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Social Transformations in Russia: Peculiarities of Information Technology Development

Abstract

In this paper we analyze the development of information technology in Russia and its significant role in the social and economic transformation of Russian society. To better understand the problems, we compare the information development of Russia and China. China has come to the information technology sphere later than Russia, but mobile phones and the Internet system in China are currently more developed than in Russia due to governmental policy towards the speed of disseminating new technologies.

Corresponding with deepening Russian economic reform, a disproportion between the level of information resources available for private and state organization and the necessity of developing a market economy are becoming more and more obvious. At the present time the critical situation in the national information sphere connects to the deep business activity crisis in Russia.

It is also clear that only further development of economic reform in Russia will permit state, local, private and international financial resources to be mobilized so that the required amount of investment needed for the development of Internet telecommunications infrastructure in a region as big as Russia will be available. Only commercial use of the Internet by the enterprise sector in parallel with noncommercial provision of its services (which are mostly developing in Russia at the present time) may guarantee the real connection of broad Russian society to the global information network and provision of its services to every interested Russian organization and private person.

Since these processes of global telecommunications and information market development are extremely dynamic, Russia does not have much time to take its appropriate place in the global information system. If Russia misses this opportunity, it could be marginalized to the information periphery and subsequently be divided into several spheres of influence within the biggest world informational empires. This could happen without blood and notice as the result of global telecommunications and information market competition and a lack of governmental regulations and support of national providers and producers.

At the beginning of the 20th century the famous Russian scientist V.Vernadskiy came to the conclusion that one of the most powerful energies on the Earth is human knowledge. During the creation of his theory of "Knowsphere," the sphere of knowledge, Vernadskiy considered that science and scientific thinking are the fundamental preconditions of the process of this "Knowsphere" formation. The collective Human Mind, he wrote, is becoming the most powerful geological energy of contemporary world, which should be taken into serious consideration (*Biosphere and*

Knowsphere; Scientific Thought as Planetary Phenomenon). These days the modern world is in systematic crisis, with social, political, ecological, and power supply sources simultaneously experiencing extreme stress. In order to resolve this systematic crisis, we need to identify factors which will change the structure of the system. During the 20th century information became such a factor. Information is becoming a strategic resource for countries, and most economic and social successes accrue to those who actively use contemporary telecommunications equipment and its network devices (e-mail, distance education, multimedia, television, teleconferences, visualization, modeling, computer graphics, the Internet, etc.). Today, humanity is creating a completely new informational space--mass media integrates with digital technologies and the newest telecommunications, forming informational "hyper-systems." This process is unique in both speed and scale because information technologies actively invade the life of society as a whole and the life of the individual person.

According to the theorists of post-industrial information society, the globalization and implementation of new computer and communication technology will not just change economic indicators and social development but also lead to the formation of a completely different type of societal system (Toffler; Bell; Touraine). Globalization proposes an absolutely new view of space and time; according to A. Giddens, space becomes independent from time. Local phenomena are formed under the influence of the events that are happening many thousands of kilometers away (602-609).

Today we can broaden the definition of "Knowsphere" given by Vernadskiy to "Inforsphere": a new universal intellectual informational human environment. This is the synergy of global telecommunication networks, intellectual computer systems, and the diversity of world information sources (content sources) (Tikhonov et al.). Globalization processes influence the formation of a single united, universal society, with a planetary infrastructure of international relations and one center of global control (management). We should discuss new steps in social development where information technologies change the character of the organization of the work processBtelework, an increasingly high level of human resource mobility, the development of telemedicine. International economic relations have undergone radical changes. Today, a so-called 24-hour society has appeared. The world economy never sleeps; it follows the sun from Sydney, Tokyo and Vladivostok to New York and San Francisco. Global communications force the economy to work non-stop. Interpersonal communications are similarly subject to drastic changes under the influence of mass communication and

the development of information technologies including mobile phones and electronic mail.

Contemporary society is experiencing a complicated period of globalization of societal processes that is caused by several circumstances, with information technologies the most significant among them. Globalization has become a most important real aspect of the contemporary world system, one of the powerful forces that determine the further development of whole world. Globalization affects all spheres of social life, including the economic, political, social, cultural and ecological, as well as state and organizational security.

Two important events of the 1990's rapidly accelerated world integration processes. The first is the end of the Cold War and the conflict between two world systems. And the second is the spread of the Internet. The indicator of the importance of the information sphere is the fact that this sphere accumulates the largest financial investments. There are two leading aspects of the globalization process:

1. The homogeneity of the whole world: the appearance of unified cultural values, life standards and behavior norms; and the tendency toward universalization.

2. The heterogeneity of the world.

Globalization is a naturally growing interdependence, the integration of different forms of social life. Its main consequence is the erasing of national borders under the activity of new actors: transnational corporations, religious groups, transitional management structures, multinational bodies, and NGOs. In recent decades a number of sources of globalization have appeared:

1. Technological progress, which has led to the reduction of transport and communication expenses.
2. Liberalization of commerce and other forms of economic liberalization, which have led to the elimination of barriers to world trade in goods and services.
3. Considerable extension of the spheres of activity of organizations, through development of new managerial technologies and the use of new sources of communication. Many firms and organizations extend their activity from local to national, international and global markets. Such world organizations as the United Nations Organization, International Monetary Fund, World Bank, World Trade Organization and World Tourist Organization have begun to play a new global role.

