

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

**TOWARDS A
KNOWLEDGE-BASED ECONOMY**

**RUSSIAN
FEDERATION**

COUNTRY READINESS ASSESSMENT REPORT



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FOREWORD

The last decades of the 20th century have represented a turning point in the global development process. It is knowledge that has become the engine of the social, economic and cultural development in the today's world. Knowledge-intensive economic activities are now a factor of production of strategic importance in the leading countries. They have also become the main indicator of the level of development and the readiness of every country for a further economic and cultural growth in the 21st century. Taking into consideration all these factors, the United Nations Economic Commission for Europe has launched an initiative of monitoring and analyzing the development of the knowledge-based economy in all the European countries in transition and emerging market economies.

The major goal of this initiative is to stimulate the exchange of national experiences, to identify best practices and to promote region-wide and global-wide cooperation of the UNECE member States, which would accelerate the development of a knowledge-based economy in the countries in transition and emerging market economies. It envisages the preparation of country assessment reports on the biennium basis by national experts, nominated by the Governments, the creation of a High-Level Task Force on the Knowledge-Based Economy, which will consider the reports and provide policy advice and recommendations to the participating countries, and the development of progress measurements and indicators, policy guidelines and tools to assist countries in overcoming obstacles to the development of a knowledge-based economy.

We hope that the country assessment reports, showing a detailed level of the countries' potential and providing information on various approaches and solutions, will help policy-makers to take strategic decisions with regards to the challenges facing them in the development of institutions, information and innovation systems, human resources development and other areas crucial for the development of a knowledge-based economy.

*Brigita Schmögnerová
Executive Secretary
United Nations Economic Commission for Europe*

The scientific and technological revolution, which is based on the development of Informatics and which is occurring throughout the world right now, has already brought its fruits. We are on the eve of grand transformations, which have in store the most surprising implications for the development of humanity.

This is why the initiative of the United Nations Economic Commission for Europe to set up a system of monitoring of the development of electronic information technologies in the European countries is worth of high appreciation. The system of preparing country assessments by independent experts, in our opinion, is the most appropriate approach to establishing a real situation in country, a snapshot of changes taking place. I think, that when a full-scale analysis of the situation in all European countries will be prepared, it would be a very interesting and useful document.

In conclusion, I would like to express words of appreciation to the initiators of this project and first of all to Ms. Schmögnerová, Executive Secretary of the United Nations Economic Commission for Europe.

With all respect,

*Andrei Korotkov
First Deputy Minister
of the Communication and Informatization
of the Russian Federation*

PREFACE

The industrial revolution of the 19th century and the scientific revolution of the 20th century have prepared the conditions for the rise of the knowledge-based economy. Economic activities associated with the production and utilization of information and knowledge have become an engine of economic growth in the developed market economies, increasingly transforming all the other dimensions of development and the entire societal *modus vivendi* and *modus operanti* of the humanity.

What do we mean by “the knowledge-based economy”?

It is not just the digital economy, which incorporates the production and use of computers and telecommunication equipment. It is not quite the networked economy, which incorporates the telecommunication and networking growth during the last decades and its impact on human progress.

The knowledge-based economy is a much complex and broader phenomenon. There are different dimensions and aspects of the knowledge-based economy:

1. The knowledge-based economy has a very powerful technological driving force – a rapid growth of information and telecommunication technologies (ICT). Every three – four year there appears a new generation of ICT. Today, the ICT companies are among the largest corporations. The ICT sector is among the fastest growing economic sectors.
2. Telecommunication and networking, stimulated by a rapid growth of ICTs, have penetrated all the spheres of human activity, forcing them to work into an absolutely new mode and creating new spheres. The information society has become a reality.
3. Knowledge, based on information and supported by cultural and spiritual values, has become an independent force and the most decisive factor of social, economic, technological and cultural transformation.
4. The knowledge-based economy has allowed a quick integration of the enormous intellectual resources of economies in transition into the European intellectual pool, stimulating the development of the former countries. Every country can benefit from developing a knowledge-based economy to become a more equal participant in the global development process.
5. The emerging knowledge-based economy has been affecting other areas of societal activity in every country, including institutional and innovation system, human resources development and etc. and visa versa. The knowledge-based economy has become an engine of progress in every country. If a country is developed, it has a developed knowledge-based economy, if a country is lagging behind, a knowledge-based economy constitutes just a small fraction of its economy.

The report below was prepared by a national expert, nominated by the Government, and represents an overview of the present situation and an assessment of the emerging trends in all the major areas, constituting the foundation of the knowledge-based economy, such as policy and policy instruments, institutional regime, ICT infrastructure, information system, national innovation capacities and capabilities.

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Introduction

The increasing influence of information and communication technologies (ICT) in the post-industrial world has brought about a new, global, technological revolution which eclipses the industrial revolution of the 19th century and the scientific revolution of the 20th. Creative knowledge, based on access to information, and supported by cultural and spiritual values, has become the most decisive factor in social, economic, technological and cultural development in today's world. This knowledge replaces the role formerly played by energy and raw materials in the economy. Knowledge is now a significant force in its own right. The knowledge-based economy creates strong potential for economic growth, and is a strategically important production factor. In the most advanced countries, it is not energy but rather new technologies, which contribute an ever-increasing share – currently more than 50 percent - to GDP.

Incorporating the enormous intellectual resources of the Russia Federation into the formation of the global information society could significantly enhance the lives of the country's population as well as contributing to economic growth and improved conditions for personal development. The Russian Federation could also become a more equal participant in world development while preserving its own political independence, nationhood and culture, based on its highly-developed civil society.

One of the key challenges for the Russian Federation is to form a knowledge-based economy and a national system that promotes innovation, within the framework of a market economy. It is necessary to create mechanisms for information support and for the transfer of knowledge, so that they can become part of economic activity. The scale and complexity of the tasks connected with the development of a new type of economy and its integration into the world economic society requires a thorough analysis of the country's current trends and prospects. This report attempts to provide such an analysis.

1. National strategy and action plan

The Russian Federation's national strategy for a knowledge-based economy and plans for its realization - an action plan - should take into account the following:

- the country's strong scientific, educational and cultural potential, as well as its cultural heritage;
- the need to realize collective knowledge potential through a highly-developed structure that promotes innovation, together with an efficient mechanism for commercialising knowledge as well as a wider use of information and communication technologies (ICT);
- Insufficient development of ICT in the Russian Federation restrains its entry into the global information exchange system and the market for knowledge.

Key problems of ICT development in the Russian Federation are:

- the low level of development of information and telecommunications infrastructure and information communication services compared to leading countries;
- the relatively low living standard of most of the country's population, limiting effective demand for ICT goods and services;
- the insufficient readiness of the population for living in the information society including the absence of incentives for use of modern ICT and inactivity and inertia in information usage.

There are a number of additional factors that hamper "electronic" development in the Russian Federation:

- the absence of clear investment policies for financing programmes and projects for promoting the development of the information society;
- a weak and incomplete legislative and normative base for information, and for the development of an economy based on information and knowledge;
- a delay in key applications of ICT, particularly in education and economy. This is due to a low degree of links between ICT and the education system at all levels, and to the insufficient development of modern electronic forms of business.

These factors underscore the necessity for the formation of a national strategy and information society transition programme. This should include the development of principles for a functioning economic system in the Russian Federation in a new "electronic" reality, as well as the development of national policies for international cooperation in these areas.

The given strategy aims at achieving:

- the development of an information and communication services industry - first and foremost in socially significant areas;
- equal access to these services;

- the development of methods for information interchange between authorities, civil society institutions and the general population, based on widespread application of ICT - “electronic governance”;
- a widespread application of ICT in education at all levels, including the training of specialists;
- the modernisation of legal practice as regards intellectual property rights and related fields;
- the modernisation of legislation, forms and methods of regulation in the information and communication fields, as well as of the normative base in the field of electronic documentary exchange and electronic business transactions;
- the introduction of electronic technologies into government procurement;
- the simplification of company procedures by applying the principle of self-regulation with the help of ICT;
- the realisation of the export potential of Russian programming ability, other ICT goods and services, and the training of qualified specialists in this area;
- A general population that is educated for living and working in the information society. This should be achieved by means of awareness-raising programs on ICT and their applications;
- regular consultations with business representatives, federal and regional state authorities, international organizations, and scientists and experts. This can take place within the framework of conferences and seminars;
- A move towards collective efforts in the development of the information society, the coordination of these efforts, and public support for relevant ideas and initiatives.

The Russian Federation’s strategy for transition to a knowledge-based society is based on the implementation of a number of special national programs, such as: “Electronic Russia”; “Development of informatisation in the Russian Federation up to 2010”; “Development of the unified educational and information environment in 2002-2006”; “Development of electronic trade in the Russian Federation in 2002-2006”; inter-departmental program “Development of a national computer telecommunication network for science and high school”; and other initiatives and measures. Examples of such initiatives are: “Project Russian development portal” (supported by the World Bank); “Development of education in Russia” (Open Society Institute); etc.

In addition to national programs that promote the development of an information society, there are a number of regional informatisation programs. Such programmes are now being implemented in more than in 15 regions of the Russian Federation. The most informative of these are the following programs being implemented in the country’s larger cities: “Conception of transformation of Moscow into an information-society city”; and “The strategy of transition of St. Petersburg to the information society”. These programmes demonstrate the commitment of officials to the promotion of informatisation in the country.

International projects and programs in which Russian organisations actively participate are also being implemented. One example of this is an UNESCO program entitled “Information for Everybody”. Programmes are currently being implemented by the following ministries and departments:

- The Ministry of Internal Affairs;
- The Public Prosecutor’s Office;
- The Ministry for Foreign Affairs;

- The Ministry for Taxes and Dues.

These bodies support and update special databases on their respective subjects. The computerisation of data collection and information processing has significantly increased in both these ministries and in other national government structures.

Informatisation programs are being developed in many areas of society including employment agencies and social services and benefits agencies. These include pensions, health services, etc. In the Russian Federation, the process of transforming the country into an information society and a knowledge-based economy manifests itself, to a varying degree, in practically every social institution and state authority.

2. The institutional regime

The Russian Federation is currently undergoing structural reform, a process that still has some way to go. The State, therefore, continues to play a more profound role in the economy than in many other countries. It formulates informatisation policies, develops economic and legal mechanisms, and determines the rules of the game for everyone involved in the development of a knowledge-based economy. The backbone of this policy is the normative-legal base, which sets out new forms and methods of national regulation to promote investment activity and competition.

