OECD SCIENCE, TECHNOLOGY AND INDUSTRY OUTLOOK 2004
COUNTRY RESPONSE TO POLICY QUESTIONNAIRE

RUSSIA

1. General framework and trends in science, technology, and innovation policy

The guidelines of government S&T and innovation policy in 2002-03 were as follows:

- Improving priority support for R&D and specifying priority areas of S&T development.
- Improving mechanisms of the formation and implementation of federal goal-oriented programmes.
- Developing approaches to optimisation of the structure and contents of the government sector of R&D.
- Governmental support of science towns.
- Provision of mechanisms to combine financial support of research organisations and targeted financing of research projects.
- Formation of a list of the most important innovation projects and arrangement of tenders for conclusion of related state contracts.
- Improvement in the intellectual property legislation for ensuring technology transfer from the government R&D sector into industry and preparation of Russia's entry into the WTO.
- Acceptance and start of the implementation of "Basic Principles of the Russian Federation Policy in the Field of Development of Science and Technologies for the Period up to 2010 and Further Perspective", approved by the President of the Russian Federation.
- Incentives for development of the innovation infrastructure and small innovating enterprises at the federal and regional levels.

2. Public sector research and public research organisations

Major policy changes related to R&D performed by public sector organisations:

In 2002, more than 3,906 organisations in Russia were involved in R&D. In public ownership, there were 2,817 organisations, or 72.1% of the total amount. In comparison with 2002, their number decreased

by 121, or 4.1%. The share of the higher education sector equalled 13.6% of the total number of R&D-performing organisations.

During the last 4 years, since 1999, an annual growth of the federal budget R&D assignments has been recorded. In 2002, the federal assignments for civil R&D increased 1.74-fold compared to 2000, and 1.32-fold compared to 2001. Their GDP share rose from 0.29% in 2000 to 0.35% in 2002. At the same time, their share in the federal budget decreased from 2.05% to 1.80%, respectively.

The overall R&D funding in 2002 increased by 28.3% as compared to 2001. Its share in GDP increased from 1.16% in 2001 to 1.24% in 2002. Funding from government sources increased in 2002 as compared to 2000 by 6.7% – from 53.7% in 2000 to 57.3% in 2002. The share of higher education remained at a very low level – 5.4% in overall R&D funding in 2002.

In 2002, the share of basic research in the overall funding was equal to 14.6% (as against 13.4% in 2000), that of applied research – 15.9% (16.4% in 2000) and that of development activities – 69.4% (70.2% in 2000). This structure has been remaining rather stable during the last 3-4 years with an insignificant bias for the benefit of basic research in 2002.

Initiatives to reform public research organisations to improve the quality of their R&D and their ability to contribute to economic growth

The state's initiatives in the field of S&T development on such issues as particular volumes of support to scientific researches, distribution of budget funds, and targeted incentives for R&D and innovation activities were based on two fundamental documents approved by the President of the Russian Federation on 30 March 2002: 1) "Basic Principles of the Russian Federation Policy in the Field of Development of Science and Technologies for the Period up to 2010 and Further Perspective" and 2) a specified list of priority areas of science, technology, and engineering.

In 2003, the mechanism of correction of priority areas and critical technologies was being improved. In particular, it is supposed to reduce the list of critical technologies of the Russian Federation to 30-35 critical technologies (instead of 52).

For information provision of the policy in the field of priorities, the use of forecasting methods is being strengthened. In particular, a S&T foresight for a long-term prospect is being developed. Besides, a forecast of development of the S&T complex is developed, in which major indicators of S&T development in the Russian Federation for 2004 and for the period till 2006 are presented.

The basic tool of implementation of priority areas of science, technology and engineering consists in federal goal-oriented programmes. In 2002 and 2003, necessary specifications and amendments were introduced in active federal goal-oriented programmes *R&D in Priority Areas of S&T Development* for 2002-06, *Integration of Science and Higher Education of Russia for 2002-06*, and *National Technology Base* for 2002-06.

