the following areas: security and the fight against terrorism; nanotechnology; ICT systems; life sciences; weapons, military and special technology; resource extraction; transport and aviation systems; and energy efficiency, energy saving and atomic energy.

The Russian Strategy for Development of the Arctic up to 2020 was approved by President Medvedev in 2008. Research and innovation was stipulated as one of the objectives, in addition


Photo: Beautiful Norway disc

to sustainable development of the Arctic[17]. In 2013, President Putin approved the Strategy for the Development of the Arctic Zone of the Russian Federation and National Security up to 2020[18]. The objective is to safeguard the national interests of Russia in the Arctic zone.

Russia has established the following priorities for the Arctic region: regional economic development in the region, development of research and technology, expansion of the modern ICT infrastructure, ecological security, international cooperation in the Arctic, and military security. Top priority is given to energy security and sustainability in the energy sector in a long-term perspective.

Research and innovation organisations of relevance for cooperation with Norway

The Russian Academy of Sciences (RAS) is Russia's largest research organisation with science centres and institutes in all fields located throughout the entire country. Basic research has traditionally been given high priority, but applied research has taken on greater importance due to international cooperation and increased user needs. The Russian authorities have identified certain geographic areas as strategically important. Viewed in relation to Norway, it is interesting that the Arctic is one such area. Russian land and sea areas that are adjacent to Arctic waters are both on the Russian political and research agendas. The institutions under the RAS encompass scientific disciplines in mathematics, physical science, energy, machine building, mechanics and process management, nanotechnology and ICT, chemistry and material sciences, biology, geosciences, social sciences, history and philosophy. In 2013, the Russian Academy of Medical Sciences was placed under the RAS, and is responsible for clinical medicine, medical biology, and preventive medicine.

The Russian Foundation for Basic Research (RFBR) was established in 1992 in order to support basic research in all scientific fields and disciplines. It is an autonomous, non-commercial government organisation under the jurisdiction of the Government of the Russian Federation. The RFBR administers a fixed share equalling about six per cent of the federal budget allocations for basic research and technological development. The institution allocates funding on a competitive basis, and supports research projects and mobility programmes for young scientists. The RFBR cooperates with more than 25 countries, and provides funding for basic research in the following fields: mathematics, mechanics, and information sciences; physical science and astronomy; chemistry; biology and medicine; geosciences; humanities and social sciences; engineering science; and computing systems.

The Russian Foundation for Humanities (RFH) was established in 1994. The RFH supports research on the basis of open funding announcements in all fields of social sciences and humanities, and provides funding for research projects, publications, seminars and conferences. Funding is targeted towards public and private research organisations in Russia. The RHF funds research in the following fields: history, archaeology, ethnography, economics, philosophy, sociology, comparative politics, law, philology, art, psychology, pedagogics, public health, global challenges and international relations.

The Russian Science Foundation (RSF) was established in 2013. The RSF will provide funding for large-scale programmes in strategically important sectors. Establishment of Centres of Excellence in key focus areas is of particular interest. The RSF will issue open funding announcements for basic and applied research projects with partial funding from targeted national programmes that previously were administered by the Ministry of Education and Science.

FANO (Federal Agency of Scientific Organisations) was established as part of the restructuring of the RAS. Properties and companies under the RAS have been transferred to FANO, as well as to the Russian Academy of Medical Sciences and the Russian Academy of Agricultural Sciences.

The Foundation for Assistance to Small Innovative Enterprises (FASIE) was established in 1994. It is a non-commercial, state-funded organisation established by the Government of the Russian Federation The Foundation is based in Moscow and has offices in 27 regions. One of its objectives is to implement state policy aimed at developing and supporting small, innovative enterprises through regional funding announcements. Cooperation with this organisation should be considered.

The Federal Space Agency (Roscosmos) is responsible for international cooperation and joint projects and programmes in space research, as well as for research and innovation related to military rocket and space installations. Roscosmos reports directly to the government and receives substantial funding. It administers the Federal Space Programme, which is the main funding programme for the space sector.