The evolution of the country into an information society, and the creation of a knowledge-based economy, inevitably requires increased governmental participation, and consequently, impacts on the normalisation process by:

- coordinating the activities of social agents involved in the process;
- keeping political, economical and legal mechanisms in the hands of government, and by determining the “rules of the game”;
- creating the legislative and normative-legal bases regulation;
- attracting investment and promoting competition;
- encouraging the participation of the private sector by offering a choice of activities and business structures - initially to small and medium-sized businesses interested in the development and production of a national market of information-communication means, products and services;
- actively supporting national ICT producers, especially, the fundamental and applied sciences, and supporting the production of relevant technologies;
- promoting the participation of the Russian Federation in the world market for information-communication products and services; the development of international standards and regulation in this field; the realisation of international projects and informatisation programs;
- encouraging regional and municipal state authorities to participate in the informatisation process;
- providing appropriate conditions at a local level for transition to the information society and adapting solutions to meet the specifics of social-economic and cultural development in regions.

The fact that thirty-eight deputies of the State Duma of the Russian Federation have established a cross-sectoral group, “Electronic Russia”, is evidence of the importance of state regulation in the ICT sector. The group has decided to examine matters related to the development and usage of information technologies. The Duma has discussed three bills: “Electronic digital signatures”; “Electronic documents”; and “Electronic trade”.

Development of the information society in the country is stimulated by relevant political, socio-economic, legislative and organizational decisions. Legislative decisions require a coherent, consistent, ordered and balanced control of information flows in the legislative arena. In the legislative process the full cycle of developments - whether at the anticipatory phase, during development or upon finalisation - are characterised by information generation and exchange. For legislative purposes to promote the formation of a Russian information society, norms and standards have to be created and/or improved. These processes to create or improve norms and standards, must happen at a number of levels,

namely: within the framework of the National Constitution; and within the existing national legislation both at the federal level and in autonomous republics.

Legislative activity in the areas of information, informatisation and telecommunication, deals with:

- basic laws normalizing relations of a common character eg. national laws on “Information, informatisation and information defence”, and including “Means of telecommunication”;
- information laws which set norms for information-related activities, and which are categorised according to type of activity, including national laws on “Participation in international information exchange, and on “Ordinary mail”.

Current Russian legislation shows that legal matters related to the creation of the information society in Russia have a wide normative base. At federal level alone this includes more than 50 national laws. In addition to these, there are numerous normative legal acts issued by the President and the Government of the Russian Federation.

The scope of these legislative acts is extremely wide, and, given the specifics of legal relations, their interpretation in relation to the information sector is very complex. This is particularly apparent during the formulation of new, and the adaptation of existing, legislative acts, as the resulting regulation has failed to provide appropriate incentives for implementation and compliance.

Evidently this field of legislation is completely new for the courts. In spite of their attempts to overcome difficulties in applying existing laws to the new situation, their effectiveness in this field remains deeply inadequate. There is an urgent need to improve and develop an appropriate legislation.

The legal conditions for wider use of information and communication services, on the basis of telecommunication networks, exist in practically all fields of activity. In order to adopt a systemic approach to this challenge, the Russian Ministry of Telecommunications and Informatization, and the State Duma Committee on Information Policies and Telecommunications, presented in 1998 a “Concept for the development of legislation in the field of information and informatization of the Russian Federation”. The concept was finalized in 1999 and is now under discussion. The development of legislation in the field of information and informatization must be synchronized with the development of legislation in other relevant fields, and harmonised with international norms and standards.

At present, the following legislative projects are with the State Duma:

- commercial secrets;
- right of access to information;
- confidential information;
- TV and radio broadcasting;
- insertion of amendments and supplements to a national law on “Media”;
- insertion of amendments and supplements to a national law on “Compulsory copies of documents”.

A number of bills have been developed according to the plans of the Supreme State authorities, including:

- electronic digital signatures;
- insertion of amendments and supplements to a national law on “Information, informatization and protection of information”;
- insertion of amendments and supplements to a national law on “ Participation in international information exchange process“.

The following bills are ready or have been prepared:

- insertion of amendments and supplements in the “Budget code of the Russian Federation”. This defines the allocation order of budget expenditure on “Information technology”, and aims to ensure coordination of efforts by the State and Government authorities towards the informatisation of areas under their jurisdiction“,
- “Information interaction between State authorities”. This aims to improve coordination between all state authorities on how social-economic policy is implemented during the formation of an information society;
- “Intra-national information exchange in the Russian Federation”. This aims to establish a common understanding and common principles for the content (interpretation) of information in the languages of the Russian Federation;
- “Regulation of matters related to the development of Internet networks in the Russian Federation”. This aims to improve the mechanism of relationships between the users of such networks with special attention being given to electronic commerce. This bill deals with the following matters:
 - common norms for Internet regulation with a description of the rights and obligations of individual operators on the Internet;
 - participation of the State in matters concerning Internet regulation;
 - regulation of information flows into private electronic mailboxes (including commercial information);
 - protection of personal data during the transmission of information via the Internet including:
 - requirements of the Internet service providers (ISP) as regards protection and confidentiality of transmitted data;
 - requirements as regards the use of personal data by ISPs.
- electronic trade on the Internet including:
 - requirements to identify the source of a commercial offer;
 - required volume of information to be contained in the offer;
 - the contractual procedure for electronic commercial transactions;
 - provision of consumer protection, including contracts made on the Internet;
 - restriction on the distribution of special types of information via the Internet.
 - status of Internet domain names.

The development of legislation in the field of information and informatisation requires the introduction of amendments to the Civil Code, the Code on Administrative Offences and the Criminal Code of the Russian Federation, as well as of other basic national legal acts. It is necessary to insert amendments and supplements into existing national laws that regulate information, as the latter do not take into account the peculiarity of information relations in the information society.

The Articles of the Federal Program “Electronic Russia (2002-2010)” envisage improvement of legislation in the field of ICT. The following measures are planned: improvement of the

normative legal base; refinement of the concept of development of legislation of ICT usage in social and economic fields; and the development of bills and normative acts that would normalise relations in the usage of ICT, including the improvement of criminal, administrative and procedural legislation. Within this program optimisation of national control and monitoring of the ICT sector is planned. This takes into account the need to protect the State's own information resources.

On 16 May 2002, the Government of the Russian Federation discussed a draft bill on "Insertion of amendments and supplements to the National Law on Communications", prepared by the Ministry of Communications. The new law is complex and systemic in nature and aims to create conditions which would raise the attractiveness of the sector for domestic and foreign investors.

The law is in complete harmony with European telecommunications legislation and is designed to develop telecommunications in the country. It coordinates more than 20 ministries and departments of the Russian Federation, the Institute of Comparative Jurisprudence, and the Legal Administration of the President of the Russian Federation. The law incorporates recommendations of international organizations, including the ITU, and it has been approved and submitted to the State Duma of the Russian Federation.

A new edition of this bill includes the concept of universal service provision and an implementation mechanism. The bill also consolidates the right of telecommunications operators to introduce a payment system. In addition the legislation is designed to establish an interconnection order for electric communication networks in the Russian Federation. This should minimize the risk of unfair competition by equalizing the ground for new and traditional telecommunications network providers.

Besides improving licensing and certification mechanisms, the bill also simplifies the entry procedure for telecommunications of small and medium-sized businesses. The bill foresees the protection of the State interests through the regulation of the participation of foreign investors in national telecommunication infrastructure and by providing a framework for the expansion of the market potential of traditional telecommunication operators.

In spite of all of the difficulties associated with the formation of a new legislative base of the ICT sector, the work on it continues. It reflects a process by which the State is defining its new regulatory role and a rising new economy.

3. Present situation and trends in the country's information system

Summarised results of an analysis of the readiness of the Russian Federation to adapt its ICT to market requirements are presented below. These are based on an investigation by the “Russian portal of development” team, using the method proposed by the Harvard University International Development Centre.

3.1 Access to the networks

3.1.1 Information infrastructure

Land-based line telecommunication

The main type of network communication in the Russian Federation is local, inter-city and international voice/telephone communication. The volume of services has been increasing by 5-7% each year and constitutes at present 60% of the information communication market. The telephone density (quantity of phone sets per 100 residents) is 21.3 against 15.1 (average world indication), while territorial telephone density (per 1 sq. m. of territory) is 27 %. The share of digital communication channels from all kind of PSTN channels in the country accounted for 70 % at the beginning of 2001. About 54 % of this share is equipped with modern signalling system OKC N 7, allowing the provision of integrated network services of the ISDN type. At the end of 2000, the coefficient of the “digitalization” of the local network was 29%.

The level of telephony in rural areas is rather low: telephone density is less than 10 per 100 people; about 40 % of the country's 150,000 villages, and 37 % of farms have telephone links.

Cellular communication

At the beginning of 2002, mobile cellular communication networks covered 74 of the country's 89 regions. According to the Ministry of Communication, the number of mobile phone communication subscribers was 9.5 millions, 90 % of whom were GSM subscribers. Two companies – MTS and Vypelcom - serve about 70 % of cellular subscribers in the country. The rapid growth of cellular subscribers, which took place between 1999 and 2002 in Moscow and a number of other cities, will, however, decrease mainly due to the relatively low average income of the Russian population.

Cable networks

Almost 20 million subscribers have Cable TV (CATV), which is provided by small operators. These operators broadcast central and regional programs and add their own local programs and satellite channels. The number of subscribers, who have access to the CATV back up channel that provides the opportunity of choosing coded commercial programs, is 10 %.

3.1.2 Opportunity to access the Internet

The Internet services market in the Russian Federation is regulated by the State. The Ministry of Communication is responsible for the licensing of different types of activities, depending on the nature of the business eg.data transition services (by the beginning of 2001 the Ministry issued about 1000 licenses, including licenses for ISP); and telematique services

(more than 1300 licenses have been issued including IP-telephony, electronic mail services, etc.). More than 300 ISPs are operating in the country. Every ISP has its own client network, containing more than 100 hosts. Eighty ISPs cover more than 90 % of the Russian Internet services market. About half of these hosts are located in Moscow and St. Petersburg.

The primary type of access to the Internet for individual users today is commutative access via PSTN (for example MGTS in Moscow and PTS in St. Petersburg). For corporate users, ISPs provide dedicated channels on copper pair, fibre-optic lines, ISDN, wireless access and satellite channels access.

For those, who have no computer at home, school or work, there are some opportunities for gaining access to the worldwide web via Internet-cafes and public organizations, such as universities and libraries. It is worth noting the important role that the traditional mail system plays in the development of access to the Internet. Post offices participate in the State Cyber Post Program, which increases public access to the Internet.