For increasing the efficiency of state purchases of S&T products, great attention was attached to improvement of the system of state contracts, in particular, mechanisms of the state order formation for S&T.

In 2002 and 2003, activities were carried out to assess the contents of the government sector of R&D and optimise its structure. To improve the government sector of R&D, proposals on its development had been introduced and considered by the Government Commission on Science and Innovation Policy in October 2003. The purposes, tasks, and the order of reforming the organisational structure of the government sector of R&D, as well as its basic segments, have been identified.

With the purpose of identifying ways of restructuring and increasing the efficiency of functioning of the national S&T complex, in 2002, an inventory of the S&T complex was conducted. Basing on it, a report on preliminary results of this action was prepared, including the register of R&D institutions. Basing on the regulation by the Government of the Russian Federation of 28 February 2003 № 252-r, activities to finalise the inventory of the S&T complex and specify the State Register of R&D institutions are continued.

In November 2003, the report on completing the S&T complex inventory, principal theses on optimisation of its structure and reduction of the number of inefficiently working R&D institutions, the above-mentioned State Register of R&D Institutions of the Russian Federation, as well as a draft regulation by the Government of the Russian Federation *On the State Register of R&D Institutions of the Russian Federation* and the draft Constitution of the State Register of R&D Institutions of the Russian Federation, were submitted to the Government of the Russian Federation.

Proposals on a reduction in the number of inefficiently working public R&D institutions are prepared in the following directions:

A change of the organisational and legal form of public R&D institutions (reorganisation of budget-funded institutions into other forms of public non-profit organisations) and transfer of institutions of federal executive authorities in double and triple subordination to the control by a single founder;

- Privatisation of public R&D institutions whose further preservation in public ownership is recognised inexpedient;
- Consolidation in the form of affiliation or merging of same-profile R&D institutions (irrespective of administrative subordination) in the framework of particular territories or areas of activity, as well as integration with higher education institutions or separation as branches in the structure of central organisations;
- Liquidation of organisations that completely have lost a scientific profile or have not sufficient personnel and other R&D resources.

The final result of restructuring should be a S&T complex optimally functioning under conditions of the contemporary economy and including development of both the public and private sectors.

Major policies to foster international collaboration in S&T

In the field of international S&T co-operation, the formation of the contractual and legal base of equal and mutually beneficial multilateral and bilateral S&T co-operation at the interstate level was carried out. In this context, much attention was attached to stimulating the inflow of foreign investments in science and technology. Enhancement of the participation of Russian scientists and specialists in international programmes, including the Sixth Framework Programme of the EU (2002-06), and projects has allowed involving additional material and financial resources in the domestic S&T sector.

In spite of the fact that the share of foreign sources for R&D in overall R&D funding decreased from 12.0% in 2000 to 8.0% in 2002, foreign funds continue to play an important role in R&D funding. In 2002, in absolute figures, their value increased by 17.3% in comparison with 2000.

3. Government support for private-sector R&D and innovation

Changes in improving instruments used to provide public support for private sector R&D and innovation

One of the major achievements of the introduction of the Tax Code in 2000-02 was the establishment of more secure conditions for business activities in the Russian Federation. The Government of the Russian Federation continues to undertake efforts on decreasing the tax load in the economy. Since 1 January 2004, the sales tax and the tax on purchase of foreign currency were cancelled. Besides, a revision of the VAT rate towards its reduction goes on.

In 2002, the most intensive efforts were made in the field of intellectual property rights, related to the preparation for Russia's entry into the WTO. At the end of 2002, there were introduced amendments in such laws as the Patent Law of the Russian Federation, the law *On Trademarks, Service Marks and Names of Places of Origin of Commodities*, *On Legal Protection of Software for Electronic Computers and Databases*, and *On Legal Protection of Integrated Circuits Topologies*, harmonising the Russian legislation with the most important international treaties on the protection of IPR and the TRIPS Agreement.