The State Corporation for Nuclear Energy (Rosatom) comprises about 250 enterprises and research and innovation organisations, including all civilian enterprises within the Russian nuclear energy sector, enterprises within the nuclear

defence sector, research and innovation organisations, and the world's only fleet of nuclear-powered icebreakers. Rosatom operates the largest power company in Russia, which provides over 40 per cent of the electricity to the European part of Russia.

3. Russia's strengths and weaknesses within research and innovation, and the country's international standing

Russia scores low on the citation index. At the same time, Russian scientists are leaders in many research fields. This may be partly explained by the fact that researchers have traditionally received credit for publishing their results in Russian-language journals, which has made their findings less accessible to the international research community. Russian authorities have focused attention on this problem, and now Russian researchers will also be assessed on the basis of their international publications.

The Russian Academy of Sciences comprises 75 000 scientists, of which 15 per cent are over age 70 and one in three are above 60 years old. From 1994 to 2010, the average age of scientists with a Ph.D. rose from 58 to 62 years old[19]. The research and innovation sector is facing a serious recruitment problem.

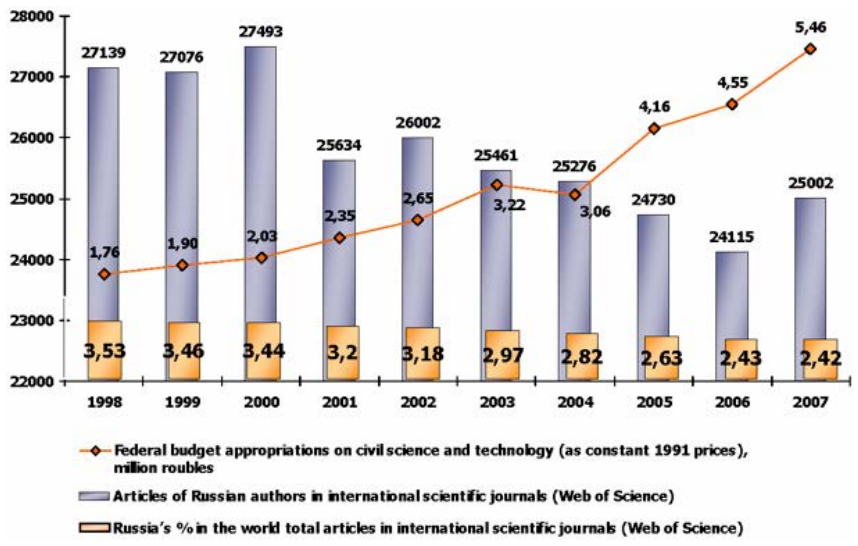
Russia improved its scientific performance and was ranked ninth on a world basis in 2007, but fell to 14th place in 2010[20]. That same year, the country ranked 22nd on the citation index. Except for the total number of researchers, all major performance indicators related to international publications and international patents show a gradual decline in recent years[21]. The research system is encountering challenges as it tries to become more internationally competitive. From 1998 to 2007, Russia's share of the world's overall article production sank from 3.5 per cent to 2.4 per cent[22].

Strengths:

- As much as 22 per cent of the PCT patent applications are the product of international collaboration, which is just below the OECD average.
- The tertiary attainment rate is 54 per cent, which is very high.
- Russia's revealed technological advantage (RTA) is close to the OECD average, with marked increases in nano-technologies in recent years[23].
- Public funding for research and innovation is on the rise, and innovation policy is a public policy priority.
- New policy tools have been implemented (tax incentives, innovation infrastructure, spin-offs at universities and science, technology and innovation institutes, grants to attract leading scholars).
- Policy instruments that support the best research environments, national research centres and research universities have been introduced, and new actors such as state-owned companies and leading universities have become involved in research[24].

Weaknesses

- International technology companies and innovators lack trust in the rule of law and the potential to protect their own investments. This diminishes interest with regard to innovation-intensive industries.
- Only 31 per cent of scientific articles are produced with international co-authorship.
- The increasing age of researchers and engineers raises concerns regarding the future research and innovation capacity.
- Innovation and modernisation are not always accompanied by political will, and state policy is not easily coordinated, which often is wrongly perceived as general incompetence.
- The legal status of proprietary rights[25].
- Corruption is a widespread problem that permeates all of Russian society.