3.1.3 Opportunity to use the Internet

The prices for services provided by ISP remain on the high side, and the tariffs thus restrict access to the Internet in the household sector. Russian citizens use the Internet at their work place (46%), at home (20 %) and at their place of study (14 %). Another growth factor of the Internet in Russia is the access to computers. In 2001, the total number of computers was 10 million. Total number of Internet users in the country is forecasted to reach around 26 million by 2010. The price for corporate users of the Internet services provided on dedicated wire or fibre-optical communication lines by commercial providers is out of reach of the SME sector. Science, culture and education organizations circumvent these restrictions by using non-commercial computer networks. Their prices are 10 times lower. In some regions (Moscow, St. Petersburg, etc), ICT support programmes for SMEs exist. These programs offer the opportunity to access the Internet on preferential terms.

3.1.4 Transmission of information via networks

Telecommunication quality

The average index of connection breaks in traditional operating companies is approximately 20 %. New operators do not publish data on the quality of their services.

Information transmission rate through the networks

The total bandwidth provided by all Russian ISPs for access to the Internet in the middle of 2001 exceeds 180 Mbit/sec. Main ground communication lines of the Russian main network, JSC “Rostelecom”, have bandwidth between 622 Mbit/s and 2.5 Gbit/s.

Currently, there is growing demand for more broadband channels (128-512 kbit/s) offering access to the Internet, but real demand will be restricted by the prices of services. National and commercial organizations, in large cities, use 2 Mbit/s dedicated lines for connection to the Internet.

Asymmetric technologies with broadband capacity of up to 512 Kbit/s – K6 Mbit/s have been widely used. They are based on ADSL technologies.

3.1.5 Software and hardware

During the last 10 years, a highly developed software-hardware market has been formed in the Russian Federation. In spite of economic and political problems, Russia, by 2000, had 32% of the east European ICT market (equivalent to 12 billions of euros). The current rate of growth in the market is around 12-13 % per year and is concentrated primarily in the computer equipment sector.

Some of the main factors behind the growth of the Russian market for ICT are: the growth in the number of small and medium-sized enterprises; the development and growth of the Internet/Intranet networks; the growing needs for professional servicing of ICT; and the launch of projects in the fields of banking insurance and financial services, as well as telecommunication and production and so on. Growth has been observed in the sector of applied software, as well as in the service sector (consultation and operational services). The number of Russian specialists working in the U.S.A, Western Europe and Australia, and the development of offshore programming in the country (the output of which in 2001 was USD 175 millions), both demonstrate the high level of programming in the Russian Federation.

The total volume of production of software in the Russian Federation is USD 250 millions, and the number of specialists, directly involved in software development, is approximately 40 thousand, with another 85 thousand involved in software services.

The Russian Federation has a relatively small ICT service market. The correlation of expenditures in the field of ITT to the volume of GNP and expenditures on ICT per citizen in the country remains lower than in other countries of central and eastern Europe. The development growth of the software industry is kept at a high level through the use of “pirated” goods - only about 70 % of software in the Russian market is licensed.

3.1.6 Training with the help of ICT

3.1.6.1 Access of educational establishments to ICT

In the Russian Federation, access to ICT differs greatly between schools, colleges, universities, as well as between cities, regions, and between urban and rural areas.

Secondary schools

There are 68 thousand schools in the Russian Federation, 46 thousand of which are in rural areas. Almost half of the 22,000 rural schools have less than 200 pupils. In 2000, one modern computer was available per 500 pupils, while in Moscow this statistic rose to an average of one computer per 200 pupils. Two-thirds of rural schools do not have any computers at all. The situation with the access to the Internet is even worse. Only 4-5 % of Russian schools have access to the Internet.

Higher education

In the Russian Federation, in 1999/2000, there were 939 higher education establishments (590 of which were governmental and 349 of which were non-governmental). Practically every institute has its own computers, more than half with connection to the Internet. Several national, and dozens of regional non-commercial scientific-educational computer networks, provide access to the Internet. The price of services, which the schools have to pay, is several times less than that of the ISP services.

3.1.6.2 Use of ICT service in education

The use of ICT in the secondary schools in the country has a very low correlation with the educational process. At best, ICT is used in information technology lessons. Remote teaching of pupils is practically non-existent. In addition to infrastructure problems, this situation is explained by poorly-qualified teachers and the lack of relevant education materials in Russian.

In the higher education sector, the situation is better, though the usage of ICT remains low. About 300 institutes have their own websites or homepages on the Internet. But for the most part, ICTs have not become part of the education process.

ICT application in education, even where the infrastructure exists, is hampered by poorly-qualified teachers, specialists in humanities in particular. In the late 2000, only 85 colleges offered remote education (RE) – distance learning - or planned to use of their technological capabilities for this purpose (only 20 institutes already use RE). Only two institutes set up their special RE universities.

The volume of educational resources produced in electronic form is, however, on rise. The production of educational materials in Russian is stimulated by competition. The number of developed commercial educational software programs on various RE subjects and courses is increasing rapidly.

3.1.6.3 Human resources training in the field of ICT

In the area of human resources development, there two major agents are responsible for training in the field of ICT: the higher education system; and adult continuous education (teaching and retraining). The education system provides fundamental knowledge and prepares specialists to become masters of new technologies. Retraining courses include upgrading of skills for those working with concrete technologies.

Educational system

In the secondary schools, where initial exposure to ICT can take place, only 20 % of schools have specialists in this field. There are about 1000 pupils per one information technology specialist.

The situation in the institutes is better. In the Russian Federation, there are 284 institutes, which train specialists in:” Information technology” (IT); “IT and computers”; and so on. In total, there are 635 institutes and their affiliates, which prepare IT specialists, information systems and IT security system specialists. There are IT courses in practically all the country’s institutes.

Training centres

In the Russian Federation, training courses in ICT exist and are being further developed. Most courses deal with the technologies of particular producers (Sun, Cisco, Novell, Microsoft, IBM, etc.) and are authorized by these producers with issuance of appropriate certificates. In 2001, the volume of ICT teaching services reached 42 million dollars.

Large enterprises, which have highly-developed information systems, and need training of their specialists (taking into account the specific nature of developed systems) are primary customers for special training courses.

3.1.7 Network society

3.1.7.1 People and organisations on the Internet

Internet users

The estimated total number of Internet users in the Russian Federation by July 2001 was between 9.9 and 10.1 million, with the number of registered users between 3 and 3.7 million (2.3 %).

Social-demographic characteristics of Internet users

In the Russian Federation there are more male than female Internet users (approx. 59% male). The majority of users are under 34 years of age (72%), and the most numerous group constitutes young people aged between 18 and 24 (42%).

More than one third of Internet users are qualified specialists with higher education (36.7 %). Students, pupils and top management are also active users of Internet (27.5 %).

Amongst the Internet users, a significant share comprises disadvantaged citizens (43 %) who have a personal income of less than 2000 rubles (70 USD) per month. These citizens are chiefly pupils and students, who have insignificant personal income or no personal income at all. The geographic distribution of the Internet audience amongst the regions of Russia in 2000 was as follows: Moscow 36%; St. Petersburg 9%; European part of the country 62 %; Ural 13 %; Western Siberia 10 %; and Eastern Siberia and the Far East 11 %.

Organizations using the network

At present, there is only limited information on ICT usage by organizations. According to the results of a study in 2000, local networks covered 32.5 % of all enterprises using ICT. Local networks covered: 35 % of public enterprises; 31% of private organizations; and 17 % of non-profit organizations. The percentage of foreign companies and joint ventures covered by local networks were 65 % and 44 % respectively. According to some studies, at the beginning of 2000, the sectoral usage of local networks was as follows: finance 65 %; communication 53 %; machinery and equipment 45 %; food industry 42 %; research and development 40 %; and State Administration 37 %.

Practically all Ministries have their own representation on the Internet. All central government departments, as well as those of regional and local authorities, publishing and information agencies, central and regional TV channels and radio stations, have their own Internet sites. Internet technologies are widely used by large companies: more than 89 % of corporations have access to the Internet (half of them – on dedicated channels); 4% have electronic mail only; and 7 % have no access. 62 % of leading enterprises in various fields already have their own Internet sites and a further 22% plan to build them in near future. However, most industrial enterprises use Internet as an information resource only. Their existing sites serve only for image. The use of the Internet for commercial purposes is not so extensive: Internet advertising is employed by only 10-15% of enterprises and those with an Internet order reception system stands at only 7 % although 43% of enterprises indicated they planned to initiate such systems.

Growth factors in Internet usage

It is possible to identify a number of factors which have driven the development of the Russian Internet, namely: action plans of Russian and international organizations aimed at increasing the information openness of Russian society and business; the promotion of the process of transition for the Russian Federation to an information society; an understanding of the present situation in the Government of the Russian Federation and the development of governmental programs in the ICT sector; and the positive dynamics of networks and information infrastructure.

3.1.7.2 Local content

The Russian Internet sector (Runet)

For the last five years, the volume of Internet-resources in the Russian language has been growing rapidly. In 2000 alone, the number of servers and unique URL increased four times and, in the same year, the rate of growth of the Runet approached 30% per month, a statistic which is higher than the world average index. The number of unique servers or hosts (servers, in which, at a minimum, documents are indexed) has increased from 10 in 1995 to as many as 200500 by the end of 2000. The quantity of unique URL (pages, documents) reached about 30 millions for this period. Total volume of all indexed unique documents was more than 420 Gbytes.

Information resources of Runet: interests and “user demand”

Russian is the dominant Internet-language in the Russian Federation and the CIS with 57% of users in the country preferring to visit sites in the Russian language and only 25% using Internet resources where content is in both Russian and English. Thematically, political and economic news occupy first place. On the whole, about 30% of users use the Internet to search for business information (business, finance, science, news). Between 8 and 27% use it to search for entertainment and leisure content (humour, entertainment, relations/chats, games, music, erotica, sport), while between 10 and 15% are interested in promoting or acquiring goods and services (advertising, shopping, political and economic news). There are opportunities for electronic teaching and training offered both on a commercial and non-commercial basis.

