RÉFLeXion Stratégique

The Russian National System of Innovation in Transition

Irini DEZHINA et Renaud BELLAIS

Les Cahiers du CHEAr

Centre des hautes études de l'armement
21, place Joffre - 75007 Paris
Tél. : 01 44 42 54 97
Fax : 01 44 42 42 33

www. chear.defense.gouv.fr

Irina DEZHINA

Leading Researcher, Ph.D.
Institute for the Economy in Transition
Moscow, Russia
degina@iet.ru

THE RUSSIAN NATIONAL SYSTEM OF INNOVATION IN TRANSITION: DEFENCE LEGACY, MARKET ORIENTATION AND EMERGING CHALLENGES

June 2004

AVERTISSEMENT

Les textes publiés dans les présents Cahiers
n'engagent que la responsabilité de leurs auteurs.

TABLE OF CONTENT

DEFENSE, R&D EFFORT, AND INTELLECTUAL PROPERTY RIGHTS: EMERGING CHALLENGES

Renaud Bellais
Strategic Studies Department
CHEAr, Paris

Since the 1940s arms-producing countries have been spending huge amounts of resources in defense R&D–a trend that has been reduced but not stopped by the end of the Cold War. One may then wonder what the consequences of such a dedication in public credits and human capital are. Concentrating these resources on a very specific aim induces a very high opportunity cost, and it seems interesting to understand whether it is possible to limit the negative impacts of military expenditures on economic and social factors.

Such a question is even more crucial when we look at the former Soviet Union, for the militarization of the Soviet economy reached levels that were never encountered before in human history. Chief researcher at the Institute for the Economy in Transition (Moscow), Irina Dezhina provides here two interesting papers that draw a good vision of the current situation in the Russian innovation system. Her great expertise helps to understand what are the difficulties encountered by Russian institutions and enterprises to achieve their transition towards a market economy. But her papers are even more interesting for the defense community worldwide…

Even thought the Russian context is quite exceptional, one may analyze it as an extreme case of a situation in fact shared by most of the biggest arms-producing countries, beyond the economic system they may have chosen during the twentieth century. Indeed the integration of the so-

called "military-industrial complex" in the national system of innovation has raised many questions since the 1980s, especially in regard to several issues related to economic growth and international structural competitiveness[1].

While Irina Dezhina's papers focus exclusively on the Russian situation, her work underlines some issues that are not well-treated even in Western Europe. It is especially the case concerning the management of intellectual property rights when they result from public expenditures and, even more, from defense budgets. Indeed our advanced industrial economies rely heavily on the knowledge economy, and maximizing the return into investment from R&D effort becomes the next big issue here as well as in Russia. However many studies (mostly about the United States) demonstrate that public research does not provide all its potential because of inefficient mechanisms to valorize R&D results.

The situation is worse in defense-related activities. Indeed Lichtenberg underlined through several studies that defense R&D produces less economically valuable results than civilian public expenditures. Even though one may moderate his assessment in regard to the primary aims of defense R&D (providing external security), it is clear that the defense industrial and technological basis (DITB) is not structured to get the highest economic return from its scientific and technological effort in terms of legal framework, industrial culture, economical incentives, contract architectures,… Nevertheless it is more and more expected that Ministries of Defense demonstrate their ability to limit the military burden or, as a counterpart, maximize the returns into taxpayer's money.

---

[1] For a survey of these debates on military expenditures and economic growth, see R. Bellais, *Production d'Armes et Puissance des Nations* (Paris: L'Harmattan, 2000).

It is thus crucial to develop a better understanding in the management of intellectual property rights for defense-related activities. This idea is not only necessary to improve relationships between the State and its partners in science and industry; it is also a good means of extracting the best value from the knowledge accumulated for more than sixty years of intensive effort in defense R&D. Such a strategy can help to develop synergies between the DITB and the civilian economy for reciprocal benefits.

Beyond the analysis of a particular national system of innovation *stricto sensu*, Irina Dezhina's articles underline some features of Russian intellectual property rights and R&D effort. Such an understanding of the post-communist Russia provides very fruitful insights on the potential of R&D and industrial cooperation for French and European enterprises. Indeed it seems clear, after reading these papers, that Russian institutions have not yet achieved their transition to a market-oriented approach. Many obstacles remain if European counterparts expect to develop efficient strategies of cooperation. One could draw such a conclusion from the early attempts to set cooperation in the beginning of the 1990s.

Nevertheless many steps have been passed and recent trends described by Irina Dezhina lead to a more optimistic assessment of Russian-European cooperation in forthcoming years[2]. The mid-2000s could be the adequate period to strengthen industrial and technological links between Russia and European countries in a win-win strategy. It is especially the case in defense activities, since Russia represents a partner of the same

2 Co-operation in aeronautics was rising in the early 1990s but led to many stalemate. Nevertheless it appears that European companies (and others) have launched again such a strategy in the recent years, for instance the creation of EADS Russia in March 2004.

technological level for the European DITB as well as an alternative to transatlantic cooperation if the United States demonstrates its inability to engage itself in balanced relationships for defense-related activities…

Then Irina Dezhina's papers are very interesting to put into relief crucial features of today's defense industry and its place in the national economy of arms-producing countries. It helps to:

- understand the Russian economy (both in defense and civilian activities);
- become aware of the challenges in integrating the defense and civilian industrial and technological defense basis;
- maximize returns into investment from defense R&D expenditures (and maybe public civilian ones);
- ground industrial and technological cooperation between Russia and Europe on a well-informed basis.

Finally these papers bring up several issues about Russia and beyond on defense economics, which have been a bit neglected by academics since the end of the Cold War because of the expected "peace dividends". Nevertheless such questions are essential to manage efficiently the military effort of our countries. One may then consider these papers as a starting point for further studies.

INTELLECTUAL PROPERTY RIGHTS REGULATIONS IN RUSSIA: CASE OF GOVERNMENT-SUPPORTED R&D

Irina Dezhina
Institute for the Economy in Transition
Moscow, Russia

Intellectual property rights (IPR) allocation is currently one of the most discussed problems in Russian science and technology sphere (S&T). The epicenter of discussions is around regulations of intellectual property (IP) created at the budgetary expense. This focus is not accidental. It has been calculated that about 90% of all IP in Russia result from federal budget. The share of government in total R&D expenditures on science is still quite high. In 2001 this share reached 56.2% and it has been slightly growing during last three years. For public research organizations (PROs)–such as government research organizations and High institutes–contribution from federal budget is even higher: up to 80% of total funding. For universities–that are mostly state owned–funding from federal budget amounts to 65%[3].

Until now there is no unified view on intellectual property rights (IPR) regulation both among lawmakers and the administration of universities and research institutes because the ownership structure is not absolutely transparent in the current legislation. The major legal framework for IPR regulation includes the following basic laws: the Constitution, the Civil Code, the Patent Law, and six basic IPR laws (dealing with trademarks; copyrights; chip design; information storage and protection; software and databases; and selection achievements).

[3] L. Gokhberg, *Statistics of Science*, TEIS, Moscow, 2003, pp.441 and 443.

The framework for IPR regulation includes federal laws such as "On Education," "On Higher and Post-Undergraduate Education," "On Science, State Science and Technology Policy." Theoretically this legislation creates the necessary basis for IPR regulation among all interested parties. However there are discrepancies across these laws and other standard acts, laws, and codes, as well as a number of vague issues that make practical distribution of rights confusing and uncertain, especially if IP was created with full or partial support from the federal budget. Besides there is a variety of government regulations that were issued for "explanation" and proper implementation of the laws and that make the whole situation even more confusing.

Thus, according to the State law "On Higher and Post-Undergraduate Education," all IPR belong to university. According to the Patent law and some other laws the distribution of rights depends on when, where, how (with which equipment), and with which credits intellectual property was created. It may belong to the university, the inventor, the customer. Then, if the creation of an invention was financed thanks to federal credits, it belongs under certain circumstances to the State. Finally, according to one of the basic laws "On information, information storage, and defense of information," all IP created under budgetary expense belongs to the Russian Federation.

The case of simultaneous funding from several sources, which is currently the most common approach in financing research and development projects, is the most confusing situation and the current context does not provide an accurate answer.

This is a fundamental debate because it is impossible to commercialize something if the ownership is unclear or uncertain. While

clarifying ownership is necessary, clear titling is only a means to an end. The ultimate objective is not clear titling *per se* but rather the creation of an efficient system of industrial innovation and technology commercialization based on the efficient transfer and dissemination of IP "from the lab to the market."[4]

The discussion around publicly-funded IP is concentrated around three major topics: 1) whom should belong IP created at the Soviet period; 2) whom and under what conditions should belong IP created today under government contracts and other forms of budgetary support; 3) how to facilitate the commercialization of IP created through public credits. All these problems result from the Soviet system of inventions.

In the Soviet Union all inventions were state-owned and theoretically they were freely available for anyone without special permission, licenses or royalty payments. Under the Soviet system, an inventor received public recognition in the form of an author certificate (*avtorskoe svidetel'stvo*). In addition the inventor could receive a modest single monetary bonus–in average equal to 50 dollars. The inventor did not have an exclusive right to his invention. Then, industrial enterprises could use inventions without special permission or license. The State had the authority to be a bridge between research institutes and industrial enterprises; it handled this task as part of the overall planning function. The State also had the exclusive right to control the use of these inventions outside the USSR by entering into license agreements or applying for foreign patent protection.

Such strictly controlled system did not allow rapid commercialization. The average lead time (defined as the time elapsed

[4] *From Knowledge to Wealth: Transforming Russian Science and Technology for*

between the registering of an invention and its applications) was four years while in the USA and Germany, as OECD surveys showed, this time was a little more than one year for 50% of surveyed inventions[5].