RESULTS OF R&D INVESTMENTS

HSE, Science Indicators, 2009; Science in Russia, Moscow, 2005

4. Current cooperation with Russia

Multilateral cooperation
Russia is among the EU's most important international partners in the area of R&D. Cooperation is based on an agreement between the EU and Russia, which was renewed in 2014. Successful measures for multilateral cooperation have been implemented, such as through the ERA.Net RUS initiative. The EU-Russia Year of Science was launched in November 2013.

Under the Fifth, Sixth and Seventh EU Framework Programmes, Russia had the highest scores among non-associated, third-country partners taking part in the framework programmes for research, in terms of both the total number of participants and the total financial contribution from the EU. In the Seventh Framework Programme for Research and Development, Russia had the highest level of participation of all the third countries (those that are not member states or associated countries).

Russia's most important partner in research and technology – not only with regard to the EU, but overall – is Germany. The country's second most important partner is France.

A cooperation agreement on research and development between Russia and the European Commission was first signed in 1999, and has been renewed a number of times. Russia gives priority to research and innovation cooperation with the EU member states and associated countries under the EU Framework Programme, and has participated in several joint funding announcements with the EU[26].

Russia is the most important third country taking part in the EU Framework Programme. In terms of cooperation with Norway under the EU's programmes, this is where we find the highest number of projects funded, a total of 65, which comprises 27 per cent of the applicant pool for Norwegian-Russian projects.

The new EU Framework Programme, Horizon 2020, allows participation by Russian researchers, but this must be funded by Russian sources. Bilateral projects may serve as a springboard to EU funding.

Bilateral cooperation
The bibliometric analysis (2014) shows that Russia is most specialised in Arctic and Antarctic research, and it is in this area that Russia has the highest cooperation rate with Norway. In spite of this, Russia's citation rate is below average in all areas. Russia is strong in the field of maritime research. Nanotechnology and new materials is the second largest field after health care. However, Russia scores low on scientific impact. Marine research and freshwater biology are important areas. Russia cooperates extensively with Norway on Arctic and Antarctic research, marine research and freshwater biology, and climate change[27].


Photo: Jon Aars/Norwegian Polar Institute.

Climate and polar research
Norway gives high priority to cooperation with Russian researchers in the field of polar research, especially with regard to the Arctic. Both countries have a particular interest in Svalbard. The Research Council of Norway has three instruments that can help to strengthen cooperation between Norwegian and Russian researchers in Svalbard. The Research Council is participating in and spearheading the establishment of the Svalbard Integrated Arctic Earth Observing System (SIOS) with funding from the EU. SIOS is an international project to upgrade and coordinate research infrastructure in Svalbard and adjacent maritime areas. The objective is to strengthen the position of Svalbard as an international arena for climate and environmental research. The Barentsburg Science Centre, run by the Arctic and Antarctic Research Institute (AARI), participates as an observer in the Svalbard Science Forum (SSF), which is funded by the Research Council. The SSF is responsible for coordination and information activities in Svalbard. In addition, the Polar Research Programme (POLARPROG) has seed funding available for research that enhances research cooperation as well as for data sharing.

Three Russian institutions participate in the research activity in Svalbard: 1) the Russian Academy of Sciences (RAS) with six institutes, 2) the Russian Federal Services for Hydrometeorology and Environmental Monitoring (Roshydromet) with two institutes: the Arctic and Antarctic Research Institute (AARI) and the Barentsburg Hydrometeorological Observatory, and 3) the Russian Ministry of Natural Resources and Ecology through the Polar Marine Geological Research Expedition . The most important areas of research are geophysics (the upper polar atmosphere), meteorology, seismology, geology and biology. The Russian Research Centre (RRC) is currently being established in Barentsburg in order to develop a joint infrastructure for monitoring natural processes and the environment in Svalbard and the bordering ocean areas. The centre will also coordinate research programmes carried out by Russian institutions.