At the beginning of 2002, changes in the law *On Leasing* were accepted. According to these, the law's new title is *On Financial Rent (Leasing)*. The law regulates relations between parties with regard to renting expensive equipment and defines the forms of government support for this type of activities. The greatest interest for S&T is attributable to such a form of leasing as rent of unique scientific equipment. Besides, during the last few years, the interest in this field of activities has been growing not only on the part of large businesses, but also small innovating firms, which thus can get access to the use of the state-of-the-art production base.

At the end of 2002, the law *On Technical Regulation* was accepted. It regulates the application of uniform rules and standards establishing requirements to products, processes, etc. The Law is aimed at increasing the safety of products, technologies, services, and putting them in conformity with international norms and standards.

Changes in the balance and/or priority of public support of business R&D and innovation

An important achievement in the field of government support of innovations was the refinement of mechanisms in the implementation of particular innovation projects. In 2003, the development was completed and implementation started for 12 major innovation projects of national importance in 7 priority areas of development of science, technology and engineering in the Russian Federation. The basis of the selected projects is made by S&T developments of a high level, meeting worldwide trends in S&T progress.

In 2003, state contracts were signed for the following innovation projects (the total costs of each project from all sources are specified):

- Development of technologies and introduction in serial production of a new generation of sealing and fireproof materials of common industrial application (the amount of government support: 400.0 million roubles, funds from other sources: 410.2 million roubles);
- Development and start of production of instruments and equipment for nanotechnology (government support: 400.0 million roubles, funds from other sources: 410.5 million roubles);

- Development of biotechnologies and industrial introduction of high-reproduction seed materials of genetically modified agricultural plants (government support: 150.0 million roubles, funds from other sources: 170.0 million roubles.);
- Development and start of production of perspective matrix photo-electronic modules for the development of competitive home-made infrared equipment (government support: 300.0 million roubles, funds from other sources: 150.0 million roubles);
- Development and start of production of catalysts and catalytic technologies of a new generation for manufacture of motor fuels (government support: 350.0 million roubles, funds from other sources: 653.0 million roubles);
- Development and industrial introduction of a technology of manufacturing new types of high-quality cardboard, using recycled fibre (government support: 150.0 million roubles, funds from other sources: 318.7 million roubles);
- Development and start of production of a class of highly efficient steam-gas power installations with the unitary power over 200 megawatt (government support: 450.0 million roubles, funds from other sources: 550.0 million roubles);
- Development of technologies and start of industrial production of constructive metallic materials with twofold increase in the most important operation properties (government support: 200.0 million roubles, funds from other sources: 200.0 million roubles);
- Development of the synthetic dielectric crystals industry and products (government support: 460.0 million roubles, funds from other sources: 501.0 million roubles);
- Development and start of serial production of a class of competitive diesel engines for motor transportation (government support: 500.0 million roubles, funds from other sources: 2041.2 million roubles);
- Development and practical improvement of technical, technological, organisational and financial solutions (including complex ones) for increasing the efficiency of heat supply in Russia's regions (government support: 250.0 million roubles, funds from other sources: 1800.0 million roubles);
- Increasing the efficiency of processing solid waste on the basis of state-of-the-art domestic technologies and equipment with output of recycled raw materials and marketable products (government support: 400.0 million roubles, funds from other sources: 427.5 million roubles).

The projects have been carried to the stage of developmental work, which predetermines possibility to involve significant non-budget funds for their implementation (over 50% of their total amount) and will enable to create on their base, within 2-3 years, large-scale high-tech manufacturing of R&D-intensive products competitive on the domestic and foreign markets. The implementation of such projects will enable to solve the task of increasing the market share of high-tech products and services.

Besides the support of the most important innovation projects, under the order from the Ministry of Industry, Science and Technology of the Russian Federation, programmes of technological development were being implemented in such branches as mechanical engineering, chemical industry, medical equipment, agriculture and food, etc. The peculiarity of these programs is that they are based on latest achievements of science and technology and oriented to market demand. The financial support of programmes of technological development was carried out on the basis of consolidation of funds of the budget, the developer, and the manufacturer of final products.