Then, more than 75% of all R&D in the Soviet Union was defense-oriented. This creates an additional problem in post-Soviet times since there are no transparent clearance procedures for separation of potentially dual-use technologies from pure civilian ones.

After the dissolution of the USSR new laws came into force, and the patent law adopted in 1992 was the major challenge in IP protection system. In all important aspects Russian IP legislation of the early 1990s complied with the Trade Related Aspects of Intellectual Property Rights (TRIPS) requirements setup by WTO. According to the patent law of 1992, ownership rights of government-funded IP were assigned to the institutions where activity was conducted. An important feature of the legislation was that ownership rights could be assigned only to legal entities–research institutes, industrial enterprises, and innovative firms, etc.–where discoveries are made. Ownership rights could not be assigned directly to ministries that have funded those activities or under whose auspices the work has been conducted. Later, when the Civil Code came into force in 1996, the Russian Federation was granted a permission to have a title on publicly-funded inventions. But no patent has been granted to the Russian Federation as an owner since then.

When the Russian legislation on IP was adopted, this was not an important step, because all organizations were state-owned. Irrespective of whether IP rights were delegated to a ministry, an enterprise or an institute,

---

a Modern Knowledge Economy, World Bank, Washington, April 2002, p.20.

[5] J.A. Martens, *Measuring Soviet Performance in Industrial Innovations: The Implementation of New Inventions*. OECD, Paris, 1999.

the State directly or indirectly remained the owner of publicly-funded IP. However in 1994 the privatization started. Suddenly it appeared that rights to government-funded IP would be assigned to newly privatized entities–a situation that was never taken into account when IP laws were passed. In practice many researchers became IPR owners. Statistical data reveal such a situation: in 2001 inventors-owners represented 38% in total IPR owners–compared to 31-34% in 1997-2000. Thus today the share of individuals-owners is growing. At the same time the share of government organizations-owners of IPR reached at the level of 8-14%[6] in 1997-2001.

These developments encouraged the government to formulate its position concerning intellectual property previously created and currently arising in the scientific-technical sphere. This has led in 1998-1999 to a series of conflicting decrees, State concept papers, and proposed amendments to IP sections of the Civil Code.

Concerning previously created IP, questions were also: What is its value? Does it have any commercial potential? Why have this problem emerged per se?

The beginning of the story is quite anecdotal. In 1997, a year before the economic crisis, there was a discussion at the government level on how the overall economic situation may be improved. And it has been calculated that, in the Soviet period, Russian science has received federal investments equal to approximately 460 billion dollars. The conclusion was that this sum is the amount that may be received back to the federal budget if the government commercializes all previously created research results or IPR. This has lead to a series of confusing decrees in 1998-1999, discussed below. Also, in the structure of the federal budget in 1999 there appeared a

6 *Source*: Annual Report of the Russian Patent Office (1999-2001).

separate line in revenues section that had to indicate the income from commercialization of government-owned IP. But it was never fulfilled.

The first act of the government was the development of a special Concept and regulations concerning inventory of all previously created IP. The inventory was not implemented so far, and this effort may become very cost-ineffective because the property that was not commercialized during more than ten years after the breakup of the USSR is either outdated, or never had any commercial potential. One of the discussed suggestions is to allow organizations themselves to decide what from existing knowledge are worth considering as intellectual property with all combined standard procedures for its registration. This approach seems to be reasonable and cost-effective. The similar approach was already implemented at the beginning of the 1990s when all owners of author certificates were allowed to exchange them to patents with no fee. This action has revealed that approximately one of 100 certificates was turned into a patent. Such low indicator is related not only to the quality of inventions protected by author certificates, but also to the fact that at the early 1990s there were no infrastructure for commercialization of inventions and low interest from the industry for them.

In 1998-1999 several government resolutions were issued to give all rights on inventions created under public spending to the State. One of them was related to military and dual use technology (#556, 1998). It declares that "the rights to such results of research and development and technological projects of military, special, and dual use designation (hereinafter referred to as "results of intellectual activities") as may have been obtained for the account of the RSFSR republican budget, the portion of the USSR state budget that represented the USSR budget, and the federal budget shall

belong to the Russian Federation."[7] The second resolution, which focuses on civilian area, declares that "the rights on such results of scientific and technological activities as may have been previously obtained for the account of the RSFSR budget, that portion of the USSR budget that represented the USSR budget and the federal budget shall belong to the Russian Federation."[8]

Unfortunately, it is nowhere explained how the government will define defense and national security areas. The latter category could be exceedingly broad. For example, will the State define its intention referring to specific domains of IP, citing author certificates and patent numbers? Or will it choose a broad area such as "composite materials and related technologies"? Rather than clarifying matters, the latter approach would inject even more uncertainty into the IP ownership discussion. Then, the legislation did not contain and does not contain until now the definition of commercially classified information, and there is no clear relationship between this term and IPR.

If before 1998-1999 the role of the State was to some extent underestimated, after 1999 the situation has changed on the opposite. Then, new decrees and orders were in contradiction with some other laws such as

---

[7] Decree of the President of the Russian Federation # 556, "On the Legal Protection of the Results of Military, Special and Dual-Purpose Research and Development, Engineering and Technological Works," May 14, 1998; Resolution of the Government # 1132, "On Priority Measures of Legal Protection of the State in the Process of Economic and Civil-Law Turnover of Results of Research-and-Development and Technological Projects of Military, Special and Dual-Purpose Designation," September 29, 1998.

[8] Decree of the President of the Russian Federation #863, "On the Public Policy of Introducing into the Economic Turnover Results of Scientific and Technological Activities and Intellectual Property in the Sphere of Science and Technology," July 22, 1998; Resolution of the Government of the Russian Federation #982, "On the Implementation of Results of Scientific and Technological Activities," September 2, 1999.

"On Education" or "On Higher and Post-Undergraduate Education" that were in force. All this made impossible the commercial application of IP since government did not provide any framework for that but only decreed that it all belongs to the State. And ministries as representatives of the State also did not have either clear mechanism for commercialization, or adequate financial, human and informational resources for that.

A slight improvement happened in 2001 when one more government order came into force. According to it, all defense and national security related results created under federal support as well as results that the State intends to commercialize on its own belong to the State. In all other instances government should transfer IP rights to organizations-inventors or inventors. But again, this order just stated the intention but in fact there were no mechanism, infrastructure, legal procedures, accounting procedures for such transfer.

Finally, in February 2003 a new Patent law came into force. It clarifies the case when the IP was created at the federal expense and under the federal contractual agreements. According to a new Patent Law, the State owns the title if it is stated in the contract and it belongs to the organization where the invention was made in all other cases. Then, in case when the owner is government, it may apply for a patent during six months after inventors informed it of the invention. If during 6 months government did not apply for a patent, then the organization-inventor has a right to apply for a patent. And since March 12, 2003 ownership rights may be assigned directly to ministries that act as government representatives.

The Patent law clarified the state of ownership but it does not introduce any approach to commercial applications of IP. Currently most of ministries drafted standard contractual agreements where all rights are

assigned to them. And it is very difficult for universities to negotiate changes in the standard contract because this extremely decreases chances for the organization to win the competition for government contractual work. Thus there still is the situation of uncertainty for universities and other research organizations and therefore they realize innovative activities at their own risk.

Moreover, practice shows that even in contractual agreements neither ministry nor government takes responsibility for commercial application of project results. And contracts usually do not include financing for patent search and commercial activities. Thus no partner takes an obligation to commercialize results.

Today, according to information from the State Patent Agency, among all patented inventions 40% were created at public expense. Other commercialized inventions were created thanks to non-budgetary sources. And taking into account that most of inventions were made in Russia at public expense, this figure means that federally financed R&D are generally not commercialized.

Besides the lack of clear legislation, the commercialization of IP faces the following obstacles: absence of traditions, absence of solvent demand from the industry and in general low interest of industrial sector in innovations, absence of qualified managers in high tech area and some others. The official statistical data show that the share of innovatively-active industrial enterprises was very low during the years of reforms. It varied from 5% to 10.6% among large and medium-sized industrial enterprises.

As a result, from 1997, in Russia the percentage of active patents ever licensed is lower than 2% of the total while across all OECD countries

this indicator is somewhere between 20% and 40%[9]. It means that in Russia today licensing is at a lower level than it was in the Soviet Union: at that time about 30% of inventions were implemented in practice[10]. Then, in the early 1990s, this indicator fell down till 7-8%, and since 1997 it reaches 1.4% and continues to be under 2%.

Universities tend to sell know-how instead of licenses because there is no trust to Russian federal legislation and therefore a widespread view is that a patent does not really protect invention. Then, since the industry sector in Russia is not very innovation-orientated, universities and researchers think that patenting in Russia is useless, and abroad–important but too expensive. However researchers prefer finding ways to patent abroad, and sometimes they violate legal proceedings by patenting invention abroad without patenting it in Russia. However there is no standard enforcement procedures to cope with this situation.

Sometimes researchers create their own small innovative firms that use university facilities and equipment but do not share royalties with universities. At the same time it is not rare when university administrators are aware of such facts but they do not prohibit researchers from doing this. The rationale is that researchers have a very low salary and therefore attempts to commercialize their inventions are envisioned as extra material "compensation."

The problem is that the Russian Labor Code grants many rights to employees and very few to employers. It is very much socially oriented and thus there is a priority in interests of employees over interests of

---

9 *Turning Science into Business: Patenting and Licensing at Public Research organizations*, OECD, Paris, February 2003, DSTI/STP (2003) 22, p.70.