Nuclear physics and space research
Since 1991, researchers from Norway (the Norwegian Radiation Protection Authority, the Norwegian University of Life Sciences) and Russia have engaged in close cooperation related

to radioactive contamination in the northern areas, with expeditions to dumping sites in the Kara Sea, most recently in 2012, and fieldwork at nuclear sites at the Kola Peninsula and the Mayak Production Association in the Ural Mountains. Fieldwork has also been performed in the Ob and Yenisei Rivers, as large Russian nuclear facilities are located in their draining areas. The research focuses on previous, current and potential future sources of radioactive contamination of the environment. To assess the long-term environmental impact of contamination, the research is generating information about ecosystem transfer, biological uptake, and the effects on humans and the environment as well as the amount of contamination that has been spread. The research is being funded as part of the Norwegian Action Plan for Nuclear Safety, and is also being conducted under the auspices of the Centre for Environmental Radioactivity at the Norwegian University of Life Sciences with funding from the Research Council of Norway.

Space research

Norwegian research cooperation with the Russian Federal Space Agency (Roscosmos) is conducted primarily via the close cooperation between the European Space Agency (ESA) and Russia. An agreement has been signed between the ESA and Roscosmos on the ExoMars Programme.

Russian and Norwegian researchers (the Nansen Environmental and Remote Sensing Center) cooperate on the use of satellite-based remote sensing to study ocean currents, ice cover and the impact of climate change in the northern areas. Studies are being conducted on the upper polar atmosphere and the Northern Lights (aurora borealis) over North Norway and Svalbard. Russian researchers buy observation time at EISCAT's radar installations in North Norway and Svalbard. The University of Oslo and the Institute for Energy Technology cooperate with Russian partners on projects in the field of physics.

Marine environment

Over 50 years of cooperation in this field lies at the foundation of the countries' joint fisheries resources management. The Norwegian Institute of Marine Research cooperates with the Knipovich Polar Research Institute of Marine Fisheries and Oceanography (PINRO) in Murmansk, the Russian Federal Research Institute of Fisheries and Oceanography (VNIRO) in Moscow, the Northern Branch of PINRO (SevPINRO) in Arkhangelsk, and the Pacific Ocean Branch of PINRO in Vladivostok. The Joint Norwegian-Russian Fisheries Commission has been in existence for 30 years, and bases its decision on this scientific cooperation.

Photo: Shutterstock

Petroleum research

Cooperation began in 2005 with a joint workshop in Moscow, and was followed by annual meetings in Norway and Russia for networking purposes. The driving force in Norway has been the Programme on the Optimal Management of Petroleum Resources (PETROMAKS), which collaborates with the Oil and Gas Research Institute (OGRI RAS) under the Russian Academy of Sciences. The focus is on petroleum research, including research on the environment, geoscience, and technology for field development in Arctic areas. The PETROMAKS 2 programme is continuing this effort, and cooperative activities have been extended to incorporate the Arkhangelsk Scientific Centre of the Russian Academy of Sciences. Several Norwegian universities cooperate with the Gubkin Russian State University of Oil and Gas in Moscow. The Programme on Social Science Research related to the Petroleum Sector (PETROSAM 2) encompasses research on Russia.

Social science research

Social science research on Russia has been developed through the Programme on Russia and the High North/Arctic (NORRUSS), which has helped to strengthen Norwegian research in this field. Both internal economic and political developments in Russia and Russia's relations with the outside world will continue to be important topics in the years ahead. Consideration should be given to expanding the research activity to include comparative studies across countries and to linking research within theoretical and methodological subject areas. The NORRUSS programme has coordinated joint funding announcements with the Russian Foundation for Humanities (RFH) and the Russian Foundation for Basic Research (RFBR). Research on linguistics and the Russian language is conducted primarily at UiT – The Arctic University of Norway, the University of Oslo, and the University of Bergen.