In 2002-03, the formation of a segment of the innovation infrastructure providing creation of small technological enterprises, and conditions for their dynamical development (innovation technology centres, technoparks, business incubators, etc.) continued. With shared participation of funds of the federal budget, regional budgets, and non-budget funds, in 24 regions of Russia by the beginning of 2003, there had been established created and were operating nearly 50 innovation technology centres and more than 70 technoparks comprising about 1,000 active small enterprises. Also in co-operation of federal and regional authorities, the multilevel system of training of managers for innovation activities is created, and more than 4 thousand persons have been already trained within the system.

4. Enhancing collaboration and networking among innovating organisations

Initiatives to promote collaboration and networking among innovating organisations

For discussion of problems of science towns at the Council under the President of the Russian Federation on Science and High Technology in January 2003, the Concept of their development was prepared. Basing on results of these discussions, completion of the normative and legal base is being conducted, criteria of assignment of the status of science town of the Russian Federation are being specified, and the order of financing actions for development of science towns of the Russian Federation is being corrected. In the federal budget for 2003, for implementation of the programme of development of science towns of the Russian Federation, there is allocated 310 million roubles. These funds are determined for support of four municipal entities having received the status of science town of the Russian Federation, *viz*. Obninsk in the Kaluga Region, Dubna in the Moscow Region, Korolyov in the Moscow Region, and Koltsov in the Novosibirsk Region. In 2003, the status of science town of the Russian Federation was received by Michurinsk in the Tambov Region, and Fryazino and Reutov in the Moscow Region.

In the field of international co-operation in 2002-03, a joint Russia–US programme was implemented, in whose framework the Ministry of Industry, Science and Technology of the Russian Federation and a private company, Russian Technological Initiatives, implemented the starting shared funding of 15 innovation projects. As a result of this co-operation, not only the commercial potential of financed projects is realised, but also all participants of the programme acquire important experience of interaction.

Initiatives to promote stronger industry/science relations

In 2003, a new programme focused on development of the innovation infrastructure was launched. In the framework of implementation of this programme, the Ministry of Industry, Science and Technology of the Russian Federation, together with the Ministry of Education of the Russian Federation and the Russian Academy of Sciences, have established on a competitive basis in six federal districts six technology transfer centres (TTC), which are intended to promote commercialisation of R&D results created using public funds. On the basis of experience of implementation of these six pilot TTC projects, mechanisms of interaction of the centres with research and industrial organisations, as well as with other participants of innovation processes, should be developed.

A promising shift in innovation policy of the state was the development of new programmes focused on settlement of special tasks, to which it is necessary to attribute the development of market-oriented cluster research. One of the largest-scale programmes in this area is the interdepartmental innovation programme *Biotechnology for Medicine and Agriculture*. The legal ground for implementation of the programme was an agreement signed in 2001 by four Russian ministries: the Ministry of Industry, Science and Technology, the Ministry of Health, the Ministry of Agriculture, and the Ministry of Education of the Russian Federation. Later, the Russian Academy of Sciences, the Russian Academy of Medical Sciences, and the Russian Academy of Agricultural Sciences joined the agreement, as well as R&D, industrial, commercial, and financial organisations of different ownership.

The programme is aimed at the development of partnership relations between the public and private sectors of the economy at all stages of the innovation process. It provides government funding at a pre-competitive stage of R&D and industrial introduction of results with the assistance of private business for manufacture of competitive and high-quality biotechnological products. At present, this programme has involved already nearly 200 biotechnological projects executed by academy research institutes, and R&D and industrial organisations. Forms of co-operation with the Programme are various, and it is open equally for Russian and international participants.

The management of the Programme is carried out through the interdepartmental Co-ordination Board that includes leading scientists, investors, and representatives of biotechnological companies and the participating ministries. The Board selects, forms and finances investment projects. To provide efficiency of investments in the Programme, its participants have founded a non-commercial partnership, Biotechnological Consortium on Medicine and Agriculture (Consortium BIOMAK). The Consortium unites major Russian manufacturers of biotechnological products, financial institutions, and research organisations. Activities of the Consortium are aimed at involving various forms of non-budget funding of innovative development (venture funding, direct investments, preferential credits, etc.).