10 Izobretatelstvo v USSR 1919-1989, Statistical issue. VNIIPI, Moscow, 1989, p.87.

organizations in which they work. Thus economic interests of an organization may be infringed. In current economic conditions, when a researcher's wages may not provide enough support, most of them have multiple positions, and often they simultaneously work in competing organizations. Therefore when invention is made, researchers treat it as exclusively their property and besides it is often not clear at whose expense it was made. Researchers usually are not aware about the conflict of interests, since there is no culture and practice of full disclosure and researchers do not report to the university about types and places of their other positions.

At the same time employer has very limited rights in arranging special contractual agreements with an employee and thus it is difficult to support the regime of confidentiality and avoid conflicts of interests. There is a State Law "On competition and limitation of monopoly at trade markets." However it does not take into account of specific goods such as IP and knowledge. This law can not regulate relationships that arise between physical persons that are not registered as entrepreneurs, and between employers and employees.

International experience shows that government should provide a framework for IPR protection, and detailed regulations may be developed at the level of universities and research institutes. And both government and PROs are in a search of a transparent model for IPR regulation. Until recently the most popular was the US experience where commercial culture is immanent for PROs. The Bayh Dole Act got greater diffusion and discussion than any other law or initiative in this sphere. At the same time popularization of the Bayh-Dole Act is somewhat one-sided. The biggest attention is given to the major idea of IP transfer from laboratories and

universities to industry but there is no system-defined view and analysis on how and with which mechanisms the whole mechanism really works. It can succeed not only when the permission for IP transfer is given, but also when this activity is harmonized with the Civil Code, Tax Code, and accounting rules. And in Russia all this legislation is in some contradiction to international practice. Then, in the Russian environment, when industry sector is underdeveloped, there is lack of solvent demand on inventions, and there are not enough educated managers in the field of commercial application of research results, a regulation based on the Bayh Dole Act may not show full effectiveness.

The European experience tends to become more and more attractive to Russia due to stronger government participation in European models of regulation, and cultural proximity between Russian and European universities. Russian government always favored direct support and direct control over the process of technology development and commercialization and therefore the preferable instrument was direct financing of certain initiatives rather then the development of indirect mechanisms to support innovations. That is why such measures as encouragement of cooperation between research institutes and industry through IPR transfer do not correspond with general government approach.

However at the present time the first attempt is made to create an infrastructure for commercialization of intellectual property created at PROs. This is the establishment of Technology Transfer Offices (TTO) in a number of leading Russian research organizations, including universities. In this activity two major Ministries working in the S&T area started this process independently and through two different approaches.

Generally TTOs are not designed to be self-supporting profit centers, but the US experience suggests that they can eventually become self-sustaining within approximately 8-10 years. In most successful Technology Transfer Offices, gross royalties and licensing fees generated by the TTO generally amount to between 0.5% and 2% of the institute or university annual research budget. As this data suggest, the real economic value of establishing TTOs and clarifying IP is derived from the economic activity generated by the commercialization process itself. This includes the establishment of new high tech SMEs, the creation of high-paid, skilled jobs and additional tax revenues generated by this newly emerged economic activity. This economic approach was taken into account by the Ministry of industry, science and technology.

It plans to establish about 1,000 TTOs in government-owned research institutions. Currently State budget supports the creation of six centers, with an annual single budget of $100,000 for each. The Ministry's primary goal in establishing TTOs is to use innovations to support economic development. The model of TTO that was elaborated implies the creation of intermediary TTO that will in turn create incubators around them and provide small companies with seed money. In this model TTO should be a legal entity. The advantages of this form are in its ability to provide a real impact on local economy, and create a neutral space for contacts between different commercial and academic communities in a given region. The disadvantage is primarily in competitive relationships among PROs.

By now there is no clear concept from the Ministry on how TTOs should be organized and function, and what will be the major sources for seed funding as well as how long the Ministry will support TTOs. Credits already provided to TTOs may be used only for wages and some community

services payments. And thus it is not clear yet how TTOs will become sustainable. Also, since funding comes only from the federal budget through the Ministry of industry, science, and technology, this increases the risk for overwhelming government patronage of these TTOs.

There is another concept of TTO that is currently developed by another ministry: the Ministry of Education. It works in cooperation with the U.S. Civilian Research and Development Foundation (CRDF). They made joint investment in creation of four TTO in selected universities. The budget for each TTO varies from $75,000 to $150,000 and will be distributed during three years. The proportion in financing is 1:2 with one-third coming from the Ministry and two-thirds from CRDF. The concept of these TTOs as well as the general approach are different from the one carried out by the Ministry of industry, science and technology. In this concept collaborative approach dominates, i.e. the goal of TTO creation is to develop and increase cooperation culture in the research community. These TTOs will be created as part of university infrastructure and their major functions are educational. The advantages of this model are to integrate public research network, ease access to scientific knowledge, and provide direct returns into investment (which it is mostly reinvested in research). At the same time TTOs inside universities, as international experience shows, have low flexibility. They are not driven by market conditions and may create conflicts of interests if evaluation is lead by internal experts. However, currently, when commercial culture in research community is underdeveloped, this form of TTO may be very timely.

Currently there is just a start for development of different TTO models and it is too early to judge which one will be more effective in Russian environment.

TTO as a phenomenon is not a complete novelty for Russia because there were previous attempts, especially patent offices (or kind of) in universities and research institutions. Today these "TTOs" from Soviet times are not active, as surveys show, in fulfilling their functions. The reason, as TTO representatives explain it, is in the uncertainty about the transfer of IP rights from the State to the organization. Therefore universities prefer to sell know-how, not patents or licenses, or to sell their know-how in a form of information purchase. In this way organizations avoid complications related to inconsistency between tax and bookkeeping standards.

The other attempt to introduce a new mechanism for more effective commercialization of IP created under public expense was undertaken in 2002 by two government foundations–the Russian Foundation for Basic Research (RFBR) and the Federal Fund for Assistance to Small Innovative Enterprises (FASIE). They started a new program that should provide stimulus for commercial application of IP created under government expense, namely, under the grants that were awarded by RFBR for the implementation of basic research. This program supports cooperation between research teams–former RFBR grantees that work in R&D organizations and universities, and small innovative enterprises that are interested in commercialization of IP created in course of grant implementation. In this program funding comes in equal parts from three sources: RFBR, FASIE, and small businesses. RFBR is investing in completion of necessary research, FASIE into development stage, and small innovative enterprises should support prototype development, marketing, and dissemination of a new product.

IP is regulated according to a special agreement that should be signed by four core participants: the two government foundations, a research

team, and a small enterprise. There is no common rule for IP regulation. Scientists and small business representatives are encouraged to sign two documents: an agreement on rights distribution on previously created IP and an agreement on distribution of IP that will be created when implementing the project. Usually research teams are asked to transfer rights on the created IP to the small firm-collaborator; and IP that would be created in the course of collaborative work will belong under equal conditions to all partners, i.e. to foundations, researchers, and small firms. At the same time foundations as owners tend to transmit their rights to organizations where teams-inventors work and current legislation generally allows them to do that. This is an important decision because when there is a joint ownership where government is one of the partners, this may discourage private firms from IP commercialization. That is why the transfer of rights from the State to the organization is crucial.

At the present time 86 joint teams received such awards, and foundations' representatives hope to reach a 50% rate of success for supported projects.

Though this approach is a step forward in resolving the issue of publicly-created IP, there are many problems that hamper the implementation of this mechanism. First, there is a vague boundary between open and "closed" research results. Since RFBR grants are awarded for implementation of basic research, the results should be published in open sources–and this is the Foundation's requirement. This may interfere with the intention to commercialize R&D results. Therefore there should be found ways not to disclose in open publications potentially commercially valued IP created under grant support.

Second, the status of the RFBR does not allow, in legal terms, to support any part of innovation process, only basic research. If the project has visible applied orientation, it should be rejected, according to the Foundation's Charter. Therefore in this program RFBR infringes its own strategic mission to a certain degree.

Third, foundations have a legal status of government budgetary entities and as such they are not quite free in making independent decisions concerning transfer of IP rights created through public credits.

It is more or less evident by now that policy trends in European countries begin to echo the landmark of the Bayh-Dole Act of 1980. The rationale for legislative moves in EU countries is that ownership by institutions, as opposed to ownership by individual researchers or government as a whole, provides greater legal certainty for firms interested in exploiting research results, lowers transaction costs for partners and encourages more formal and efficient channels for knowledge and technology transfer[11].

Meanwhile the most attractive European practice for Russia is related to special government agencies like British Technology Group (BTG) in UK or ANVAR in France. The possibility to introduce similar organizations in Russia is currently under discussion. The most important features of these institutions are seen in the possibility to concentrate patenting related activity and thus its inventory and control over its commercialization in one place, under government auspice and with the federal support (as it was at early stages of BTG functioning). Less attention is given to the evolution of European organizations and to the fact that they combine a variety of activities that stimulate commercialization and support

the development of small and medium enterprises. The creation of similar organizations taken out of context of economic and legislative environments may lead to a negative result.

Russia already has one practical experience of that type, when at the beginning of 1990s government widely supported the creation of technology parks at universities and this scheme was modeled after European and American technological parks. In several years it became clear that the implantation of this model was not quite successful, and the assessment of technological parks conducted two years ago has revealed that among all technological parks in Russia less than 10% meet international standards in their activity. All other parks consist mostly of organizations that provide community services at lower price and do not provide any consulting or assisting services. That sort of failure results from the fact that the reproduction of foreign experiences was made out of broader context of economic conditions (such as state of industry, availability of venture, seed money, level of privatization, etc.), state of legislation, development of tax rules, and so forth. It turned out that Russia has copied only part of the whole instrument.