Public health and environmental health research

The Norwegian Institute of Public Health cooperates with Russian partners in the health sector via the Cooperation Programme for Health and Related Social Issues in the Barents Euro-Arctic Region and the Northern Dimension Partnership in Public Health and Social Well-being (NDPHS), and through the bilateral cooperation programme funded by the countries' health ministries which supports cooperation and exchange of research-based knowledge. Focus has been placed on developing bilateral programmes and measures within the framework of a strategy for global non-communicable diseases. This includes the global strategy for reducing the harmful use of alcohol, development of an action plan for global mental health, and the Millennium Development Goals targeted especially at reproductive health and children's

health, control of infectious diseases and the post-2015 agenda. As a general rule, the Cooperation Programme for Health and Related Social Issues in the Barents Euro-Arctic Region does not allocate research funding, and the Norwegian Institute of Public Health has provided its own funding for the cooperative activities. The NDPHS also includes work-related health issues.

UiT – The Arctic University of Norway cooperates with the Northern State Medical University in Arkhangelsk and the St. Petersburg I.I. Mechnikov State Medical Academy on the effects of pollution on indigenous peoples and their health in Arctic regions.

Nanotechnology
There is some cooperation within this field under the EU Framework Programme and the ERA.Net RUS initiative. In 2007, Russia prepared a strategy for developing a nanotechnology industry, and in 2009 the country was the second largest public funder of nanotechnology-related activities.

Since the 1990s, institutional cooperation has gradually developed between Norwegian and Russian universities, and over time has come to cover a broad range of subject areas. The extensive contact between UiT – The Arctic University of Norway and the Northern (Arctic) Federal University in Arkhangelsk, and the relationship between the University of Nordland and the Baltic State Technical University in Saint Petersburg have been critical in this regard. The University of Stavanger has established long-term cooperation with the Gubkin Russian State University of Oil and Gas in Moscow and Saint Petersburg State University. The University of Oslo has signed a cooperation agreement with Moscow State University.

5. Grounds for considering cooperation with Russia

The Research Council of Norway's Strategy for International Cooperation 2010–2020 identifies five main objectives for increasing international cooperation:

- help to address global challenges to society;
- enhance the quality and capacity of Norwegian research;
- secure Norway access to international knowledge production;
- boost the competitiveness of Norwegian trade and industry;
- promote Norway as a leading research and innovation nation in selected research areas.

The Norwegian Government launched its High North Strategy in 2006, and followed this up with the report entitled New Building Blocks in the North. The Next Step in the Government's High North Strategy in 2009. In the white paper The High North (Meld. St. 7 (2011–2012)), the Government presented a cohesive, long-term Norwegian policy for addressing the challenges and opportunities inherent in the northern areas.

The Research Council of Norway's Research Strategy for the Arctic and Northern Areas was first drawn up in 2006 and then revised in 2011. The strategy states: "The Arctic and northern areas are of great strategic importance both globally and to Norway. There is an increasing need for research and new knowledge to ensure the sustainable management of the area's abundant natural resources and to respond to the challenges and opportunities arising from climate change and a new political framework." The framework for Norwegian activity in the Barents Sea is set out in the integrated management plan for the Barents Sea and the ocean areas around Lofoten. As Norway and Russia share sovereignty of the Barents Sea, the management plan also establishes the framework for Norway's cooperation with Russia on the marine environment under the auspices of the Joint Norwegian-Russian Commission on Environmental Protection and the Joint Norwegian-Russian Fisheries Commission. Under the direction of the Joint Norwegian-Russian Commission on Environmental Protection, the two commissions are working to establish a basis for cooperation between the two countries to achieve integrated management of the ocean areas.

Norway and Russia have been cooperating for many years on petroleum activity, which is clearly seen in the dialogue on energy between the two countries. The signing of the treaty concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean in 2010 laid the foundation for increased cooperation on natural resource and environmental mapping. In 2011, the Norwegian Ministry of Petroleum and Energy and the Russian Ministry of Natural Resources and Environment signed a Memorandum of Understanding, which formed the basis for further dialogue and cooperation.