Certain shifts happen also in venture funding. Joint efforts of the Government and the Russian Association of Venture Investments gave start in 2003 to activities aimed at establishment of Russian venture funds with the governmental participation. For this purpose, in 2000, the government founded the Venture Innovation Foundation (VIF). It is established as the basic foundation for subsequent formation of a commercial infrastructure of venture investment. The Fund has encountered the following tasks:

- Implementing a complex of measures to develop a system of direct venture investment in technological business, including small and medium-sized innovating firms;

- Supporting Russian innovating enterprises developing products and technologies in the framework of priority areas and being at initial stages of development.

Now, the first commercial venture fund has been established with the participation of VIF. It has allowed involving 11 million USD of private capital on 1 million USD from public funds. The tender for establishment of other funds is at the final stage. It is supposed that, by 2005, it will be possible to create at least five venture funds that will allow involving annually more than 1 billion roubles of private venture capital in the high technology sector.

5. Human resources for S&T

Recent statistics on science and engineering personnel and graduates from universities

In 2002, R&D institutions of the Russian Federation employed 870.9 thousand people. The number of those employed in R&D had been reducing steadily during the 1990s. In 1998, it totalled only 44% in relation to 1990, which was the lowest indicator for the whole period. In the last few years, the process of reduction in the R&D employment has lost its previous rate. In comparison with 2001, the number of personnel engaged in R&D reduced in 2002 only by 1.7%. According to preliminary estimates, this indicator will total 866.2 thousand for 2003, which is by 0.5% less than in 2002.

The greatest decrease in R&D employment was recorded in the higher education sector: 22.3% in 1994-2002. It was expressed not only in a reduction of the number of personnel of R&D units of higher education institutions, but also in the decreased participation of teaching staff in R&D. In 2002, the share of the higher education sector in the structure of R&D personnel was at the level of 5%.

The government sector including R&D institutions of federal ministries and departments, as well as the Russian Academy of Sciences and specialised academies, and R&D institutions subordinated to regional and local authorities, was in the least degree in comparison with others affected by the process of staff reduction. The employment size decreased in this sector for the period 1994-2002 by 11%. The share of the government sector in the structure of R&D personnel amounted in 2002 to 29.6%.

In the structure of R&D personnel in 2002, researchers made 47.6%, technicians 8.6%, auxiliary personnel 26.7%, and other staff 17.1%. In the government and higher education sectors, the share of researchers in R&D personnel is above the average and makes 51.1% and 67.0%, respectively.

The professional structure is one of the most stable characteristics of R&D personnel: engineering sciences still prevail, and their share has even increased to 64.3% in 2002. The shares of physics and mathematics (9.9%), chemistry (4.8%), medicine (4.1%), and agricultural sciences (3.4%) have slightly increased. The outflow to the business and finance sector promoted the reduction in the share of researchers in economics (to 1.5%).

By the present moment, the process of ageing of R&D manpower, caused by the outflow of younger people from S&T and the absence of an inflow of the youth, sufficient for normal reproduction of human resources, has taken a dangerous scale. Already now, 48.7% of researchers are in their fifties. This age group includes more then a half of candidates of science (60.9%) and 84.4% of doctors of science. The process of ageing of R&D human resources can be observed also in the dynamics of middle-aged employees. The average age of a Russian scientist is now 48 years, holders of a candidate's degree are on the average 52 years old, and doctors of science have reached 60 years and are in the retirement age. The average age of researchers noticeably exceeds the average age of employment in the national economy of Russia, which equalled 39.3 years in 2002.

Meanwhile, the last few years demonstrate a steadily growing number of graduates from higher education institutions. From 1996 to 2002, the number of graduates with university degrees increased almost twofold, having totalled 840.4 thousand in 2002, i.e., by 16.7% more than in 2001.