4. Western and Eastern countries seem to have achieved global like-mindedness in their evaluation of the market economy and free trade. The starting point of this process was Chinese reform in 1978 and then, later, political and economic transformations in Central and Eastern Europe and in Russia. This process led to an ideological convergence of the West and East with the development of a common view of market economies.

5. Peculiarities of cultural development. There is an increasing tendency toward the formation of global, universal mass media, mass culture, and the use of the English language for international communication.

Rapid changes in providing information influence and transform all the main components of the social system: economy, politics, social priorities, and human values. We can conclude that information is the window not only to the future but also to the condition of every person and the source of the whole society's confidence in the future. All together, we must resolve how to make information and the channels of its distribution more reliable, information resources more accessible, and the knowledge and values that comprise the information sphere more effective and useful for people and society.

One of the main principles of the Okinawa Charter is the availability of information and modern information technologies. The Charter places in one line the problems of informatization, the building of a global society, and poverty elimination. Poverty reduces access to information; thus, it preserves underdevelopment and deepens social differentiation. Poverty and negligence are threats to a complicated technological world society. We need to expend more effort to help develop poor countries, regions, and social groups economically and culturally. When we talk about informational communications, we mean assistance in infrastructure development and the improvement of Internet access, especially in rural areas.

The wide gap in financial, technological and informational resources creates an intention to force other nations to use Western models of development. This intention is expressed in the phenomena of "Westernization" and "Americanization." The wide dissemination of American culture and English language around the globe causes European countries such as France, for instance, to see globalization as an American effort to achieve cultural, economic and political hegemony. Other countries consider globalization a new form of colonial dependence, where the USA plays the role of center with other countries reduced to the status of colonies.

In reality, the resolution of these vexing economic, political, and other problems of globalization requires the strong common efforts of all the largest states such as the EU, the USA, Canada, Japan, Russia, China, India, and Brazil working cooperatively. It is necessary to modernize or to create new institutions which will have global perspectives and the power to make global decisions, and to control their realization using principles of transparency.

In our contemporary world the relevant use of information becomes more important than its creation and storage. Today there are such enormous amounts of information that no single person or even a single organization or institution could ever process and utilize them. Contemporary wisdom is knowing how to use knowledge rightly. In 1997 there were 1805 organizations in the world selling information and 3000 organizations producing information. In January 1997 the total number of online information products was 10,033. Russia is represented by about 10% of all information included in databases. The databases are distributed among a few major spheres: Business -- 33%; Science and Technology -- 19%; Legislation -- 12%, Consumer Market -- 10%, Other -- 26%. Undoubtedly, however, the leader of the information market is the USA. It provides access to more than 6000 databases. Great Britain has about 1000, Germany 400, France 300, Austria 200, Japan 150, and Spain 140 (Gorchakov, Golodova, and Dianova 53).

The most significant role in the professional information market, however, is played by such systems as LEXIS-NEXIS (with more than 1,000,000 documents added every day)**,** Westlaw, Knight-Ridder (Dialog and Datastar), QUESTAL-ORBIT, Dow Jones/News Retrieval System, Datatime, STN, and NewsNet (Gorchakov and Golodova 14).

Unfortunately, the development of Russian information infrastructure falls considerably behind that of the USA, European countries, and Japan. In Russia and the NIS there are not more than 100 organizations that have their own professional databases (Likhodedov and Tovstih). We might find a similar situation in all other communications spheres such as the Internet.

Map 1. Internet connectivity 1991.

The map below, from 1991, shows a large number of countries colored blue, representing full Internet access, particularly in the Americas and in northern Europe (Landweber, ctd. in Dodge). But an equally large number of the world's nations are shaded yellow, indicating that they had no international connectivity. In fact, this category includes well over half the nations of the world. However, they are clearly concentrated in the less developed regions of Africa and central Asia. By 1997, the majority of the nations of the world are shaded blue. Access to the Internet, as measured by Larry Landweber's survey, was so widespread that the exceptions really stand out (ctd. in Dodge). It was at this point that tracking diffusion at this scale became redundant, and, hence, this is the last map in the series. The yellow-shaded exceptions are nations suffering from extreme poverty, war and civil conflicts (such as Afghanistan and Somalia) or from geopolitical isolation--e.g., Libya, North Korea, Burma, Iran and Iraq.

First, it is important to realize what exactly Landweber was measuring: international connectivity at the national level. The maps ascribe a single value to a whole country, suggesting that every place and everyone within this area have

equivalent levels of Internet connectivity. Clearly, this is not the case, even in the most networked nations, as recent concerns over "digital divides" have highlighted.