Norwegian-Russian cooperation on trade and industry is overseen by the Norwegian-Russian Working Group for Regional and Cross Border Cooperation of the Norwegian-Russian Intergovernmental Commission on Economic, Industrial and Scientific-Technical Cooperation, which is concerned with maritime transport, marine bioprospecting and cross-border cooperation. The Norwegian Government focuses in particular on industry-based research.

The greatest potential for **cooperation in trade and industry** is probably in the seafood industry. The energy dialogue also creates opportunities outside of the Barents Sea related to oil and gas projects in Arctic areas, the Jamal region and the Russian Far East. Norway has developed cooperation on innovation with Russia to only a limited degree, mostly in the area of petroleum research. The Research Council is considering developing cooperation with Russia within EUREKA. Russia has been a member of EUREKA since 1993, but has had a low level of participation. Russia is not a member of Eurostars, which is a funding instrument co-funded by EUREKA's members and the EU.

There is a basis for cooperation on health care within the framework of the cooperation programme between the health and care ministries in both countries, which is followed up by

the fourth cooperation programme under the Barents Cooperation for the period 2012–2015. Relevant Russian institutions in this regard are the Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor) and the Federal Biomedical Agency (FMBA).

Bilateral cooperation can *enhance the quality and increase the capacity of Norwegian research*, and give Norway better *access to international knowledge production*. Knowledge is the primary objective of the government's white paper The High North (Meld. St. 7 (2011–2012)) and the Research Council's Research Strategy for the Arctic and Northern Areas. Current bilateral research cooperation with Russia functions well and generates added value. Both countries have mutual interest in cooperation. The Russian research community has a high level of expertise, and the Russian research foundations are flexible, effective partners. This will form a sound basis for submitting joint grant proposals under Horizon 2020. The Norwegian Government seeks to promote increased internationalisation of research through participation in Horizon 2020. The success rate for joint Norwegian-Russian projects under FP7 has been high and offers the potential to develop multilateral cooperation within Horizon 2020. Grant proposals have been approved in areas such as the environment (including climate change), research infrastructure, space research, transport (including aviation), economics and the humanities. Other areas include food; agriculture and fisheries; biotechnology; nano, materials and production technology; and energy.

6. Current priorities for Norway's activities vis-à-vis Russia

- The Norwegian Government's white paper on research, Long-term perspectives – knowledge provides opportunity (Meld. St. 18 (2012–2013)) identifies Russia as a priority country;
- The Norwegian Government's white paper The High North (Meld. St. 7 (2011–2012));
- The Research Council of Norway's Research Strategy for the Arctic and Northern Areas, revised 2011;
- The Research Council of Norway's Strategy for International Cooperation 2010–2020;
- A bilateral, intergovernmental agreement is planned to replace the state agreement which expired in 2008. This agreement may be a key instrument for strengthening research cooperation with Russia.
- Bilateral research agreements with:
  - The Russian Academy of Sciences (RAS)
  - The Russian Foundation for Basic Research (RFBR)
  - The Russian Foundation for Humanities (RFH)
- The geographically oriented Programme on Russia and the High North/Arctic (NORRUSS);
- Other programmes involving Russia as an important partner: the Polar Research Programme (POLARPROG), the Programme on the Optimal Management of Petroleum Resources (PETROMAKS 2), the Programme on Social Science Research related to the Petroleum Sector (PETROSAM 2), the Large-scale Programme on Climate Research (KLIMAFORSK), the Programme on the Oceans and Coastal Areas (HAVKYST);
- The Norwegian University Center in St. Petersburg, funded by five Norwegian universities.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7. Follow-up and implications

Introduction

The bibliometric analysis (Science-Metrix 2014) shows that Russia is most specialised in Arctic and Antarctic research, and it is in this area that Russia has the highest cooperation rate with Norway. In spite of this, Russia's citation rate is below average in all areas. Russia is strong in the field of maritime research. Nanotechnology and new materials is the second largest field after health care. However, Russia scores low on scientific impact. Marine research and freshwater biology are important areas. Russia cooperates extensively with Norway on Arctic and Antarctic research, marine research and freshwater biology, and climate change.