The core factors for successful commercialization are transparency of legislation and as well as administrative rules, transmission of authority and responsibility for commercialization from the government to PRO levels. The necessity of these factors is already realized in Russia and the implementation of certain elements of the system for IP commercialization is taking first steps. In order to succeed, a further elaboration of effective

---

[11] *Turning Science into Business: Patenting and Licensing at Public Research organizations*, OECD, Paris, February 2003, DSTI/STP (2003) 22, p.5.

approaches developed in other countries, in cooperation and consultations with them, appears necessary.

CREATING A NATIONAL INNOVATION SYSTEM IN RUSSIA: GOVERNMENT POLICY

Irina Dezhina
Institute for the Economy in Transition
Moscow, Russia

The purpose of this paper is to give an overview of the major developments that have occurred in post-Soviet science in the creation of the national innovation system and present major directions of government policy in this respect.

First, for general orientation, key participants of innovation process in the area of technological innovations, the structure and sources of financing of R&D and innovations, and the general outcomes of innovation activity (such as patents, licenses, technological balance of payments) will be described. Second, government-supported initiatives aimed at creating the national innovation system will be discussed.

The key participants of innovation activity in Russia are:

1. Universities, academy institutions, and former branch institutions, i.e. organizations primarily involved in R&D;
2. Industrial enterprises;
3. Small innovative enterprises.

In Russia today there are about 4,000 organizations that conduct R&D. Not all of them are related to innovations but definitely the scientific establishment may be seen as a part of innovation system. About half of all these organizations are concentrated in so-called industry sector. However it is not what is usually understood as industry sector in Western countries. In the Soviet Union there were so called "branch institutes" that conducted applied R&D and developments for needs of certain industries and they

worked under the auspices of respective Ministries. Therefore branch institutes were not representing in-house R&D and were not really connected with industry. Today many of these former branch institutes exist and work, as before, separately from industrial enterprises per se.

As graph 1 shows (cf. annex), sources of financing of R&D in Russia have changed over time. The federal budget remains the primary source of support and its share have even slightly grown during the last two years. But what is important, the share of funding from private industry also has grown over time. It is about 25% today. It is still a very low level.

In comparison, as graph 2 shows, the industry funding in selected Western European countries (UK, Germany, and France) is at least twice as much and varies from almost 50% to almost 67%. Japan gets the biggest share: 73%.

The structure of expenditures by types of work (graph 3) shows that applied research (that serves as connection between fundamental research and development) is rather low and thus there is a risk of losing potential for technological development. The comparison with the U.S. shows that there the proportions among R&D categories are stable and the share of applied research is visibly higher than in Russia.

As far as defense-related R&D is concerned, expenditures have been growing for the last three years. Among all types of government allocations on "National Defense" the spending on R&D represents 38%[12] in 2003. Inflation-adjusted growth of R&D expenditures in comparison with the previous year is 22%. The budget for weapons research stands at 1.37 billion dollars in 2003 and is scheduled to jump by 35% in 2004[13]. There will be

[12] *Izvestiia*, February 3, 2003, p.4
[13] P. Webster. "Russia Revives Sagging Research Program," *Science*, vol. 301, July 4, 2003.

more transparent control over the use of this financing because, for the first time, it will be transferred through the Treasury[14]. Before this increase, the government paid in 2002 all his debts to defense sector, including defense R&D.

At the same time today the defense sector is much more involved in civilian R&D and technology production: the share of civilian development represents 48%-52%[15].

Second key players in innovation are industrial enterprises. The share of industrial enterprises in Russia that are innovation-orientated is rather low (graph 4). Currently there is less then 10% of enterprises that implement innovations whereas in OECD countries the figure varies from 25% to 80% with an average equal to 50%[16].

Most innovational active Russian firms are not trying to enter foreign markets, and their major task is to preserve their existing share of the Russian market. According to information given by consulting companies today the approximate correlation between export-oriented and domestic-oriented producers is about 1:4. The preferential orientation towards domestic market may be explained by a number of reasons. The most important of which are: large potential of Russian market, its comparative emptiness, weak competitiveness (which permits to have lower advertisement expenditures) and lower demand for quality from potential domestic consumers. At the same time an important factor that restricts possibilities to commercialize products and technologies at domestic market is low solvent demand for novelties.

---

[14] *Izvestiia*, January 5, 2003, p.4.
[15] "Minpromnauki natsionalizatsiiu ne planiruet," *Nezavisimaya Gazeta*, January 14, 2003.
[16] OECD, *Science, Technology, and Industry Scoreboard 2001*. OECD, Paris, 2002.

As a result of this orientation on domestic market and conservative strategy, innovation spending by Russian firms has a low R&D content, which, in turn, leads to a low demand for science and technology outputs. In these Russian firms that innovate, as surveys show, only 18% of their innovation expenditures are related to the development of new products, services and new production processes. The comparable figure for OECD firms exceeded 33%. It may be partially explained by the lack of sources for in-house R&D because industrial enterprises usually rely only on their own funds. As table 1 shows, the share of own funds is not decreasing and thus other sources of support stay insignificant.

Table 1: Sources of support of technological innovations in industry

	1998	**1999**	**2000**	**2001**
Own funds	74,0	84,5	82,3	88,1
Non-budgetary funds	3,4	3,3	2,7	1,9
Foreign sources	10,0	7,0	5,3	1,5
Federal and local budgets	4,4	2,9	1,3	0,9
Other sources	8,2	2,2	5,6	5,6

However as far as defense technologies are concerned, their export sales are four times larger than their domestic sales. It is expected that the new generation of technologies will be developed by 2006.

The number of small innovative enterprises (SME) also is not large and it is decreasing every year (graph 5). It should be noted however that there are no exact data on the number of SMEs in Russia. Statistically figures that are shown refer only to those SMEs that are operating in the sphere of "science and science services". Those registered are not necessarily involved in high tech activity. At the same time there is also a number of SMEs that statistically are attributed to different branches of industry such as

machine building, and light industry, for example, which are not counted here. These figures just help to catch a trend, not to get an accurate data.

It is the same for sources of support in innovation by small enterprises. There are only pieces of data from sample surveys. One of the most recent ones, conducted in 2001, shows that as for industrial enterprises, the major source to support innovations in SMEs is own funds (about 70% of total funding) followed by bank credits (8%) and financing from the federal budget (5%).

The business/innovation infrastructure–tax, capital and financial markets, administrative barriers–inhibits the emergence of a vibrant SME sector. However it is interesting that there is a certain evolution in factors that small enterprises identify as the most hampering their innovative activity. Surveys conducted in 1999 and 2000 have revealed that eventually underdeveloped infrastructure have become more hampering then the lack of financing (table 2).

Table 2: Factors Hampering Innovative Activity at SMEs

Surveys of 1999 and 2000	**Survey of 2003**
Lack of financial resources (70% of surveyed)	Underdeveloped infrastructure in the area of technology commercialization (46%)
Economic instability in the country (25%)	Incomplete and misleading legislation (22%)
Lack of modern equipment (20%)	Lack of financial resources (16%)

A survey of small enterprises conducted in 2001 shows that they are mostly oriented on domestic market. According to different estimates, 8-20% have foreign partners. They mostly sell products inside the region

where they are located (48% of surveyed firms) followed by 37% of those who sell their products to other regions of Russia.

Consequently, SMEs are still not in a position to be the engine of innovation that they are in OECD countries. Large enterprises, on the other hand, tend to have a more stable financial position and diversified source of revenues. They have the financial means of innovating and account for the majority of innovation activity that is currently implemented in the Russian economy. Not surprisingly, more than two-thirds of innovation expenditures are concentrated in two sectors–chemicals, chemical products, machinery and equipment. At least in Russia today, large firms rather than SMEs dominate these sectors.

Foreign countries that are the most attractive for Russian innovation-orientated industries as well as foreign countries that are most interested in developing innovation activity in Russia may be identified through patent statistics. The majority of external patent applications submitted by Russian inventors was in the U.S., Germany, the United Kingdom, and France.

Data on foreign owners of patents in Russia show which countries are the most active in Russian technological market and with which countries Russian industrial firms cooperate the most intensively. By the number of valid patents the leaders are the United States and Germany–in 2001 their shares from the total number of valid Russian patents granted to OECD countries were 27.5% and 21% respectively (graph 6). But if one takes into account the size of each country it becomes obvious that Germany is an absolute leader. The share of France is constantly growing as well as shares such countries, like South Korea. But the graph shows only the countries-leaders.

The comparative data on license contracts by type of parties (graph 7) show that most of rights are transferred between Russian firms but the share of contracts where one side is Russian and another foreign has grown considerably in 2002. These are official data from the State Patent Office. It indicates that cooperation is increasing.

However general licensing activity is low in Russia (graph 8): the share of valid patents ever used reaches 2% of the total number of valid patents.

This is also reflected in trade balance for technology advanced products that was negative in the year 2001 (latest year available) and amounted to 153.8 million dollars. In the structure of export the share patents, licenses and trademarks was in 2001 only 2% and in the structure of import – 10%. The specificity of Russia is in its ability to make small technologies, not high quality technological chains. And therefore Russia mostly exports small products such as new materials, sensors, and coatings.

However the geography of contacts is growing: Russia now sells technologies to 80 countries (compared to 46 in 1998).

What did the government do to support and stimulate the creation of the national innovation system?

Already in the late 1980s the Russian government declared the importance of development of the national innovation system. This was noted in the "Conception for science and technological development" released in 1990. At those times it was called "the development of innovation activity". The term "national innovation system" was publicly introduced only in 1997.

The government has always favored direct support and direct control over the process of technology development and commercialization and

therefore the preferred instrument was a direct financing of certain initiatives rather then the development of indirect mechanisms to support innovations.