The total number of higher education students equalled 5,947.5 thousand, which was by 9.6% more than in 2001. The number of students per 10,000 population grew by 8.8% from 377 in 2001 to 410 in 2002. The female proportion of students also slightly increased for the period 1996-2002. In 1996, it had made 55.2%; and in 2002, this indicator equalled 57.5%. Noteworthy, the share of women in the structure of students is higher at private higher education institutions where it covered 63.2% in 2002, whereas for public higher education institutions the female proportion comprised 56.8% of all students.

The number of postgraduate students grows continuously as well. For the period 1996-2002, it had grown 1.82-fold. The number of postgraduate students amounted in 2002 to 136.2 thousand, which was by 6.1% more than in 2001. The number of graduates from postgraduate courses increased for the examined period 2.36-fold from 11.9 thousand in 1996 to 28.1 thousand in 2002. The level of graduates from postgraduate courses, which have defended their dissertations, also has grown, although not so rapidly. In 1996, the share of graduates from postgraduate courses, having defended dissertations, had made 24.1%; in 2002, this indicator was equal to 26.4%.

Initiatives taken to improve S&T personnel structure

In accordance with the regulation by the Government of the Russian Federation of 8 January 2003 № 4, On the Introduction of Amendments in the Regulation by the Government of the Russian Federation of 6 July 1994 № 807 “On the Establishment of Salaries for the Rank of Full Members and Corresponding Members of the Russian Academy of Sciences, the Russian Academy of Medical Sciences, the Russian

Academy of Agricultural Sciences, the Russian Academy of Education, the Russian Academy of Arts, and the Russian Academy of Architecture and Construction Sciences, and Increments for Scientific Degrees of Doctor of Science and Candidate of Science", for staff members permanently employed at budget-funded R&D institutions (organisations) and higher education institutions irrespective of administrative subordination, there were introduced monthly increments for the scientific degree as follows: for doctors of science at 1,500 roubles and for candidates of sciences at 900 roubles. Since 1 January 2003, these increments are paid to teaching staff of budget-funded higher education institutions. Employees of budget-funded R&D institutions (organisations) and higher education institutions (except teaching staff) receive these increments since 1 April 2003.

With the purpose of attracting young people in S&T, stimulating R&D performed by young scientists, and entrenchment of young professionals in the S&T sector, the Decree of the President of the Russian Federation of 3 March 2002 № 267, *On Some Measures on Strengthening the State Support for Young Russian Scientists – Candidates of Science and Their Scientific Supervisors*, established since 1 January 2003 competitive grants for a 2-year period for support of young scientists (below 35 years) and lumpsum payments to supervisors of studies of these young scientists.

The support of R&D performed by young Russian scientists with a doctor of science degree was accomplished in the form of 100 annual grants of the President of the Russian Federation (Decree of the President of the Russian Federation of 27 March 1996 № 424 and the regulations by the Government of the Russian Federation of 26 September 1995 № 957 and of 23 May 1996 № 633).

For encouragement of young scientists for outstanding achievements in S&T, as well as talented scientists, State prizes of the Russian Federation were established. A complex of actions was implemented in the framework of the federal goal-oriented programme, *Integration of Science and Higher Education for 2002-06* (in 2003, the total expenditure under the programme amounted to 219.5 million roubles, of which 175.0 million roubles spent on R&D). Activities were implemented in the framework of departmental programmes of supporting R&D performed by young scientists (in the Russian Academy of Sciences, the Ministry of Education and the Ministry of Atomic Energy of Russia, and the Lomonosov Moscow State University).

A draft regulation by the Government of the Russian Federation, *On Official Salaries and Other Conditions of Payment in R&D Institutions of the Budget Sector*, and the sector-related section of the Concept of Reforming the System of Payment of Staff of Budget-funded Organisations have been prepared. It is supposed that the new system of payment of staff of budget-funded R&D institutions will allow a noticeable increase in official salaries of the principal categories of personnel. The essence of the new approach consists in rejection of the levelling principles and attachment to an official salary (rate) of functions of the principal indicator of qualification and social status of researchers and quality of their work.