One reason for Russia's low score on the citation index may be that Russian researchers have traditionally published their results in the Russian language in Soviet/Russian journals. As a result, these publications are not very accessible to the international research community, which cites very few Russian research results. Russian authorities are aware of this problem, and they support the use of international publications as a basis for evaluating scientific performance.

Relevant research areas for cooperation

Climate and polar research

Norway gives high priority to cooperation with Russian researchers in the field of polar research, especially with regard to the Arctic. Svalbard serves as a research platform for both countries, and as such has a special position. The Research Council is participating in and spearheading the establishment of the Svalbard Integrated Arctic Earth Observing System (SIOS) with funding from the EU. The Barentsburg Science Centre, run by the Arctic and Antarctic Research Institute (AARI), participates as an observer in the Svalbard Science Forum (SSF), which is funded by the Research Council.

The most important areas of research are geophysics (the upper polar atmosphere), meteorology, seismology, geology and biology. The Russian Research Centre (RRC) is currently being established in Barentsburg in order to develop a joint infrastructure for monitoring natural processes and the

environment in Svalbard and its adjacent ocean areas. The centre will also coordinate research programmes carried out by Russian institutions.

Research cooperation should be strengthened, also with regard to facilitating access to infrastructure and data in Svalbard, where the SIOS and SFF comprise important instruments. With regard to the polar Arctic, climate and environmental research should in general be prioritised. Future research may also encompass forests (the carbon cycle), permafrost and the cryosphere with some sub-fields (the impact of climate change, ocean circulation, and adaptation to climate change, as well as international negotiations and measures for reducing pollution).

Marine research

Cooperation on marine research has been ongoing for more than 50 years and provides an important foundation for the countries' joint fisheries resources management. The Joint Norwegian-Russian Fisheries Commission has been in existence for 40 years, and has based its decisions on precisely this research cooperation. Future cooperation should encompass fisheries, resource management, understanding of marine ecosystems and the environment (including the marine bio- and geosphere in central and northern parts of the Barents Sea) and ways in which these are affected by human-induced stressors such as the ecological effects of climate change, pollution of the oceans, pollutants and changes in habitat.

Petroleum research

Norway and Russia have cooperated on petroleum activities for many years, which is evident in the energy dialogue between the countries. The treaty concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean, which was signed by the two countries in 2010, paved the way for increased cooperation on natural resources and environmental mapping. The Norwegian Ministry of Petroleum and Energy and the Russian Ministry of Natural Resources and Environment signed a Memorandum of Understanding in 2011, which laid the foundation for further dialogue and cooperation. The research fields encompassed are petroleum research, including the environment, geoscience and technology for field development in Arctic areas.

Social science and humanities research

Russia has no tradition of social science research. The Communist regime in the former Soviet Union was not open to social criticism, and Marxist philosophy dominated research in this field. Monopoly structures are still in place that are affecting the political and economic transition from a centralised, planned economy to a liberalised, market economy, and the country faces numerous challenges on the path towards becoming a modern, well-functioning society in which research and development are regarded as important driving forces. Future cooperation should encompass the development of the welfare model, drawing on experience gained through research on the Nordic welfare model, and it should include Nordic, European and Russian partners. Cooperation should be established between researchers within traditional social science research and research on Russia. Social science research on the internal economic and political developments in Russia, as well as on Russian relations with the outside world, will continue to be important in the coming years. The Programme on Russia and the High North/Arctic (NORRUSS) has helped to develop and strengthen Norwegian research in the field. Further research cooperation may be expanded to include comparative studies in the Arctic.

Linguistics and language research that encompasses the Russian language should be strengthened. Language is critical for communication and contact between the societies.

Health and health technology

Cooperation may be relevant in research on the harmful health effects of exposure to nanoparticles and research on synthetic nanomaterials and industrial products that may generate new, long-lasting pollution.

Russian authorities have launched reforms of the health care sector, and have expressed an interest in the Norwegian welfare model. Innovation in the production of processes and services is just as relevant as innovation of products and technology. Making public services more accessible reduces the level of corruption and enhances transparency.