The following government initiatives were implemented since then:

1) Establishing new financial mechanisms;
2) Creating a technical infrastructure to facilitate innovation activity;
3) Developing indirect measures of support.

The major government-supported financial mechanisms created after the breakup of the Soviet Union are listed in table 3.

Table 3: Major Government-Supported Financial Mechanisms in Innovation Sphere

Organization/mechanism	**Year**
Russian Foundation for Technological Development (RFTD)	1992
Federal Fund for Assistance to Small Innovative Enterprises (Fund for Assistance)	1994
Russian Venture Innovation Fund ("Fund of Funds")	2000
Large-scale innovative projects carried out by groups representing science and industry	2002

The first new financial mechanism was introduced in 1992; this was the Russian Foundation for Technological Development (RFTD). It was not connected to the idea of creation of the national innovation system but in fact it was the first organization that tried to connect research and its practical applications after that the Soviet system for the application of the achievements of science to production was collapsed.

The RFTD was created under the auspices of the Ministry of industry, science, and technology (former Ministry of science and technology) and its budget results from deductions that industrial enterprises make from the basic costs of their production. During latest years the RFTD budget has varied from 1.5% to 4% of budgetary allocations for science.

Though RFTD is formally considered as a non-budgetary foundation, in fact it fully depends on government policy. In its selection process the Foundation uses the list of government priorities in high tech area. The RFTD offers up to three-year awards on refundable basis through open competition to applied projects, which may have interdisciplinary, inter-industry applications. These "grants" are interest-free credits.

Since its creation the Foundation has supported about 700 projects, and every ruble invested into projects gave three rubles of profit. However only about 10% of supported projects were commercialized. Expert assessments show that most of the projects are at the stage of research or at the first stages of development. That is why so few project results were commercialized. The largest number of grantees is from the industry sector (about one third) followed by organizations of the Russian Academy of Sciences (10%) and higher educational institutions.

Historically another financial mechanism was introduced in 1994, and again it was a Federal Fund called the Federal Fund for Assistance to Small Innovative Enterprises (Fund for Assistance). The Fund is a federal organization which budget comprises 1.5% of federal allocation on science. In 2002 the total budget of the Fund was about 16 million dollars. In comparison, the U.S. government agencies spend 2.5% of the R&D budgets for the SBIR Program (Small Business Innovation Research[17]) to support SMEs. This total sum represents one billion dollars.

[17] US Government SBIR program provides grants for the explicit purpose of bridging the innovation gap. SBIR program serves at least three valuable functions: (i) it supports technology commercialization, (ii) it promotes the development of high tech SMEs, and (iii) it helps to create a flow of potentially bankable deals for venture capitalists.

The Fund focuses primarily on supporting small innovating firms that have already entered the market for high-tech products. It helps those firms that have designed a product and have secured intellectual property rights on it, embarked on commercial manufacturing of the product, and have managed to find prospective customers. When it was created, the Fund did not have experience in assessing new technologies and it chose to support firms that already passed certain stages in their development. Thus the Fund was taking lower risk. By now the situation has changed, and the Fund is going on to support more start-up companies.

The Fund considers that a firm that received a grant may be considered as a success if it has annual rate of growth about 20-30% and an annual output per employee about 20,000 dollars. According to the Fund, during last three years successful SMEs paid taxes that exceeded 6 times the volume of financing that they received from the Fund and it is 30% more than the total budget of the Fund for this period.

This Fund was the first one to implement several new approaches to support and stimulate innovating activity.

First, the Fund introduced a new system of training. It sponsors educational courses for small innovative enterprises. There is a number of such programs across the country and the specificity of this one results from its special focus on technology commercialization and intellectual property rights protection. A separate program is also designed for school students and undergraduates. After training courses they take part in small innovating enterprises' activity during summer breaks. The scale of the program is around 100 undergraduates and about 50 graduate students annually. Currently the Fund is involved in creation of a so-called Teaching Company Scheme (TCS) modeled from

the UK experience. The TCS provides a government grant to encourage Russian enterprises to hire graduate students, young research scientists, or young professors for up to two years to conduct a research or engineering project defined by the private enterprise. Via this program, small innovative enterprises may get new workforce and benefit of research expertise from young scientists and engineers. Then, such a scheme creates closer links between research organizations, universities and small businesses. Experience that young, skilled workers gain during their stay in a small enterprise may shape their future academic research, thus creating closer links between the research needs of enterprises and the research outputs of university, scientific institute and laboratories.

Second, the Fund initiated in 1996 a pilot project aimed to support the creation of several new structures called innovation-technology centers (ITCs). In total the Fund supported 26 such centers located in 11 regions of Russia. More than 300 SMEs are located in these centers (data for 2002). More about ITCs will be said later.

Third, the Fund and the Russian Foundation for Basic Research (RFBR) organized a joint competition in 2002 to support the transfer of R&D results to small enterprises for their further commercialization. The importance of this competition is in an attempt to develop a new scheme in the transfer of IP created under public expenses.

Still, the Fund's primary activity is the support of small innovating enterprises. It directs about 70% of its budget for that purpose. A large majority of projects is in medicine and pharmaceuticals, machinery and

equipment, and new materials. In total during 8 years of operation the Fund has supported more than 2000 SMEs[18].

Ideally, the Fund and RFTD have to invest funds into the most risky stages of innovation process–when development should be turned into product acceptable for commercialization purposes (prototype development, certification, marketing). Unfortunately both foundations skipped exactly that stage, and RFTD mostly supports applied research, and the Fund for assistance - the small enterprises at manufacturing stage.

Finally, in 2000 the government launched the Russian Venture Innovation Fund–"Fund of Funds" (with a financial participation from the government). It was not as successful as the "Yozma" Fund in Israel, which was the model used for creation of this Fund. The initial intention was to create 10 regional venture funds with the support from the Venture Innovation Fund (its share in total financing had to be about 30%). Instead, only one regional foundation called "Leading" (with total budget of 11 million dollars (in St.-Petersburg,) has been created with support from the Venture Fund.

There are several problems hampering the development of venture capital in Russia, such as:

- Lack of seed money in general;
- Low level of IP protection (though now small enterprises pay to this matter more attention than 3-5 years ago); and too many dual-use technologies than demand a special regime;
- Underdeveloped infrastructure and thus absence of critical mass of small enterprises that may be attractive for venture capital
- Lack of deal-flows;

[18] *Poisk*, no.16, April 19, 2002, p.16.

- Lack of economic stimulus for attracting direct investments into high tech enterprises that would ensure the acceptable level of risk for venture investors;
- Underdeveloped legal basis. Thus the Civil Code does not contain any legal forms that would satisfy the standards of venture business;
- Complicated procedures for registration of venture funds;
- Underdeveloped stock market and thus low liquidity of venture investment (few choices for exit strategy);
- Lack of qualified managers for venture funds.

Until recently foreign investments were prevailing in Russian venture industry. And there was no real expanding of their activity because the lack of domestic investors was a sign of instability for foreign ones.

Recently several positive developments became evident. First, small firms increased their spending on protection and purchase of IP. Second, there is a growth of domestic investment, including high tech area. Third, the government announced in 2003 that its strategy is evolving from controlling and regulating to stimulating. It plans to pay more attention to indirect measures and to development of legal basis.

In 2002 the government initiated a new program aimed at fostering technological development and bringing closer research organizations and industrial enterprises. The mechanism of implementation became large-scale innovative projects carried out by groups representing science and industry.

In May 2002 the Ministry of industry, science and technology announced a tender for large-scale innovative projects. Each of the winning projects is to get 20 millions US dollars for two years, which is quite a considerable funding for the scientific-innovative sphere. The government is providing about one third of the needed funding. The balance is to be

obtained from interested investors. As of today 11 projects among more than 200 have been chosen. In the 2003 budget allocations a separate line of 1.25 billion rubles has been created.

At the basis of this initiative there is the idea that high-tech branches more than others favor the country's economic growth. But conditions for different branches are uneven, as risks in innovation are very high. By giving its support to large-scale innovative projects, the government takes in charge of technological risks and thus creates conditions for high-tech business growth. At the same time the government support of innovative projects is a temporary initiative, which is only used to set examples of success.

Innovative projects were chosen – which is also a novelty for such tenders – by a commission consisting not only of civil servants and researchers, but also business representatives. All this taken together gives hope that chosen projects will succeed. It is expected that a budget of 200 millions dollars will produce one billion dollars in 2-3 years, thus demonstrating to Russian and foreign investors the relevance of investing into science-intensive part of Russia's economy. Then, additional effects of such projects can be both a growth in the number of modern scientific managers and the establishment of venture business.

Government also participated in the creation of an innovative infrastructure. At the beginning it was quite a spontaneous process. In 1997 the Ministry of Science and Technologies suggested to unite efforts and create one interagency program to foster innovation development. The program received the name "The Urging of the innovation activity in science and technology sphere". The major goal of this program was the creation of an innovating infrastructure, which includes the following components:

- organizations supporting innovating activity and the commercialization of technologies,
- informational network in this sphere,
- training and retraining courses,
- consulting services, including legal and marketing.

The key element of this program became a new concept of innovation-technology centers.

But prior their creation such elements as technological parks and science cities (or naukograd) already existed.

Chronologically technological parks were among the first new elements of the innovating infrastructure created in the late 1980s. The Moscow State University was the first institution to experiment the concept and S.-Petersburg followed shortly thereafter. Currently 78 technology parks are listed as active, mostly as organizational departments of universities. However only 30 technoparks have passed the accreditation in 2000[19]. They have different areas of specialization and the majority of technology parks are working in such areas as ecology, scientific equipment, technical equipment for measurement and control, new technologies in medicine, medical equipment, new materials, computer technologies. Regions with the most diversified activity are Moscow, S.-Petersburg and Moscow region.