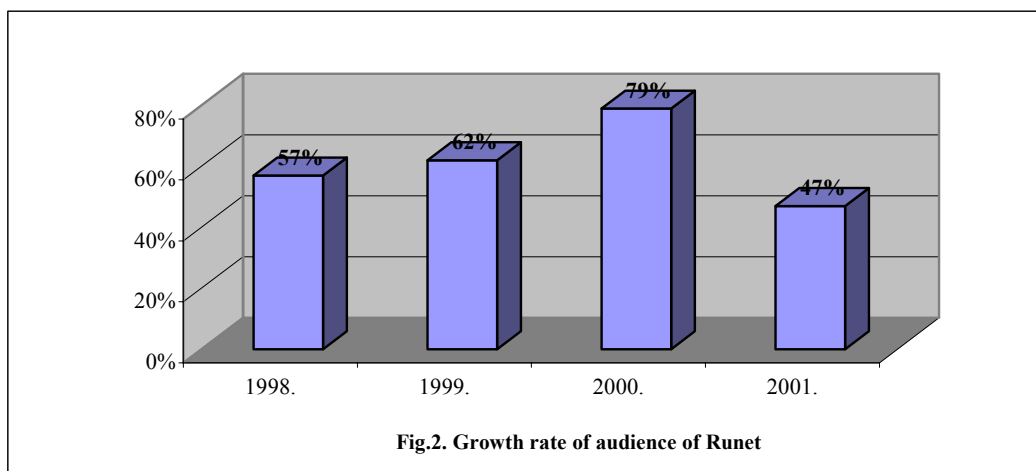


Fig.2. Growth rate of audience of Runet

Chargeable and free of charge access to information resources

By 2000, mass users in the Russian Federation has lost confidence in chargeable content which popular belief had regarded automatically to be better than content provided free of charge. Free content was popular in Runet in the middle of the nineties and is now overwhelmingly dominant. The only niche where chargeable content is prospering is that of professional information for corporate users. Various free information resources have been developed and successfully used, including archives, electronic libraries etc. There are large archives of free software in academic circles, and there are a great many resources devoted to scientific research results. As regards content, the resources of Runet can be classified as follows:

- servers and catalogues;
- banner networks;
- special resources;
- electronic media and broadband portals.

The relatively small number of Internet users in the country, low solvency and the insufficient development of electronic forms of payment, have hampered the growth of chargeable content and services. Most commonly, subscription mechanisms are used to realize chargeable services while, more rarely, hourly payment for the volume of data received is employed.

3.1.7.3 Use of ICT in real life

In recent years, there has been continued growth of phone density in the Russian Federation. Cellular communications cover 74 regions of the federation and the penetration coefficient exceeds 2% of the population (in Moscow it exceeds 15%). The number of pager-owners country-wide is approaching one million although more than 70% of the Russian market for paging communication is concentrated in the largest Russian cities. Overall, paging communication covers about 100 cities (mainly regional and industrial centres).

As regards the possession of information handling and transmission facilities, 51% of the general public have a phone set at home 51%, while 5.4% have a personal computer (PC).

In recent years, the internalisation level of home PCs (percentage of PC users connecting to the Internet from home) has increased steadily, a situation which is typical in practically all regions of the Russian Federation. For example, in 2000 in Yekaterinburg, Nizhniy Novgorod and Omsk, the share of those connected to the Internet via home PCs was between 18 and 22% while in Kazan, Samara Ufa and Cheljabinsk, the index was lower standing at about 6 to 9%. Home users of the Internet in Moscow are three times more numerous than the country average.

A common trend noted throughout the country is a rise in the number of users of traditional and mobile phone sets of the Internet. Recent trends include projects to develop dedicated channels for the popular use of the Internet. The tendency to connect home users employing dedicated channels has risen rapidly. If this trend continues, it is expected that approximately 5 to 10% of Moscow's individual Internet users would be able to have access to the Internet on dedicated channels of various types.

3.1.7.4 Use of ICT in the work place

By the beginning of 2000, the total number of registered enterprises and organizations in the Russian Federation was 3,106,000.

The average number of PCs in any one enterprise was slightly more than 5 pieces. Over a very short period of time, the financial services, banking sector, power industry, transport, statistics and tax services sectors, became the most important fields in ICT use. Private companies became the major consumers of equipment such as PCs, printers and office equipment. Banks consume the most expansive and complete resources in both software and hardware facilities and equipment.

According to data of the Department of Government Information, 70% of the Russian public officials have PCs in their place of work. However, only 2% have access to the Internet. In 2000, only 18% of leading enterprises had complex automation systems based on integrated enterprise control systems (IECS); 64% plan to put into such systems into operation in the near future, while 18% (chiefly in 'light industry) do not consider they would be useful to them.

In the Russian market, there are software solutions for IECS available from both global sources and from Russian programmers. Above 70 % of Russian enterprises are orientated towards national software solutions providers. Contrary to the situation with complex automation, individual business processes in leading Russian companies are already automated. For example: computerization of accounting and finance is taking place in almost every company; and two thirds of enterprises have their own sale control systems (half of the organizations have automated production and supply, and 25% of the companies have an automated quality control). Though most leading enterprises have their own local networks, these networks do not provide complex communication between all the services.

3.1.8 Network economy

3.1.8.1 Electronic commerce, “business-to-customer” model (B2C)

The first Internet shops appeared in the Russian Federation in 1999 and 2000. Today, books, music CDs, tickets, products, computer equipment, electronics, home utensils and gardening equipment, are actively traded on the Internet. In 2000, the total number of web shop windows, Internet shops and trade Internet systems approached 600. However, only 200 could be named as Internet shops and only 80 were actively working. Among Russian Internet shops, computer shops occupy the leading place with 19% of trade; shops offering various services attract 18.7% of trade; and shops selling electronics and consumer goods attract 15.7%.

On Runet, there are 12 payment systems. However, many online shops offer the opportunity to pay by credit cards or by other electronic means.

The use of Internet shops is still limited. According to year 2000 surveys, only one third of users had acquired information on goods and services via the Internet, while users who had actually visited to purchase from shopping websites was two time fewer again. Only 3% of the users have bought one or more real goods on-line.

Nevertheless, the cybermarket in the country has significant development potential. Between 1999 and 2000, the number of shoppers using the Internet increased from 53,000 to 221,000. In the second half of 2000, purchases at Internet shops increased by 90% compared with the

first half of the year. Moreover, 77% of Internet shops increased their sales by 200-400% although the remainder suffered a recession.

Significant market niches in the Internet remain open. Internet trade allows small and medium-sized businesses to overcome barriers easier than in traditional markets. The other opportunity for growth, which Russian Internet-shops have yet to capitalise on, relates to entry to regional markets. The largest companies organize sales chiefly in Moscow. Two-thirds of the buyers in the 50 most popular shops are from Moscow according to statistics from Spy LOG. However, in the Russian segment of the Internet, Moscow makes up only one third of the users, while St. Petersburg is one eighth. The proportion of use by other cities with a population of more than one million is only marginally larger. On the whole, regional markets have considerable potential for the development of the Internet trade.

3.1.8.2 Electronic commerce, “business-to-business” model (B2B)

Inter-corporate electronic business is embryonic in the Russian Federation. The conditions required for its successful development have not yet been created. In 2000, the total volume of inter-corporate sales on the Internet was only 60 million dollars, whereas the total volume of industrial output in the same year was equal to USD 160 billions.

According to some expert estimates, up until 2003 the Russian B2B market will be in an organizational structuring phase during which the realization of B2B solutions will take place only in those separate branches of industry which are ready for it. It is predicted that fast development of inter-corporate electronic business will start in 2004, by which time the necessary economic, infrastructure and legislative pre-conditions for B2B will be established. According to this scenario, one can expect that inter-corporate sales on the Internet would be in the order of 2.8 billion dollars in 2005. Nevertheless, in absolute and relative figures, the Russian B2B sales will be significantly less than the expected volumes of B2B trade in developed countries.

In the short term in the Russian Federation, the B2B segment will be dominated by an interactive cooperation between companies. However, as trading systems develop, the share of electronic trade zones (ETZ) in total volume of electronic trade will increase (as it will worldwide) and will approach 40% in 2005. It should be noted that interest of investors is growing in the development of ETZ in the B2B trade. This development was highlighted, particularly in the summer of 2000, when electronic systems for trade between corporations began to appear.

At present within the Russian Federation, there are dozens of B2B projects (about 50 highly-developed B2B communities) existing in the timber and chemical, metallurgy, and computer industries, as well as in other fields. In addition, there is a trend towards the integration of Russian enterprises with western B2B systems. Initially, this has been seen in the raw materials sector, and, to some degree, within manufacturing industries. Typically, ETZs in the Russian Federation are formed as electronic advertisement boards (catalogues). Fewer, separate systems allow more or less total coordination and conclusion of the transaction. Where regulation of commercial transactions on the Internet is under-developed, closure of ETZ deals require paper work to ensure a binding contractual arrangement enforceable by law.

In the Russian Federation, both multi-industrial universal ETZ and sectorally specific ETZ exist (For example, respectively, www.faktura.ru or www.grin.ru and www.emetex.ru and

www.inmarsys.ru for the trading of oil and gas equipment). For B2B in Russia today, the special ETZs are predominant and, in the near future, will see the most dynamic development.

3.1.8.3 “Electronic governance”

In the Russian Federation, several national government organisations developed the “Electronic Governance” project. These organisations included: the Ministry of Communication and Informatization; the Government Administration; and the Ministry of Economic Development and Trade. Within the government administration, the Department of Government Information and Department of Culture, Education and Science have participated in the development of this project.

Today, the creation and information support of the government organizations’ websites remain the most important avenue of implementation of the project “Electronic governance” in the country. In December 1999, the official site of the Government of the Russian Federation was created (<http://www.government.gov.ru>). The President of the Russian Federation and the State Duma both have their own websites.

This process is not yet completed. By 1 January 2002, it was predicted that 23 of the 24 national ministries would have their own websites. The largest problem is the low rate of information update on web sites of the national ministries. Thus, five sites have no news at all. On 11 websites, new information is added once per month, and only on eight sites does this increase to new information once every several days. On four websites alone was new information added one or several times per day.

It is notable that five sites of national ministries have no homepages of ministers. Fourteen websites of the ministries have no references to other State Internet resources (in particular, the official site of the Government of the Russian Federation). Some government websites do not have interactive links or these are insufficiently developed. In particular, three ministry sites have no electronic mail, and only on six sites is there an opportunity to participate in conferences, ask questions or leave messages in a guest book.

The situation for national department web sites is less developed than for the Ministries. Only nine departments have their own websites (29%). At the regional level, there is no complete and reliable data. Non-official data, however, reveals that not more than 70-75% of the regional State authorities have an Internet presence. The Republics of Karelia and Chuvashia are the leading regions with relation to Internet use.

The transition of state organisations to paperless documentary systems has not yet started. According to the Ministry of Communication, there are about 800,000 computers available to the national and local State authorities, and only 25,000 of them are connected to the Internet. In the central state authorities, 95% of officials have computers at their work places, while in regional administrations, this number drops to 70% of the officials. In spite of such a large quantity of computers, only 2% are connected to the Internet. This impedes the development of a paperless system.

3.2 Trade policy in the field of ICT

Trade policy in the field of ICT remains underdeveloped and is unlikely to advance significantly before the Russian Federation joins the WTO. Furthermore, foreign companies are facing a number of entry barriers and the investment risk in the high-tech sector is still very high.

At present, Russian Federation trade policy restricts the import of high tech products, while tariff, tax and customs policies have been subject to ad hoc interpretation. Taxation issues have not been resolved and, notably, tax rules are often changed. There are contradictions in the definition of custom duties as far as their size is concerned between the executive and legislative branches of the Russian State authorities. Other risks include those associated with unpredictable changes in import regulation and the use of foreign products (customs duties and so on) which are widely used by the Russian telecommunication networks and ISPs.