Changes related to the international migration and mobility of scientific and high-skilled personnel

During the 1990s, the number of persons employed in the R&D sector and having emigrated from Russia, as estimated by the Centre for Science Research and Statistics, equalled nearly 1-2 thousand a year. Moreover, the figure includes not just properly scientists, but also other categories employed in this sector. Recently, together with the reduction in the total migration from Russia, this indicator also has decreased to 600 in 2002.

Most people employed in R&D and education leave for Germany and Israel. In the total number, these two countries accounted in 2002 for 87% of the persons of this category who had left Russia. The

third place as to involving scientists from Russia was occupied by the United States (5%). whereas all other countries of the world accounted for only 8%.

According to available estimates, nearly 3-4 thousand researchers are employed under contracts abroad annually. In 2002, their number totalled 2,922, or 0.7% of all Russian researchers. Almost a half of them (46%) stayed abroad for long terms (more than one year): of whom 17% from 1 to 2 years, 8% 2-3 years, and 21% more than 3 years.

A significant proportion of scientists (46%) engaged in professional activities abroad in 2002 were invited by foreign partners, 16% arranged contracts with foreign organisations independently, and 6% left under contracts accomplished through official Russian organisations. 26% of the researchers employed abroad were on long-term missions, and 3% left by exchange. It is characteristic that those invited by a foreign partner or having concluded the contract independently left for longer terms more often. Most of those leaving on official missions or by exchange stayed abroad for less than one year.

Among the scientists leaving for temporary employment abroad, specialists in natural scientists prevailed: one in three was a physicist, almost one in for was a biologist, and one in ten was a mathematician. These are followed with a great gap by researchers in the fields of engineering and humanities. Russian professionals in other fields of S&T (medical, agricultural, and social sciences) are less required abroad. A comparison between the structure of all researchers employed within the country and the similar structure of those leaving for temporary employment abroad by field of S&T demonstrates especial activity of natural scientists and humanists.

More than a half of Russian researchers (54.2%) who had left for abroad worked in the United States (29%), Germany (19%), and France (7%); other 12% went to the United Kingdom (5%), Japan (4%), and Sweden (3%). In total, the share of these six countries accounted for two-thirds of Russian researchers employed abroad, whereas one-third fell on all other states. Although, the geography of scientists' voyages is rather spacious and includes even exotic countries, such as Antigua and Barbuda, Benin, Cote d'Ivoire, etc.

A significant part (40%) of Russian scientists working abroad left with the purpose of implementation of joint research projects; one-third went for research activities in foreign organisations, and 12% were employed under contracts. Nearly equal shares (slightly above 6%) fell on those who left for lecturing (consulting), and training or studies.

Most researchers temporarily employed abroad (59%) were in the age from 30 to 49 years; those older than 50 years accounted for 28%; and 13% fell on young people (below 29). Despite the high female proportion in the structure of researchers in Russia, among the scientists temporarily working abroad they were only 25%.

6. Policies to boost innovation in the service sector

Policies to foster increased innovation and productivity growth in the service sector

The level of innovation activity of Russian enterprises, both in industry and in the service sector, remains rather low. In 2002, the share of innovating enterprises in industrial sectors made 9.0% of the total sample of enterprises surveyed. In the service sector, this indicator equalled 6.7% in 2002 (in 2001, respectively, 5.5%), and the ratio of expenditure on technological innovation of these enterprises to total services was at the level of 8.9% (in 2001: 10.0%).

By economic activity, the shares of innovating enterprises in total sample of the service sector were distributed in 2002 as follows: wholesale and retail trade – 3.1%; transport and communications – 15.0%

(of which in communications 15.3%); financial activities – 2.4%; operations with real estate – 3.5% (of which computer and IT related activities 8.3%); public administration and defence, and compulsory social security – 10.5%; and municipal, social and personal services – 4.6%.