In general Russian technology parks unite small innovating enterprises and provide them first, with office space at a rate below the market price for a limited time and second, arrange for them consulting services such as auditing, business plan drafting, access to telecommunications, assistance in fundraising. The support for technology parks comes mainly from the Ministry of Education (the largest share)

followed by the Fund for Assistance, and sometimes funds come from local budgets. Investment from industrial enterprises is very limited.

Science cities (*naukogrady*) existed from Soviet times and had to be reoriented and adjusted to new economic conditions. Naukogrady are structures similar to technology parks but they occupy large territory, and usually form whole cities. The analog structure is Japanese technopolis. But in contrast to Japanese technopolis Russian naukogrady were created for the development of defense-related R&D and production and they were parts of the Soviet military-industrial complex.

More than 70 science cities were established during the Soviet period. For security reasons, many were deliberately located in isolated areas, secure compounds adjacent to civilian cities. These cities generally contained one or two specialized enterprises and related research institutes. There was almost no linkage between the output of these science cities and the R&D needs of industrial enterprises in the surrounding civilian cities. Funding for these science cities was supplied almost entirely from the State budget, rather than from any commercial sources. Consequently, their work had very little commercial orientation. When budget funding dried up, and conversion started, many of these cities experienced strong difficulties to survive. Nevertheless, they continued to represent high concentrations of some of Russia's best S&T assets. And when in the mid-1990s foreign foundations and programs started to provide support for researchers to convert them to civilian projects, the cities started to regenerate.

In 1998 there appeared a government resolution which announced the launch of pilot project in one of science cities–Obninsk. The idea was to develop on a "model object" all mechanisms and legislation aimed to revive

[19] For comparison, there are 160 technological parks in the U.S. and more than 300

science cities and use more effectively existing infrastructure and scientific potential. In May 2000 Obninsk received an official status of "science city". The major idea was to exempt such a city from all federal taxes and redirect this fiscal receipts to regional development. This measure could also attract foreign investments into region because the status indicates that the region becomes more open and civilian-oriented. Also, the status gives privileged access to government contracts. Currently this status is granted to four former closed cities–Obninsk, Dubna, Korolev, and Kol'tsovo in Novosibirsk region. The last one received this status quite recently–in January 2003.

Audit of the work of the first two science cities (Obninsk and Dubna) conducted in 2002 has concluded that the crisis in these cities was stopped but R&D did not get enough stimulus for their development and there were no new R&D results[20]. One of the key hampering factors is that the federal financing of science cities is not goal-oriented and the budget is not transparent. Then, government financing is granted through the budget line that provides support of the social sphere, municipal economies, by no means for innovative development. Therefore financing could be spent for support of the city needs and not for R&D and technology development. And regional administration did not provide support for R&D. Finally, government does not have a clear strategy for the development of science cities so far.

Thus, the old infrastructure was not very effective and that is the reason why the new concept of ITCs emerged. Their creation started in 1997 due to united efforts of four government agencies–Ministry of Science and Technologies, Ministry of Education, RFTD, and the Fund for Assistance.

---

in the world. (*Poisk*, no. 33-34, August 25, 2000, p.12).

ITCs represent conglomerates of small innovating enterprises which are located "under one roof", i.e. in certain compact territory (in case of today's Russia - even in one building since the scale of most ITCs is small). Most of small enterprises participating in ITCs are on manufacturing stage and only small portion of them are pure R&D organizations. In fact an ITC as it is today resembles a technology park. Some of ITCs were created on the basis of technology parks and all of them provide similar services.

Today there are 52 such Centers in different regions of Russia. Some of them were established on exclusively federal support and others used combined federal and regional resources for their creation.

The evaluation of ITCs conducted in 2001 revealed that for small enterprises the most attractive features in ITCs are: privileged renting conditions, possibility to take part in investment programs, and geographical location. As much less important were ranked such resources as training programs, consulting services, and exchange of experience with other small enterprises located in ITC. In part it may be explained by the fact that currently professional consulting and training services are affordable outside ITC sometimes at lower price.

In the area of innovations the predominant number of initiatives was aimed at supporting small enterprises but there was minor stimulus for larger industrial enterprises to increase their innovation activity. Indirect measures as well as an adapted legislative system are still not well developed.

Tax exemptions in Russian S&T area are applicable only to R&D establishments. Usually they are related to the status of organization – it should be so-called "organization of science" where expenditures on R&D comprise at least 70% of the total expenditures of organization. Tax

[20] *Rossiiskaya nauchnaya gazeta,* no.27, 23.07.2003, p.1.

exemptions are not related either to effectiveness or types of work the organization conducts. Since a new Tax Code was introduced in 2002, research organizations have lost some tax remissions. Thus, now there are no tax remissions for the import of research equipment and that will be an obstacle to renovation of material basis of research organizations and thus may lead to a technological lag of the country.

At the same time tax incentives for stimulating innovation are insignificant. Since 2002 organizations (including industrial enterprises) may receive investment tax credit for income tax as well as for regional and local taxes for the period from one to five years. And tax payments may be reduced with later phased payments of sums of credit and interest.

For many years the government was reluctant to introduce tax exemptions and tax remissions because it was concerned over inappropriate use of these incentives in favor of organizations that in fact are not working in high-tech area. Then, the International Monetary Fund did not support the introduction of such measures because their analysis have shown that in transition economies tax incentives in S&T area do not produce any real effect[21].

However it now becomes clear that only under direct financial support from the Federal budget the innovation sphere stays inconsistent and underdeveloped.

[21] Thuronyi V. (Ed.) *Tax Law Design and Drafting*. IMF, 1998.

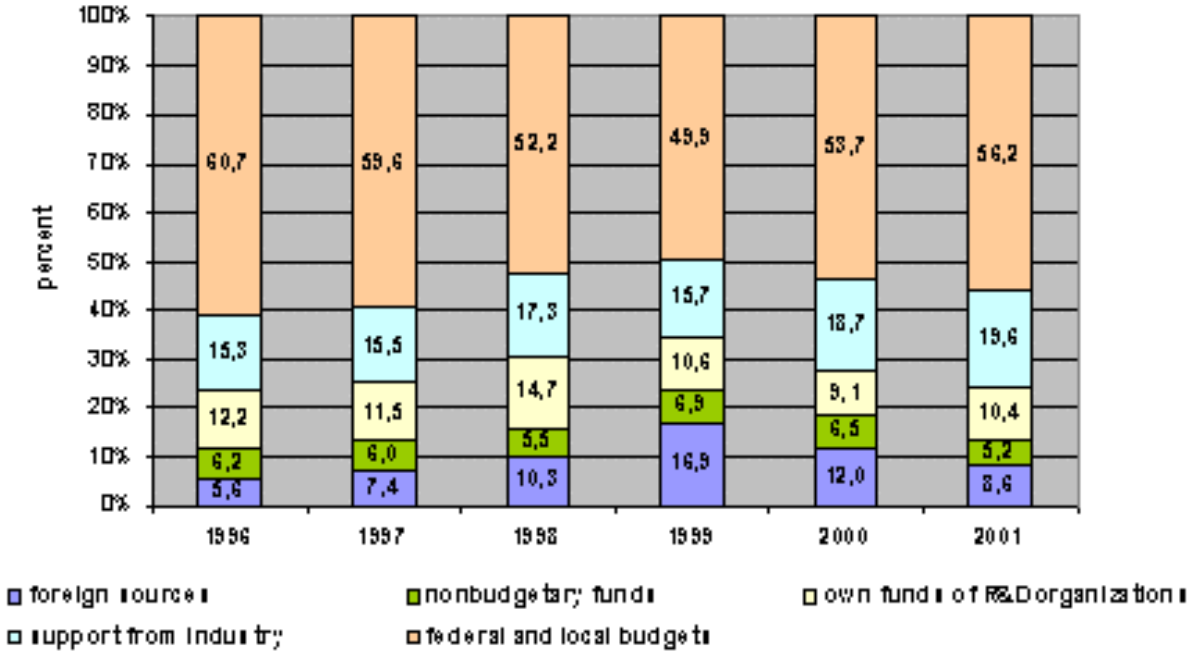
CONCLUSION

The recent strategic direction for development announced in 2003 by the government is the creation of a "technological corridor", i.e. linkages and relationships among all participants of innovation process, starting from basic research and to the commercialization of new technological products. Indeed, during the observed years, no sustainable connections were being built among the key participants of an innovation system–higher education institutions, academic organizations, small innovative firms and industrial enterprises.