The market for e-commerce services and ICT networks has just begun to emerge. Market development is hampered by the absence of an effective legal framework.

Many regional trading companies, operating in the field of ICT, as well as new Internet companies, often lack qualified management and are unable to provide quality services. The implementation of proposals to change taxation rules could provide a much-needed boost for development of the ICT market and for the diffusion of information technologies. Some proposals of this nature are currently being considered by the State Duma of the Federal Council of the Russian Federation.

3.3 Civil society

By 2001, there were 19,863 civic alliances registered by the Ministry of Justice and its regional affiliates. These included: 17,745 civic organisations (major groupings being broken down as 748 political parties and 7,582 professional organisations); 679 civic movements; 679 social funds; 1,172, social organizations; 127 non-governmental organizations; 26 national culture bodies; and 66 social associations. The total number of registered religious organizations was 20,215.

Taking into account non-profit organisations of various types, the total number of civil society organisations today total around 300,000. According to expert estimates, these civil society bodies comprise approximately 3.5 million citizens.

The main problems for civil society are as follows:

- although there are numerous information resources created by civil society organisations, these are not being used across broader Russian society. Most of the civil society information is in Russian and, as such, is virtually unknown to foreign users;
- civil society organizations have difficulties in building their own constituencies and this creates challenges with respect to distribution of information highlighting their activities and with respect to feedback on their activities;
- within the Russian Federation, the problems of inter-cultural and inter-religious interaction are acute. Solving this problem could promote mutual understanding, stability and strengthening of democratic trends in the country;

- the majority of civil society organizations are not visible to the broader public. This limits the ability of civil society organizations to become a social force, and, therefore, to have an impact on decision-making processes;
- interaction between civil society organizations (including information interaction) is insufficient and limits the replication of effective civil society models in different parts of the Russian Federation.

3.4 Business

3.4.1 Small-sized business

According to official statistics, as 1 January 2001, there were 860,000 small-sized enterprises in the Russian Federation. On average, there are six small-sized businesses per 1,000 people. According to specialist estimates from the National Program of the State Support of Small-Scale Entrepreneurship, for the period from 2002-2004, the total number of employees in small-sized businesses was 7.6 million. Taking into account sole proprietors (their number, according to the Ministry of Taxes and Duties approached four million people at the beginning of 2001), 11.6 million people work in the SME sector of economy (17% of the economically active population).

On average, the economic position of small businesses is not strong. Despite the growth in production over the last two years, the contribution of small scale enterprises to GDP does not exceed 12%. The share of small businesses in gross domestic investment is about 3%. Small businesses chiefly operate in retail and public catering. The share of the shadow economy in the SME sector remains very large. According to various estimates, it is equal to 30% to 50% of GDP.

Small business enterprises typically have the following needs:

- assistance in entering international and regional markets, as well as in searching for business-partners, donors and investors from inside and outside the country;
- consulting support and training in the field of ICT (including electronic business), especially in quality requirements and in the development of a culture for the provision of online services;
- a starting website to benefit from existing models of ICT application and know-how;
- modern operational informational and legal support for small businesses;
- up-to-date information on electronic development projects carried out by both Russian and foreign SMEs. Also, information about tenders and fairs/contests both inside and outside the country, in which they could participate.
- The creation of online market spaces, such as an ETZ (for example cartel, branch and regional ETZ);
- an ICT channel for promotion of the products and services of SMEs;
- a democratic environment for discussing actual problems and needs of SMEs aimed at the operational delivery of this information to key decision-making figures;
- provision of the following services:
 - research on the Russian telecommunication market, ICT and electronic commerce (separate segments, sectors, trends, competitive environment and so on);
 - analysis of the Russian normative-legal base relevant to the problems of business development via ICT;

- market research on the influence of ICT on the development of the Russian business sector;
- consulting services and lobbying in favour of the ICT for development concept;
- expertise and project management in the field of ICT use;
- preparation of, and consultation on, applications for grants, technical and economic substantiation, system projects, business plans etc;
- development of business models based on ICT use;
- identification of qualified personnel for project implementation in the field of “electronic development”;
- organization and provision of teaching seminars on various aspects of ICT use;
- provision of information about donor organizations and investment companies as well as services to search for investors and donors;
- assistance in the preparation of investment and tender documentation;
- space allocation on regional portals for private companies for the promotion/advertisement of their goods and services, and for information updates on national, regional and international markets.
- creation of regional portals of “Electronic Governance” in cooperation with the State authorities, particularly for the purpose of ensuring a feed-back channel of communication between the Government and SMEs.

Most of the above problems are being addressed in the implementation of the program “Electronic Russia”.

3.5 Scientific-educational community

The data below illustrates current trends within the scientific-educational community:

- in 2000, the total number of organisations carrying out scientific research work was 4,145 This included: 2,733 scientific research institutes; 320 designing agencies; 395 scientific-research institutes within educational establishments; and 226 industrial enterprisers, conducting scientific-research work;
- in 2000, about 1.1% of GDP was spent on science and research (47.8% of which was funded by the State).
- the share of the 2000 budget expenditure on fundamental research was 1.79%. The total number of specialists working in science and research was 910,400 people, of which 436,200 were researchers;
- in the 2000/2001 academic year, there were 965 institutes in Russia (607 state institutes and 358 non-state). The total student body was 4,742, or 327 students per 10,000 citizens. There were 69,000 schools with about 20.5 million pupils. There were 3,839 primary schools (1.7 million pupils) and 2,589 compulsory schools (including 989 colleges) with 2.3 million students;
- in 1999, a sharp reduction in scientific literature being received by the country’s scientific libraries meant computer networks became important channels of communication and sources of scientific information. This led to a growth in demand for electronic publications and libraries;
- the growth in the number of sites of scientific and educational organizations, magazines, funds and other specialized resources gave rise to problems of navigation and of creating scientific and educational portals. There are no such portals in the Russian section of the Internet yet despite the fact that they are necessary for any scientific/educational organization. There is a need for both special scientific and

- educational portals, devoted to specific scientific subjects, and for portals of a more general scientific nature eg at various educational levels;
- there is a lack search mechanisms for tracking down content and a need for operational channels, organised by discipline, within the framework of the scientific community;
 - the effective use of modern ICT in scientific work and education is hampered by insufficient information on the opportunities for new technologies and by a lack of necessary skills. Reference and teaching resources for the exchange of experience and best practices for ICT use in science and education are required. Various instruments for distance consulting, learning and teaching, for the use by the scientific-educational community, are needed;
 - methodological teaching materials for various disciplines with ICT applications are needed on a daily basis. It is also necessary to incorporate a new requirement – the skills to apply ICT in the educational process - into the certification of teachers;
 - schools in particular need computer specialists and system developers. This requires the creation of a training system, which incorporates distance learning, to train up such specialists.

Annual exhibition-forums, such as “Info-communications of Russia – XXI century” will reflect the current situation, dynamics and implementation of the strategic plans for development of info-communications in Russia. Additionally, the implementation of the National special program “Electronic Russia” will be highlighted. The Second International exhibition-forum “Info-communications - 2002” will take place on 21-22 October 2002, at the Moscow Expo-Centre.

4. Characteristics of the country's human resources

The development of human resources is one of the most important aspects of the information society and of a knowledge-driven economy. This can be achieved via education and the continuous upgrading of skills, which extensively employ modern technologies.

4.1 Employment opportunities for specialists in the ICT sector

A high demand for ICT specialists is stimulated by many different circumstances. These include: the development of the information communication sector of the economy, the rapid growth of mobile communication; the Internet and the rising number of computers in the country; the mass transition of enterprises to electronic accounting; as well as the development of other applications of ICT. According to the Ministry of Communication and Informatization of the Russian Federation, employment in the ICT sector of the economy rose by 15% between 1999 and 2000, and now stands at 500,000 people (0.8 % of the working population). Communication as a whole (including ordinary mail) today employs 800,000 (1.3 % of the working population). Across the board employment agencies are noting a high demand for ICT specialists. These specialists are most sought after in Moscow, and a similar trend is visible in all large cities in Russia. The most wanted professionals are project managers and high-qualified programmers. In addition, there is strong demand among Internet-companies for web designers of with mid to superior level qualifications.

However, opportunities for employment for ICT specialists differ significantly depending on region and locality. Whereas large cities generate employment opportunities for ICT specialists (particularly Moscow, St. Petersburg and Novosibirsk), such opportunities are far more limited in rural areas and many small towns throughout the country.

By 2005 the need for specialists with mid and higher level education will reach up to 100,000 people per year, rising to more than 130,000 people by the year 2010. According to the "Electronic Russia" programme, avoiding a radical shortage of specialists will require: an accelerated development of mid-level professional education; the development of scientific schools in the ICT field and the creation of scientific parks and venture capital enterprises; the development of new professions and specialisations; raising the information culture level of the population; and re-training of civil servants, etc. To implement these programme objectives, "Electronic Russia" envisages: the "creation of methodological and material and technical bases" in select leading institutes; the development of distance learning and the intellectual property rights system; the re-training of civil servants and employees of budget organizations, as well as the unemployed; the upgrading of administrators and managers in education; and the creation of an effective market of teaching services.

4.2 Human resources in the area of offshore programming

As regards human resources, it is worth noting that the income of the Russian Federation from offshore programming in 2000 corresponded to the income of India in 1990. The present salary level of programmers in Russia and India is the same. However, the last generation of Russian programmers appeared to be one of the strongest in the world. If the existing trend persists, there is every reason to believe that by the end of the current decade, Russia will become one of the leaders of offshore programming. Moreover, while a brain drain of programmers was a problem in recent years, today the world's leading companies will provide work for Russian programmers in the country itself.

Estimates show that between 5,000 and 8,000 people are employed in offshore programming in the Russian Federation. Annual turnover in this field is estimated to stand at between 60 and 100 million US\$. However, these numbers tend to be low as a significant part of this business is not yet legalized - primarily due to the imperfect nature of Russian taxation legislation.

The Russian branch of offshore programming is approximately five years younger than those of Ireland and India. Today, in the Russian Federation, there are three main centres for offshore programming: Moscow; St. Petersburg; and Novosibirsk. All of these are based at local universities, which produce fine programmers. Offshore activity takes place in cities such as Nizhniy Novgorod, Yekaterinburg, Saratov and Perm.

A number of American companies are establishing development centres in Russia. These are:

- Intel, which started in 1993 with a team of 10 programmers. Now Intel has more than 200 programmers, and soon this number will approach 500;
- Motorola, which has a similar development dynamics;
- Sun Microsystems, which started its work in 1989. Today it has a staff of 300 programmers.