Realising the necessity to strengthen the innovation element of economic development, the Government of the Russian Federation is increasing since recently its attention to this aspect of S&T and innovation policy. The report of the Ministry of Industry, Science and Technology of the Russian Federation, *On the Stimulation of Innovation Activities and Industrial Introduction of R&D-intensive Technologies*, prepared at the beginning of 2004, announces that "today, prerequisites have emerged in the country for essential reorientation of priorities of the state, private business, and civil society to intensification of innovation activities and increasing the role of science."

As such prerequisites, the following trends are considered:

- The presence of imported products on the domestic market has essentially changed the standards of both consumer and investment demand, and has approached them to the level of advanced countries. Price competitiveness of products and services of Russian enterprises is already an insufficient condition for the preservation of their positions even on the home market;
- The involvement of Russia in globalisation processes and the complex of measures related to its entry into the WTO do not permit domestic companies to hope for the preservation of essential protective and preferential measures of support, allowing existence outside international competition. It makes business intensify the search for perspective technologies and non-standard solutions for ensuring specific competitive advantages in the framework of global competition;
- The strengthening of the new business elite not having access to raw materials resources, and ambiguous forecasts of the development of raw material sectors of the Russian economy in the general context of global economic development stimulate increased interest and an inflow of financial and management resources in high-tech branches;
- Recognition of the necessity and governmental stimulation of structural changes, the general improvement in the investment climate, a substantial improvement of the legal base, including innovation activities, and the programmes of actions declared by the government on the development of S&T and education, enable players on the field of high-tech businesses to feel more confidence.

At the same time, at the present stage, Russian authorities pay principal attention to innovative development in the industrial sector of the economy. Measures to stimulate innovations in the service sector are considered in the framework of the general direction of development of the innovation infrastructure. In the documents devoted to development of a perspective model of the Russian S&T sector, the authorities have noted that the innovation infrastructure should develop in the public sector of S&T. At the same time, it is recognised that, at the present stage, direct and indirect government support is required by practically all its basic elements, such as:

- small R&D and innovating organisations;
- innovation and venture funds;
- scientific parks, innovation technology incubators and business incubators, etc.;
- consulting and engineering organisations, as well as organisations rendering applied services in the field of humanities (sociology, law, economics, ecology, etc.);
- science towns and technopolises.

ICT statistical survey results

The statistical survey the field of information and communication technologies (ICT), sampling 158,899 enterprises and organisations, has provided the following picture as of the beginning of 2002. The proportion of organisations using ICT in total sample equalled as follows: the use of: personal computers – 76.4%; local area networks – 34.6%; E-mail – 34.4%; the Internet – 29.0%; and other global networks – 4.7%.

However, the use of global networks in Russia has not reached such a scale of occurrence as in Western companies. With rather high availability of computer equipment, only 6.3% of enterprises and organisations of the country are going to start using network facilities. At present, more than a half of organisations (63.2%) neither use nor plan using global information networks in the near future.

Among the companies having access to global information networks, network opportunities were used mainly for general purposes: for information search and information exchange. Commercial objectives were pursued by a comparably smaller number of organisations. First of all, network interaction with suppliers is considered as a source of data on necessary products and services. The placement of orders and purchase of products via a network was in question twice less often. As a channel of contacts with consumers, the use of global networks was extremely limited. As well as in the case of suppliers, everything was reduced basically to supplying clients with commercial information on opportunities to order necessary products or services.

The most advanced and technically complicated options of using networks for commercial objectives, in particular electronic payments, delivery of electronic products and maintenance of after-sale service, are mastered by enterprises and the organisations most poorly.

As a result of using global information networks, the enterprises and organisations have mentioned improvement in the quality of interaction with partners, attraction of new suppliers and consumers, preservation of the traditional market share and creation of new markets of products, improvement of the product quality, extending the product range, and reducing expenditure on manufacturing and sales of products.

Among the organisations and enterprises, which neither are using nor plan further use of networks, the main factor hampering their dissemination was identified as shortage of funds. It was followed with a rather significant gap by constrained technical opportunities of access to a network, poor quality of connection, and shortage of qualified professionals in information and communication technologies.