Public health and research on environmental impacts

The cooperation programme approved by Russian and Norwegian health authorities provides a basis for developing research cooperation between the two countries. This has been followed up by a fourth cooperation programme on health and related social issues within the Barents Cooperation, which runs from 2012 to 2015.

Nuclear physics

Since 1991, the Norwegian Radiation Protection Authority and the Norwegian University of Life Sciences have cooperate closely with Russian researchers on radioactive contamination in the northern ocean areas. Norwegian research in this area is funded under the Norwegian Action Plan for Nuclear Safety, and is conducted within the framework of the Centre for Environmental Radioactivity (CERAD), a Centre of Excellence funded by the Research Council of Norway.

Space research

Norwegian research cooperation with the Russian Federal Space Agency (Roscosmos) is conducted primarily via the cooperation between the European Space Agency (ESA) and Russia. An agreement has been signed between the ESA and Roscosmos on the ExoMars Programme. Russian and Norwegian researchers (the Nansen Environmental and Remote Sensing Center) cooperate on the use of satellite-based remote sensing to study ocean currents, ice cover and the impact of climate change in the northern areas. Studies are being conducted on the upper polar atmosphere and the Northern Lights (aurora borealis) over North Norway and Svalbard. Russia researchers buy observation time at EISCAT's radar installations

in North Norway and in Svalbard. The University of Oslo and the Institute for Energy Technology cooperate with Russian partners on projects in the field of physics.

Nanotechnology
Some cooperation has been established through ERA.Net RUS projects. Russia has identified nanotechnology as a priority area.

Innovation, industrial development and commercialisation of R&D
The most important areas of research for Norwegian trade and industry are health technology, aquaculture, maritime technology and petroleum.

Aquaculture and marine technology
Norwegian seafood exports to Russia are limited at present due to restrictive measures as well as to various procedures and requirements regarding food safety documentation. This notwithstanding, there is a large potential market for Norwegian technology related to aquaculture that is adapted to extreme climatic and geographic conditions and for equipment, design and services related to renewal of the Russian fishing fleet.

Petroleum
Future cooperation should be based on the established priorities as described in OG21 - Oil and Gas in the 21st Century, Norway´s Technology Strategy for the 21st Century. The priority areas are the external environment, geoscience, and technology for field development in a cold climate. Cooperation should also include social science research that is relevant for petroleum activity in the northern areas.

Funding instruments

National research funding and joint funding announcements with Russian research-funding institutions
The most important instrument for joint funding of research is cooperation with Russian research-funding institutions. The Research Council of Norway signed an agreement with the Russian Foundation for Basic Research (RFBR) in 2011 and has been issuing joint funding announcements since 2012. The Research Council also signed an agreement with the Russian Foundation for Humanities (RFH) in 2012 and issued its first joint funding announcement in 2013. With more federal funding, these institutions will be excellent instruments for further research cooperation.

Cooperation of this nature may be developed with other, similar research-funding institutions in Russia, such as the Foundation for Assistance to Small Innovative Enterprises (FASIE). The Russian Science Foundation (RSF), established in 2013, and FANO may also be considered as potential partners for the Research Council of Norway.

EU cooperation
The EU Framework Programme, Horizon 2020, will be a key instrument for promoting Norwegian-Russian research in a broader European context. Norwegian actors will be encouraged to explore the opportunities available there with regard to thematic area, access to other/new partners, and not least, as a source of funding.

Bilateral agreements on institutional cooperation between universities in Norway and Russia
Institutional cooperation between Norway and Russia has been gradually developing since the 1990s, and provides an excellent basis for further cooperation.

The Norwegian University Center in St. Petersburg
The Norwegian University Center in St. Petersburg is funded by five Norwegian universities. The centre serves as an excellent meeting place for Norwegian and Russian researchers.

Research infrastructure
The Polar Research Programme (POLARPROG) has seed funding for the purpose of strengthening research cooperation and data sharing.

Strategic framework for international cooperation
The Strategic Forum for International Science and Technology's (SFIC) Working Group on Russia should be used actively to develop and strengthen research cooperation with Russia within a European framework.

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