In addition to these, other large companies, such as IBM, Boeing, Nortel and approx. 100 other programming and technological companies are operating in the Russian Federation. All of these companies have reported similar results concerning their operational activities in Russia which can be summarised as follows:

- the projects are all generally viewed as successful, and the company has chosen to scale up their research and development team in Russia;
- Russian research and development, and software development centres are ranked on a par with those in the U.S. and India;
- cost savings exist, but this is not the primary reason for the success and growth of Russian software development teams;
- the key advantage of the Russian development centres and the reason for their success are their strong technical capabilities (especially in the areas of mathematics and fundamental sciences), and the innovative approaches of Russian professionals;
- intellectual property rights and security have not been perceived as an issue;
- taxes and bureaucracy have been issues for those companies which have followed the ownership model of offshore development.

4.3 Labour market (wages) in the telecommunication field

The dynamics of wages in the Russian telecommunications market during 2001-2002 has been studied by “Staff-line”. In the course of the study, heads of the human resources departments of 30 Moscow companies were interviewed. Information on vacancies and resumes placed on the web were also taken into account.

The market for telecommunications services in the Russian Federation is rather complex. It is not surprising, therefore, that some companies have shown opposing trends in levels of pay over the last year. Approximately 40 % of the companies interviewed revealed an increase in

wages of between 10 and 20% for the last year. The majority of those interviewed were large companies operating on the mobile telecommunications service market, and companies producing telecommunications equipment. Some companies reported an increase in the rubble equivalent of the wages (an indication of wage stagnation). Other companies noted an increase in the wages of sales managers (linked to their performance in terms of personal sales volume). Only 25% of the companies recorded an increase in wages at all levels of specialists ranging between 10 and 25%.

The most significant trend of the year 2001 was the stagnation of wages. Large companies indicated that they considered their wage level as high and competitive, and that, as such, they did not plan any wage increases. However, wages in SMEs increased by 5 percentage points during the same year. This was mainly due to additional bonuses and social benefits. Such a trend is usually indicative of economic expansion and appears during a growth phase. The general perception was, therefore, that salaries would grow in the foreseeable future.

In some ICT market segments, salaries fell over the last year. This took place mainly in foreign company affiliates operating on the Russian telecommunication market and, to a lesser extent, in some Russian companies closely linked to the Internet network business. This trend saw wages decreasing (by 20%) and cuts in the number of employees (sometimes by several times). The workload was redistributed among the remaining personnel without any salary premium. This tendency occurred mainly in response to a fall in sales on the world telecommunication services and Internet technologies market. As a result of the closure of some foreign Hi-Tech companies in Russia last year, it is now much easier to hire good programme developers without increasing their salary.

The professionals most in demand in 2002 are still sales managers. Their monthly average salary is approximately \$400 to \$600. Some companies add sales bonuses of between 5 and 15% to the base salary which raises the monthly salary up to \$1000 US\$ or more.

In addition, there is still a demand for cellular telecommunications and telecom equipment engineers. Certified professionals, fluent in foreign languages are the most urgently required. With the average monthly salary of engineers standing at approximately 400 to 600 US\$, the aforementioned professionals could expect to earn between 1200 and 1500 US\$, if not more.

A new feature of the Russian market is an hourly salary for certified, part-time engineers in the installation and start-up equipment. Their salary is approximately 40 to 50 US\$ per hour, which earns them up to 5,000 US\$ per two weeks. A growing demand for engineers proficient in installation, equipment set-up and cable networks is becoming apparent. The salary level of these professionals is the same as for mid-level engineers - approximately 400 to 600 US\$, and occasionally 800 US\$.

There is a large demand for programme development engineers and test engineers. About 30% of companies are interested not just in top professionals (monthly salary 1000 to 1500 US\$), but also in young graduates from prestigious universities (monthly salary 400 US\$). Salary level, however, is not the only stimulus for technical professionals. Other important factors include: the possibility of training; access to state-of-the-art technologies; and a stimulating professional environment.

The most significant growth was recorded in the wages of highly-qualified professionals such as top managers (up to 3,000 US\$), high-level programme development engineers (up to

2,000 US\$) etc. On other hand, despite steady demand, the salary level of low profile specialists e.g. cellular phone technicians remained practically unchanged (250-300 US\$).

Wages in the Russian telecommunications sector.

Position	Monthly salary Minimum, US\$	Monthly salary Maximum, US\$
Top management (commercial manager, technical manager)	1200-1500	2500-3000
Project manager, section manager	800-1000	1500-2000
Leading programming engineers	800-1000	1500-2000
Programming and installation engineers, test engineers	400-600	600-800
Sales managers	400-600	600-800
Technicians (service, repair)	250-300	300-500

In recent years, there has been an improvement in the quality and the quantity of compensation packages. A majority of companies indicate the existence of additional benefits such as free catering (worth about 50 US\$ per month). Approximately 35% of companies pay for the mobile phone calls of their employees; while 20% of companies provide medical insurance and free training. The total compensation package in large companies averages about 3,000 US\$ per year.

A distinctive point of Russian companies is the significant freedom management has when it comes to fixing the salary level of an employee. This is why salary is negotiated at the point of hiring. In practice this can result in a 10 to 20% increase on the starting salary level.

Russian Federation, therefore, has extensive and relatively cheap resources of highly-qualified technical specialists in telecommunication and information technologies. Conversely, there is a shortage of qualified managers. Slow but stable economic growth, unavoidably, leads to a growth in wages. The wide-scale utilisation of skilled Russian workers within the global hi-tech market is complicated, however, by the complexities of the transition underway throughout Russian society.

5. National innovation capacities and capabilities and their effectiveness

The Russian state has prioritised a policy of support for national telecommunication and information technology producers. The purpose of this support policy is to maximise national potential for manufacturing competitive ICT equipment and technologies. There is growing evidence that this policy is effective. The report, entitled “Concept of the development of the Russian telecommunication market in 2002-2010”, highlights the effectiveness of the policy to support national producers.

Other good examples exist in the information technology field; one such example is found in the development of software for image recognition. These Russian manufactured products have been sold successfully to leading global manufacturers of scanners, and management control systems used in aviation. The creation of Russian centres for software development has facilitated this process.

Increasingly, Russia has the capability to develop a diversified information technology industry. The “Electronic Russia” programme focuses on building up the prerequisites of such a diversified industry which, in turn, could boost the efficiency of national manufacturing as a whole.

The fundamental determinants of an economy based on knowledge are: the interaction between capital markets and new technologies; integration with the globalizing forces generating new knowledge, technologies, products and services; the utilisation of these new forms of knowledge and technologies; and the societal receptivity and acceptance of the new technologies.

The main forms of innovation within the global economy for the next 15 years will be in the fields of informatics, health care, and environment. These three critical areas are accepted as possessing the greatest potential to impact on all spheres of human activity. These are exactly those areas of human activity which enjoy the highest level of demand from both the State and consumers.

Innovation within the Russian system is held back by unpredictable market conditions arising from transition process shocks. The Russian market does not, as yet, reflect the accumulated intellectual, human resource and production assets of the country. Structural distortions are caused by the one-sided inclusion of Russia in the world economy, and a country export quota which is one of the highest in Europe. These distortions threaten to proliferate in the areas of fundamental science and education. If this situation persists, Russia Federation will be forced to look to foreign rather than domestic sources for innovation.

In most general terms, the key priority of State policy should be the stimulation of domestic demand for innovation, and the development of national sources of innovation. The following are among the most effective, but under-applied, instruments of State intervention in this field:

- the creation of an atmosphere of urgency and commitment in the development of science and advanced technologies in society by constantly prioritising these objectives at the highest level of legislative and executive powers, as well as in the media;

- the development of a package of coordinated measures, including taxation, credit, amortization, custom and budgetary measures, for stimulating innovation;
- an improvement of the investment climate; consolidation of property rights, including intellectual property rights; development of the banking system and capital markets; a system of financial brokerage; and promotion of competition at regional as well as state level.

The existing Russian innovation system is incomplete and suffers as a result of this fact. Large-scale, science-intensive companies, which could cover the financial and technological risks associated with innovation development, are almost inexistent on the market. Stagnation in the creation of new small hi-tech companies is also a cause for concern. These situations could be blamed on: the rapid commercialisation of existing innovations which has exhausted stock; an increase in stock prices, as compared to the first half of the nineties; and taxation burdens and increased bureaucratisation of the business sector.

Experience gained in the nineties has demonstrated the need for Russian technologies to be promoted in world markets with the help of so-called “technological brokers”. These brokers can match Russian innovation supply with foreign demand, while providing financial and legal services for such projects.

At present, more than 20 venture foundations with a total turnover of about two billion US\$ operate on the Russian market. The situation in this sector should be looked at within the context of the relatively new concept of national innovation systems. The term national innovation system has become widely used by economists and analysts since it was first introduced by the Organization of Economic Cooperation and Development (OECD) 10 years ago. The terms imply the existence of a system within which new knowledge is generated, transformed and embedded in new technologies, and diffused and consumed. The theory of the knowledge-based economy, in its turn, uses the concept of national innovation systems as an operational instrument. At present, we may go further and acknowledge the emergence of a global innovation system, a transnational system of knowledge creation and its transformation into different useful products and technologies being consumed by different countries. It is also important to note that the core of the global innovation system consists of a pool of the most developed countries.

Applying the concept of national innovation system to the current situation in Russia, it could be said, that the country is in the process of transition from a command-administrative system of innovation towards one which is market-based.

Elements of the present innovation system of the Russian Federation

There already exist today some elements of a market innovation system. The structure of science and R&D has changed remarkably. Research centres have been broken down into smaller entities, because the “big monsters” have not been able to manage and react to market signals using traditional Soviet type management. In the place of these big centres, there has emerged ten of thousands of small innovation firms. New innovation mechanisms were set up thanks to legislation based on the private property of intellectual products, and including a patent law. New motivation mechanisms have begun to bring in results. However, the former motivation mechanisms continue to coexist with the new ones, as do some of the old structures eg. academic institutes and state scientific and

research centres. Much management, however, is still based on the old thinking. In other words, the Russian Federation has not yet restructured the organisation of the initial stage of the innovation cycle.

Development problems of the innovation economy in the Russian Federation

In Russia, a new infrastructure for innovation activity is not yet complete. There is still no capital market, hi-tech or otherwise. The development of an information infrastructure is obviously lagging behind.

Management is also a problem, notably in research centres which are trying to respond to the demands of the real economy. Those, who are genuinely able to manage under the new conditions, are few in number. Resolving the management problem for the new innovation economy is critical for start-up stage, and is a key task for Russia

The place of the Russian Federation in the global world

In the opinion of Russian scientists, the concept of “innovation economy” includes not just a manufacturing component, but also innovative policy-making, management, and solutions to the challenges of every day life. At bottom, it implies a new societal psychology, the psychology of a society based on knowledge. In the social sphere, innovative development aims to raise the quality of life. In the economic sphere it aims to ensure the sustainability of development and the country’s place in the global economy, in particular, by increasing GDP through utilising renewable resources and knowledge.