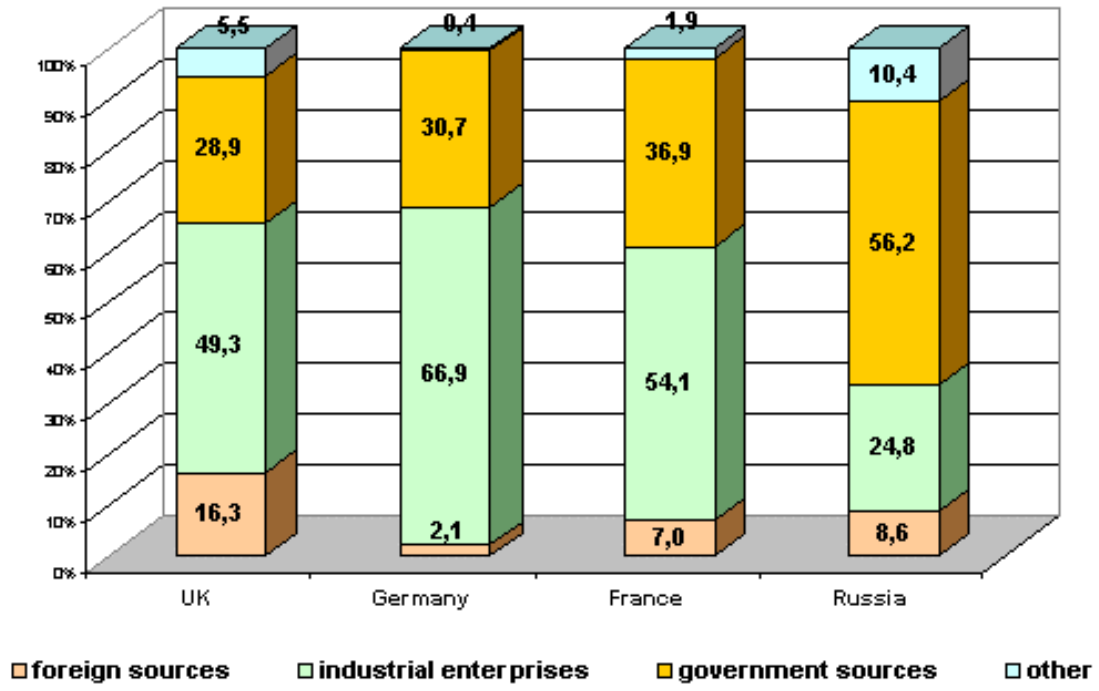
The years of reforms show that hands-on type of management through direct financing and control is still dominating at the government level and this is the legacy of the Soviet period, which is very difficult to overcome. At the present time the government tries to move from selective support of mostly small enterprises to more system-defined approach. It hopes to become a catalyst of creation of the innovation system through the development of legal system and innovative infrastructure.

ANNEX: GRAPHS

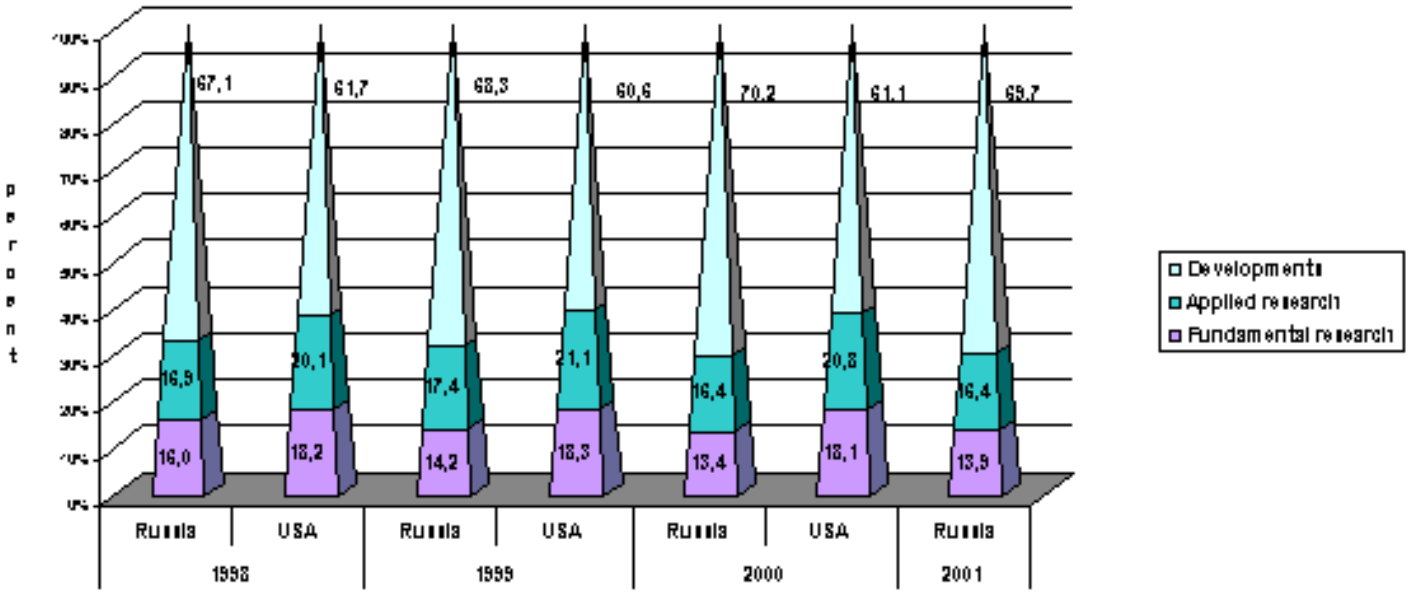
Graph 1: Intramural Expenditures on R&D in Russia, by Source of Funds



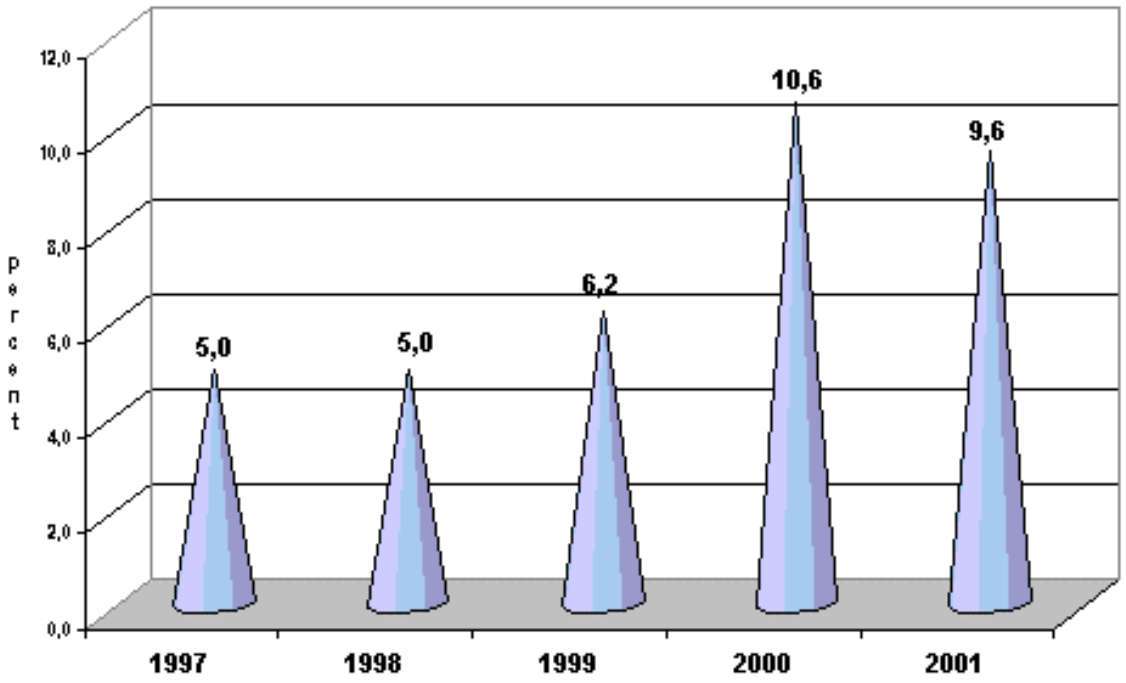
Graph 2: R&D Financing by Main Sources of Funds (%), Latest Year Available



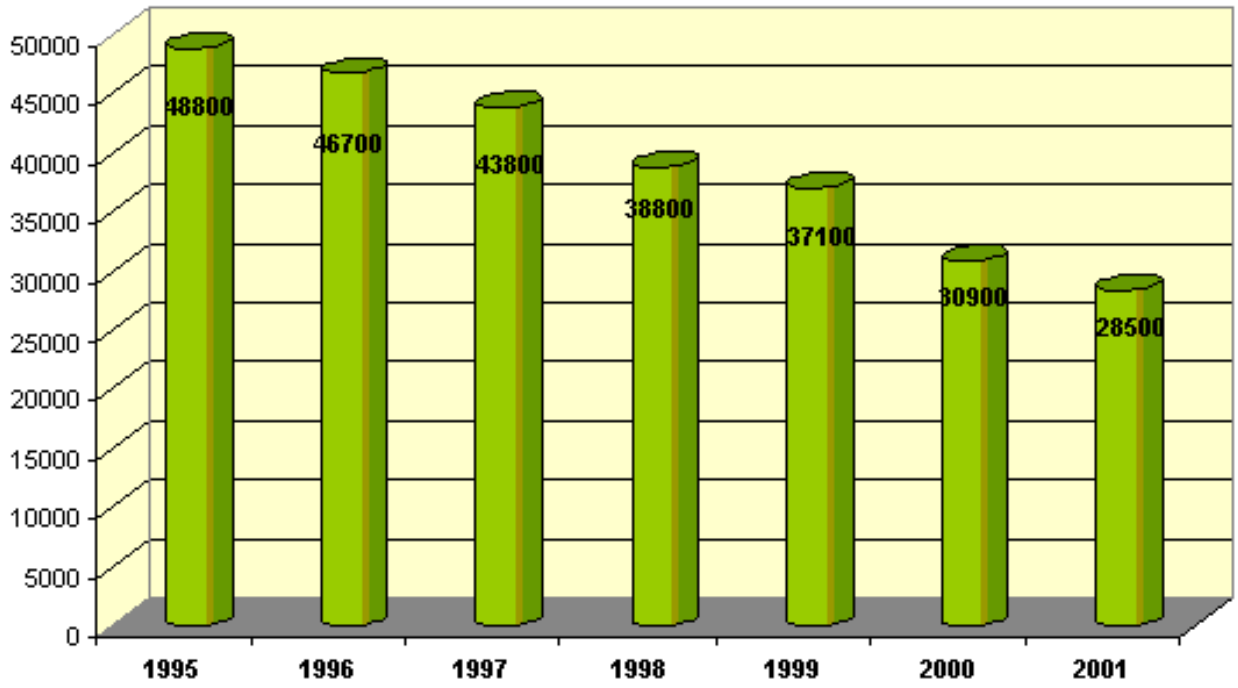
Graph 3: Intramural Expenditures on R&D, by Type of Work