Today, in Russian Federation, there is huge scientific, and, to some extent, educational potential for innovation. But readiness for innovation in itself does not qualify as capital because it does not generate commercial scientific products. Innovation is not just a novelty. It is a novelty which can be translated into an economic product. Innovation potential could be a starting point for the development of a new economy, but the existing approach to its formation and utilisation should be revised.

One of the key challenges faced by the Russian Federation is to ensure that its GDP growth is achieved through increasing value-added, that is by increasing the contribution of science via commercialisation of scientific products and, therefore, of the knowledge-based society.

This challenge can be met only if the economy follows a path of innovation development, a path that is characterized by a systematic and wide application of innovation, starting from the creation of new technologies, their utilisation in production, and ending with the promotion of new products in world markets.

This policy should be achieved via a balance of two approaches. One of these approaches is to make a choice of scientific and technical priorities by analysing accumulated technological and scientific stocks in the light of global development trends. The second is to analyse market demand in the broadest sense. It is therefore necessary to analyse not just demand, but also those integrated industries which, while not necessarily the most profitable, support and ensure the sustainability of industrial activities. When developing industrial sites it is also important to take into consideration labour market trends so that the national need for employment generation can be met.

Not many instruments suitable for implementing such a policy are available. First of all, there are financial instruments, such as state and regional budgets, as well as non-budgetary resources. In addition to these there are institutional instruments, such as property rights legislation. Standardization and tariff regulations constitute another important group of policy instruments. Finally, there is a need to promote new instruments for human interaction, such as lobbying, promotion of scientific and technical ideas and others. Society must understand how important these policy instruments are for the country's overall economic prosperity. The realisation of innovation policy is possible only with all stakeholders working together, including federal and regional executive and legislative powers, the business community and other agents of civil society.

In summary, one of the most crucial developmental problems of the Russian Federation is the creation of a national innovation system within the sphere of advanced technologies operating on a market basis.

6. National major initiatives

As of 5 July 2001 the Government of the Russian Federation adopted the programs “Electronic Russia” (2002 – 2010) and “Creation of a Single Education and Information Space during 2001-2005”. This is a symbolic gesture – a simultaneous adoption of two programs ie. the single educational information environment programme, whose results will be fully felt only by contemporary generations of the young, and an operational program, Electronic Russia, which aims to transform all government and business operational activities into electronic format in the nearest future.

Today’s generation in Russia faces the risk of being left behind if it fails to adapt to rapidly developing computing and telecommunications technologies, which together create a new era. This is an era not in terms of historic chronology, but in terms of a radical change away from the long-established routine of State documentation circulation, and a decisive turn towards paperless documentation. This will result in a broad on-line access of the general public to information sources at different levels.

The primary goal of the “Electronics Russia” programme is the provision of universal access to modern information resources. Its implementation until 2010 will require 76 billion Russian rubles, 50% of which will come from the State budget, 30% from the regional Government budgets, and 20% from private sources. This programme will help to improve legislation governing the use of information databases, while, at the same time, shaping strategic perspectives of the development of information technologies in the country.

The program also envisages the support of international organisations involved in the development of information and telecommunication technologies (electronic government, electronic business and education), including the UN Task Force on Information Society, profile working groups of the World Bank, the European Union, WTO, and other multilateral bodies. The main target of such cooperation is the integration of Russian experiences together with those of other countries into the development of information technologies, coordination of actions and, ultimately, in the creation of a global system of knowledge and information exchange.

To achieve the targets of this program, the following tasks have to be fulfilled:

- creation of an effective legal framework based on enforceable laws, including a law on information security and on confidentiality of personal data, guaranteed by the Constitution of the Russian Federation;
- secure effective, inter- and intra-communication, cooperation and interaction (on the basis of modern ICT) of the federal and local government bodies, as well as between government bodies, enterprises and civilians;
- secure the conditions for a more effective and wider use of ICT in the economy on the basis of constitutional actions;
- secure an increasing level of education, training and re-training of personnel to run parallel with the modernisation of the education system on the basis of ICT applications;

- support for the development of an independent media by stimulating the application of ICT in their professional activities;
- promote the development of a public information infrastructure allowing broad access of enterprises, organisations and the general public to telecommunication networks, electronic libraries, archives, databases, and scientific and technical information. The quality of services in this field also needs to be drastically improved;
- build up a necessary telecommunications infrastructure for securing the functioning of state and local authorities and to create a single education and information space in Russia.

The goals and targets of the above program are in complete concordance with the basic principles of the Okinawa Charter for the Global Information Society, of which the President of the Russian Federation is one of the signatories (26 July 2000). The “Concept of Creation of a Single Education and Information Space and Respective State Information Resources” approved by the President of the Russian Federation is also in concordance with the Doctrine of Information Security of the Russian Federation.

The federal program “Electronic Russia for 2002-2010” will be implemented in three stages.

First stage (2002)

At this stage, the institutional preconditions for the realisation of the program will be established. An analysis of existing legislation will be carried out to identify key problems and barriers to a wider diffusion of ICT. It will be necessary to make an inventory of the informatisation level of the public and private sectors already achieved; to undertake an analysis of the efficiency of budget spending in the area of informatics; to carry out a wide scale audit of all of the information assets of the federal State authorities; and to study international experience in the realization of similar programs. In the framework of this stage, the experience acquired in formulating rules and norms through a self-regulatory process of ICT will be examined and summarized. During the first stage the following monitoring systems will be developed:

- global ICT development trends and their social and economic effects;
- penetration level of information technologies in the country;
- efficiency of budget expenditure in the ICT area;
- efficiency of information technologies exploitation and information resources by the State authorities and within the public sector of economy; and their technical and telecommunications capacity;
- efficiency of the existing legal base in the field of ITT market regulation and the socio-economical affects of ITT.

An internal system for coordinating the activities of government bodies at all levels in the area of ICT development and mass expansion will be built up; criteria of efficient budget expenditure in this field will be formulated; and a mechanism ensuring compliance with these criteria will be established.

During the first stage, the setting up of the institutional preconditions for the implementation of the programme will be complemented with a package of legal initiatives aimed at removing restrictions on the creation and expansion of information in electronic format; decreasing administrative barriers faced by Russian ICT enterprises in penetrating the ICT market sector; harmonizing legislation in the field of ICT with international laws and with EU legislation. Preconditions for guaranteeing the implementation of the right of the population to access open State information by means of ICT will be created.

Pilot projects on developing paperless documentation in the State central and regional authorities, public and non-commercial entities, as well as projects on modernisation of the professional education system in the area of the ICT development and application, will be initiated. An important task at this stage will be to formulate the position of the Russian Federation with regard to its participation in different international organizations (WTO, EU, UN etc). Within the framework of negotiations on WTO membership of the Russian Federation, serious consideration will be given to issues relevant to the ICT sector. Decisions on liberalisation of the market for ICTs and on promotion of exports of intellectual products will be taken.

Second stage (2003-2004)

During the second stage, on the basis of the above (research findings, conceptual documentation and new legislation), measures will be undertaken to develop and implement projects in the area of interactive cooperation between the state central and regional authorities, the general public, and enterprises (including taxation reports, customs documents, registration and liquidation of judicial persons, licensing and certification, reporting documentation foreseen by the law on joint stock companies and stock market regulation, etc).

An array of actions will be implemented to bring in information technologies to public enterprises, with the aim of establishing a system of monitoring of financial and economic activities of public enterprises and organizations; implementing the pilot projects; promoting unified corporate information systems in the process of restructuring; and integration of the military-industrial complex. At this stage, a foundation of a unified telecommunication infrastructure for the State central and regional authorities, public and non-profit organizations, public information centres to access information networks, as well as the basic configuration of an “electronic government”, will be established.

Simultaneously, the process of developing and adjusting the legal base of the ICT sector will continue to be carried out. It is also expected, that a systematic activity will be initiated with the aim of promoting Russian products and services in the world market, as well as Russian interests in the field of ICT.

Third stage (2005-2010)

At the third stage, the process of setting up preconditions for mass expansion of information technologies in the economy; export of goods and services based on the application of ICT; and maximum realization of the rights of the population to access to information will be over. The earlier stage will have allowed the establishment of a single standardised system of documentation, which will increase the efficiency of communication within and between the State central and regional authorities, as well as between the government, the enterprise sector and the population at large. At this stage, the formation of a unified

telecommunications infrastructure for the State central and regional authorities, public and non-commercial companies, and public access centres to information networks, will be fully implemented.

Finally, it is important to take into consideration the extremely rapid integration of electronic business methods by modern enterprises in the interest of profit maximization. At present, this is primarily a feature of the industrial complexes of the most developed countries, but the situation could change in the near future as a result of the operational realisation of “Electronics Russia”, providing a strong incentive for Russian industries to follow the same pattern.

Conclusion

Today, there exists a range of factors, which delay the development of the Russian information society and the build-up of an economy based on knowledge. These are the following:

- the service system based on ICT use works almost exclusively for rich and socially active people and societies;
- The problem of free access to modern services, which has become one of the key social development problems on the public agenda in developed countries, has not yet been seriously discussed in the Russian Federation;
- the low level of computerization and PC expansion in the country;
- lack of understanding among the population, State representatives and industrialists, of the importance of the provision of the services which aim at resolving civil problems, and of the policy which would support the development of an information society in the country, and the integration of the Russian Federation into the emerging Global Knowledge-Based Economy;
- inefficient coordination of the existing electronic information resources in the country;
- inadequate representation of Russian content in global networks. This representation does not correspond to the content's potential in sciences, intellectual and business development;
- lack of instruments for the self-organization of communities for virtual communication, information, experience and achievement exchanges, achievements, search for a partner etc. These functions are spread between narrowly specialized sites;
- lack of information and communication infrastructures for delivering modern education, including the use of distance learning, and for realization of life-long education;
- absence of reliable mechanisms for the commercialisation of scientific and technical achievements;
- an unfavourable legal system for the development of a new, knowledge-based economy.

In spite of all the above problems, a platform for the development of a “Knowledge-based Economy” has been formed. Over the last 7 to 10 years, ICT has penetrated all spheres of daily life and work. In 1992, the ICT market was liberalized. The information resources of Russia are of a gigantic size and represent a unique value. The market of electronic information and services is very dynamic. The Internet audience is estimated to constitute 10 million consumers with three million registered. The Russian Federation possesses a unique potential of highly-qualified personnel in the ICT sector, which continues to grow.

On the Russian market there exists practically all models of electronics business. The State has started implementing a range of strategic programs and initiatives aimed at achieving an effective integration of the Russian Federation into the world economy. Large investment in the ICT sector, as well as support from the international community, could significantly accelerate this process.

Annex 1 – knowledge-based economy indicators

1. Network Access

1.1. Information infrastructure

- Telephone penetration (number of mainlines per 100 people):
21 per 100 people
- Mobile wireless penetration (%), growth trend:
Mobile penetration is 7% of the population. Growth trend information not available (N/A)
- Total number of mobile telephone subscribers:
11, 000,000
- Total number of mobile telephone subscribers per 1000 people
68 mobile subscribers per 1000 people
- Wireless penetration (percentage of the population):
7%
- Growth trend:
Information N/A
- Total number of cable TV subscribers:
12,000,000
- Cable TV subscribers, % of households:
20% of households are cable TV subscribers

1.2. Internet availability

- Total number of ISP providers:
300 providers
- Prevailing types of ISPs' networks (microwaves/radio...):
Dial-up.
- Percentage of unsuccessful local calls:
Highly variable
- Is there competition among ISP providers?
Yes
- What are opportunities for public Internet access (libraries, Internet-café, etc.)?
Internet-café
- Are there dedicated line lease possibilities? Are there competing providers?
Yes on both counts

1.3. Internet affordability

- What are the prices of Internet access (unlimited access, per minute charge)?
Per minute and hour charge
- Is it affordable for the majority (compared with average salary/income)?
Internet access costs between 30 and 70 cents per hour, and average salary stands at \$300/month.
- What are the rates for leasing lines?
\$300/month

- Are the rates affordable for small businesses or individuals?
Highly variable

1.4. Network speed and quality

- What is the percentage of successful calls?
Highly variable.
- What is the quality of voice connection?
Highly variable.
- How many faults are reported per year for each 100 telephone mainlines?
N/A
- How long does it take to clear faults (48 hours, a week, month)?
48 hours
- Which services are supported by local telecommunications infrastructure: e-mail, high-speed modem connection, what is the maximum speed?
Services are e-mail and ADSL modem connection. Speed is 2-4 Mb/second
- Are there sufficient backbone facilities/networks? Even for peak demand?
Yes on both counts.
- What is the percentage of packet loss by the network?
Between 1 and 3%.

1.5. Hardware and software

- Are there local IT hardware/software sales points?
Yes
- Is the price of IT hardware/software affordable for majority/minority of citizens/businesses?
Yes, for the minority
- Is there software available in local languages?
Yes
- Is software imported or adapted locally? (Percentage of the imported, adapted, produced locally hardware or software in total number in circulation)
85-90% is imported and adapted, and 5-10% is produced locally
- Is there a broad variety/some/very few software business applications?
.There are some software business applications
- Are the IT software/hardware retail and wholesale markets competitive and vibrant?
Yes

1.6. Service and support

- How long is the waiting period for telephone line installment? (Total number of those on the waiting list; waiting period: days, weeks, months, years)
The waiting list for a main line is 6,500,000. The waiting period in Moscow is weeks, in the country it is months.
- How long is the waiting period to repair reported telephone line problems? (Minutes, hours, days, etc.)
Hours

- Are there software developers, web designers, network administrators and other technical personnel, and how many (working where, employed/unemployed)?
Yes, but numbers not available.

2. Networked Learning

2.1. Access by schools to ICTs

- Are there computers in schools? How many students per computer? On which level (university/secondary/primary)?

Number of schools	68,000
Number of computers in schools	40,000
Number of schools with computer labs	14,000
Number of computers per school	0.6
Number of students	19,190,300
Students per computer	480
% of schools with computer labs	20%

- Who has access to computers (technical staff/faculty/students)?
Faculty/students.
- What is the quality of hardware (386/486/Pentium...)?
286-386 – 40%; 486 – 35%; Pentium/Celeron – 25%
- Are there LANs in schools? Regional WANs? National school networks?
There are rarely LANs in schools, and there are no regional WANs.
- Do schools have connection to the Internet? Is it dial up or through a leased line, wireless?
Connection is typically through dial-up, with only 3% via wireless.

2.2. Enhancing education with ICTs

- What is the percentage of students and teachers who use computers? (Universities/primary schools/secondary schools)
Universities - 75%; primary schools – 15%; secondary schools – 25%
- What are the computers used for? What is the level of computer literacy/skills?
N/A..
- What is the level of information and communication technologies integration in the curriculum?
N/A

2.3. Developing the ICT workforce

- Are there training opportunities for programming, maintenance, and support?
Yes
- Who is offering them (public/private centers)?
Private centres
- Are they affordable for majority/minority of the population?
Yes, for the minority

- Is there on-line training available?
Yes
- Do employers offer training?
Yes

3. Networked Society

3.1. People and organizations online

- What percentage of the population:
 - is aware of the existence of the Internet?
4%
 - has used the Internet recently?
3%
 - uses the Internet regularly?
3%
- What is the structure of users by gender, age, social and educational status?
N/A
- What is the number of locally registered domain names (per 1000 people)?
N/A
- Is there advertising for online companies, and how common is it?
N/A

3.2. Locally relevant content

- Are there (and how many: no, few, some, many) websites:
 - Providing local topics?
Many
 - In local languages?
Many
- How often are they updated and is content static or dynamic?
Updated frequently, and containing dynamic contents
- Are the above websites created in the community?
Yes
- Are bulletin board systems, Usenet groups, newsletters, and/or listservs in use?
Yes
- Are there opportunities for Web-related training?
Yes

3.3. ICTs in everyday life

- Does the population include information and communication technologies (phones, faxes, pagers, computers) in everyday life?
Yes

- Are there phones, wireless phones, digital assistants, pagers, PCs and are they being used regularly? Are they used for household commerce (banking, online shopping, investing) and social and commercial interaction (bartering, online chat and etc.)
Yes on all counts.
- Are there PCs with e-mail capability available (cyber cafés, telecenters) and are they being widely used?
Yes on both counts.

3.4. ICTs in the workplace

- Do employees have:
 - (Un)limited access to phones?
Limited
 - Personal e-mail accounts?
Not very often
 - Internet access from personal workstations?
Not very often.
 - E-mail and web addresses on business cards?
Not very often
- What percentage of businesses and government offices have computers, how many of them, how many employees use them?
90% of businesses and government offices have computers. Information on employee use N/A
- Are they networked?
Yes
- Is business mostly conducted in person or by e-mail, or is there data sharing, enterprise, reporting, transaction, and research applications? How intensively are they used?
NA
- Are there efficiency gains resulting from the use of ICT systems?
N/A

4. Networked Economy

4.1. ICT employment opportunities

- Are there opportunities for technically skilled workers within the country?
N/A
- Are companies from outside of the country investing in IT related projects?
N/A
- What is the proportion of knowledge-workers and information-related business in the economy? (Percentage of labor force, percentage of GDP)?
N/A
- Are businesses considering IT in their strategies?
N/A

4.2. B2C electronic commerce

- Do local businesses have websites and how many? Is content current or static?
25,000 local businesses have websites, and content is current
- Are there online B2C transactions, or are transactions mainly oral and/or paper-based, phone or fax-based?
Highly variable. Many transactions are a mix of online and oral, or online and fax(paper-based)
- Is online retail a noticeable component of overall commercial activity?
NA

4.3. B2B electronic commerce

- What are the sources of market information and are they sufficient for providing transparency?
N/A
- Are there online B2B transactions, or are transactions mainly oral, paper-based, phone or fax-based?
Mixed – online and paper-based
- Can transactions be conducted online without paper documents? Is the process automated? Does it allow online tracking, monitoring?
No
- What portion of B2B activity is conducted on line? Is there gain in efficiency?
N/A

4.4. E-Government

- Number of government resources online? Does it include information, hours of operation, any services? Is information current and relevant?
70 government resources are online and do include information, hours of operation and any services. Information is current and relevant
- Is there online interaction between government and citizens, or is interaction mainly oral, paper-based, phone or fax-based?
Under development
- Is there online interaction between government and suppliers and contractors, or is the interaction mainly oral, paper-based, phone or fax-based?
Under development
- Is it possible to download applications from the websites?
Yes
- Can citizens apply for permits, licenses, and taxes on line?
No

5. Network Policy

5.1. Telecommunications regulation

- Is liberalization of the telecommunications sector planned or implemented?
Under development
- Is there competition between telecommunications service providers?
Yes

- Is broadband Internet access offered?
Yes
- Is regulation set and enforced by an independent body?
Yes

5.2. ICT trade policy

- Do tariffs or other restrictions (technical standards, domestic regulation, etc.) exist?
Yes
- Are there restrictions in the service (including information services) sector?
No
- Are there disproportional taxes on electronically delivered services?
No
- Is Foreign Direct Investment in IT sector existent, and is it encouraged, discouraged, restricted?
Encouraged

6. Media

6.1. Radio, TV and newspapers

- Number of radio and TV stations, newspapers
3,000
- The size of audience/circulation.
N/A

6.2. Employment in the media

- Number of employees in the media
N/A
- Trend: is the number increasing/decreasing?
N/A

7. Intellectual Capital

7.1. Patents

- What is the number issued per annum?
5,500
- What are the trends?
N/A

7.2. Copyrights

- What is the number issued per annum?
2,000.
- What are the trends?
N/A

7.3. Licenses

- What is the number issued per annum?
1,200.
- What are the trends?
N/A

7.4. Trademarks

- What is the number issued per annum?
800
- What are the trends?
N/A

7.5. Scientific and/or technical associations

- List with a brief profile
Nine scientific and/or technical associations.

8. Education

8.1. Higher education

- Total number of higher education establishments (public/private).
N/A
- Total number of students (total average per annum, in both the private and public sectors)
N/A
- Prevailing specializations. (distribution of students among the fields)
N/A
- Cumulative number of population with higher education degrees (total in the fields of both science and technology)
N/A

8.2. Distant learning

- Distant learning facilities
N/A
- Number of students trained per centre
N/A

9. Labour Force

9.1. Employment in science and technical fields

- Number of employees and trends in the fields
N/A
- Compensation rates in the fields (average salaries)
N/A

9.2. Employment in the electronics industry

- Number of employees and trends in the fields
N/A
- Compensation rates and trends in the fields
N/A

9.3. Employment in the telecoms industry

- Number of employees and trends in the fields
430,000
- Compensation rates and trends in the fields
N/A

10. Research and development

10.1. Research institutions

- Number of research institutions
800

10.2. Investments in research and development

- The total amount
N/A
- Government and private business breakdown of total investment in research and development
N/A

11. Other issues

National initiatives regarding science and technology policy, venture capital, stimuli for students, scientists etc.