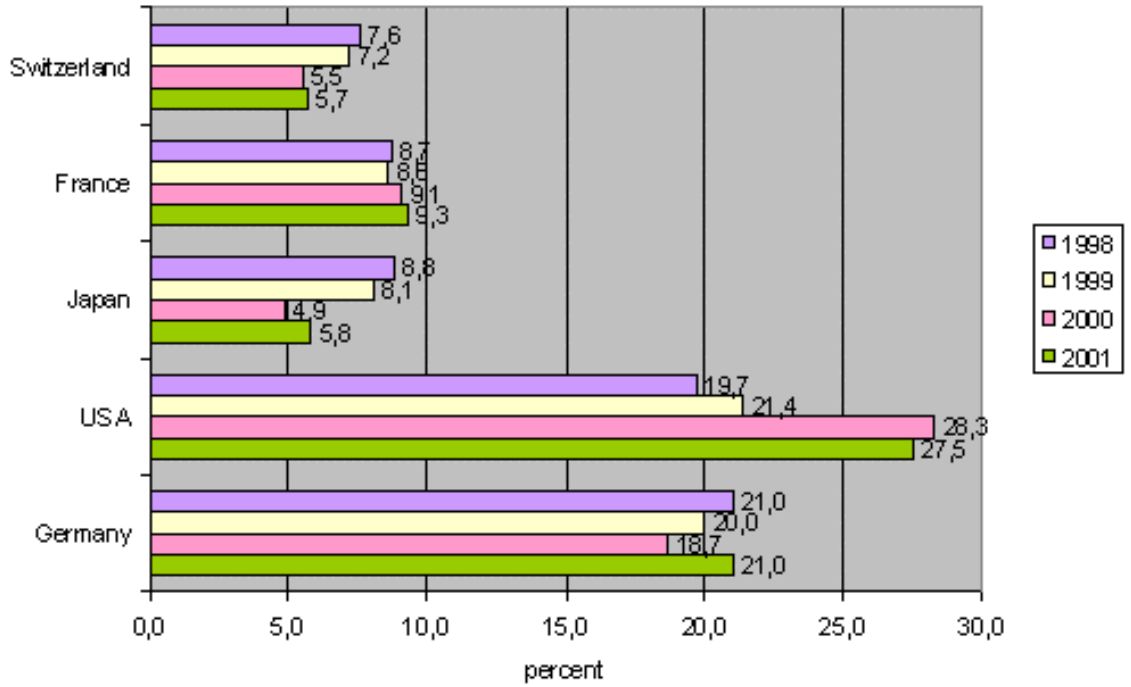
Graph 4: Share of Industrial Enterprises in Russia Conducting Innovations



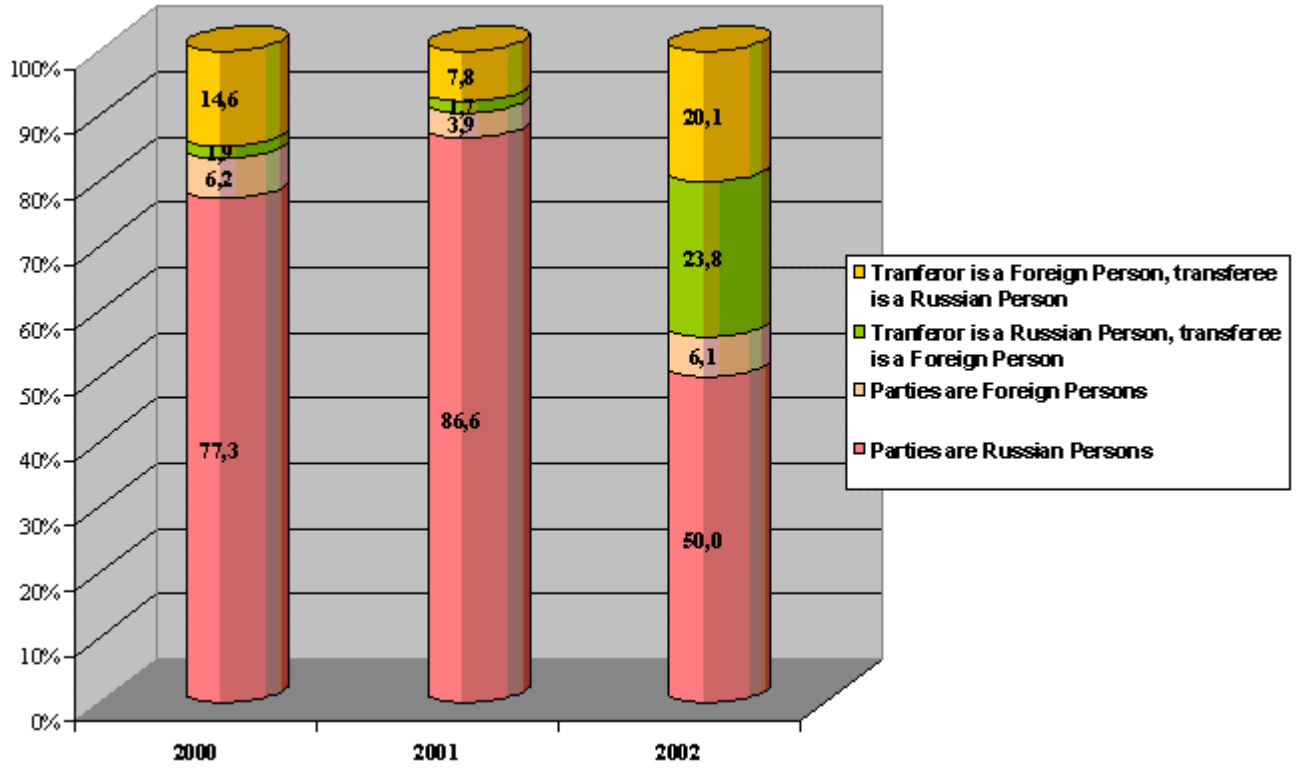
Graph 5: Number of Small Innovative Enterprises in Russia



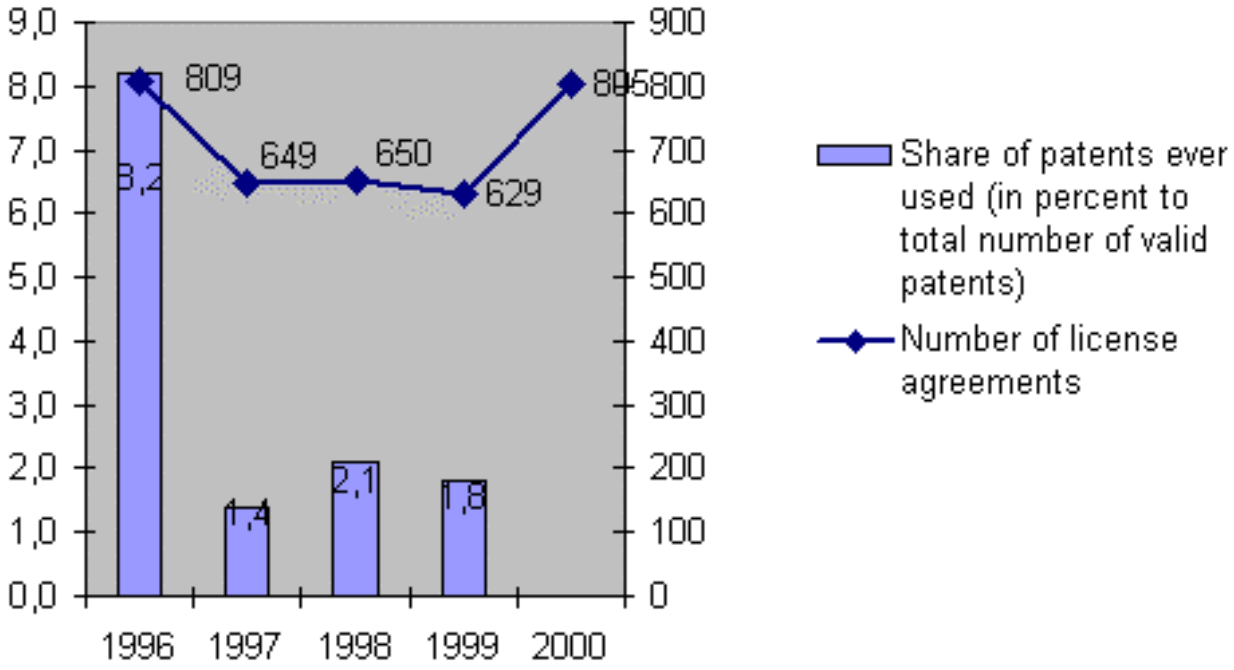
Graph 6: Valid Russian Patents Granted to Foreign Applicants
(% of Total Number of Russian Valid Patents Granted to OECD Countries)



Graph 7: Comparative Data on License Contracts, by Type of Parties, in % to the Total of Every Year



Graph 8: Licensing Activity in Russia



DGA/CHEAr
Centre des Hautes Études de l'Armement
École Militaire
21, Place Joffre - 75007 Paris
Adresse postale :
4bis, rue de la porte d'Issy
00457 ARMEES
Tél : 01 44 42 54 97
Fax : 01 44 42 42 33

www.chear.defense.gouv.fr