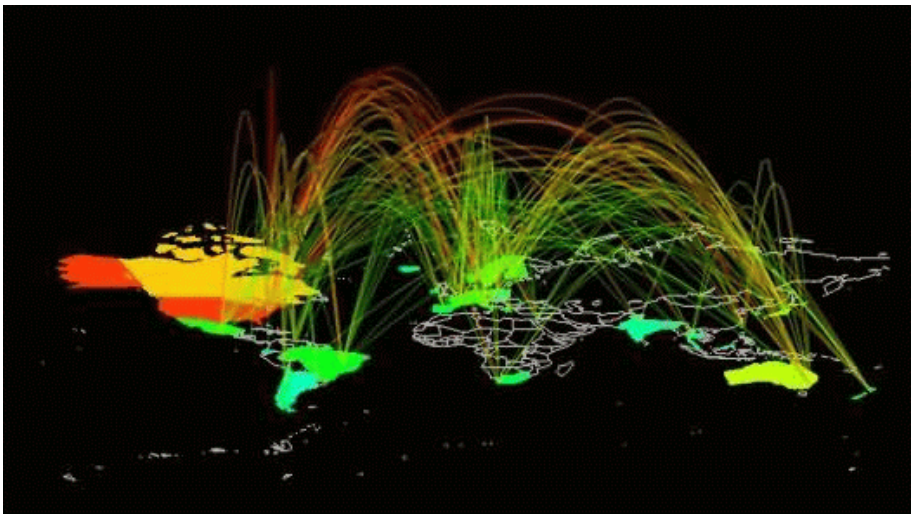
The second way the Landweber maps can deceive the unwary reader is that very different countries appear to be same. Due to the limited range of categories, nations appear visually similar on the map when in reality their level of Internet connectivity can be very different. Countries are colored blue if they have permanent international links to the Internet, but these links may be a small number of satellite connections (expensive, low bandwidth) in a few major cities or numerous high-capacity fiber-optic cables linking all parts of the country to the Internet. To the unwary eye, both cases can appear the same on the map. For example, in the September 1991 map, the three nations of North America are all shaded blue, indicating they are in the same group because they all have Internet connectivity, yet it is clear that Mexico was not in the same league as the USA and Canada in terms of how widespread and affordable the Internet was. In the final map produced by Landweber in June 1997, a large proportion of the nations of the world have Internet connectivity, but one must be aware of the wide variations among nations in the degree of connectivity (ctd. in Dodge).

Development of Information Technology in Russia

Corresponding with deepening Russian economic reform, a disproportion between the level of information resources available for private and especially state organization and the necessity of developing a market economy are becoming more and more obvious.

For instance, the capacity of business information available for Russian international market actors is just 15-20% of the essential norm (Andreeva 46-52).

Map 3. Main International backbones



Let's have a closer look at the Russian connectivity and Russian Internet diffusion situation right away. On the map we have the regions with high Internet population density and connectivity colored red and those with the lowest levels of Internet availability colored blue (Eick). Here Russia, as well as Africa, is marked as a dark continent, unreachable via connection. This map does not even show the reality of the current situation in Russia but, rather, the extent to which information about this situation is available to the public.

There has been much scholarly work done to try to understand the prerequisites and processes behind the global diffusion patterns indicated by the maps. At one level, clear relationships between measures of wealth and Net connectivity have been found, but the underlying processes are likely to be more complex. For example, it is important to factor in variations in social and cultural practices in the adoption and use of technology, as well as the differing political and regulatory structures of countries.

So let's have a closer look at the preconditions of and obstacles to the development of the Internet in Russia. There are several factors that favor rapid development of the Internet in Russia. Among them are the following:

1. Transformation of Russia from a completely closed society into an open one.
2. Considerable growth in the number of personal computers in the country, which are in the hands of both state organizations and thousands of private enterprises as well as hundreds of thousands of private persons.

3. Development of local area networks (LANs), based in the information and computer centers of ministries and state agencies, science and educational organizations and commercial companies.
4. Creation of a number of regional and interregional backbone networks.
5. Generally high level of education in Russian society and the growth of PC literacy and public awareness about new opportunities for the use of LAN and Internet services and information resources in commercial and research work and education.
6. Privatization and rapid growth of the private enterprise sector as a potential principal commercial player in the use of Internet connection services.
7. Knowledge of foreign languages, particularly English, by a growing number of Russians and their interest in and need for original data and information in English.

After social, economical, and political transformations, the unified telecommunications system of the USSR was divided in 1992 into the 86 private corporations that now control the markets in the provinces. And we have 2500 small alternative operators. But the cables and telephone lines still belong to Svyazinvet, a private corporation with a large state ownership. At the same time the international telephone through international connections center M9 and the long-distance lines belong to Rostelecom,[1] also a private corporation but with 25% of its stocks owned by Svyazinvet,[2] which is still the largest telecommunications holding not only in Russia

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[1]The largest Russian provider of intercity and international telecommunications, with 60% of Russian outgoing traffic and 100% of intercity traffic.

[2] Nowadays, the reorganization of Svyazinvest has caused a recent shift and new tendencies in the Russian telecommunications market: instead of numerous different companies there are now 86 consolidated Svyazinvest companies. There are 11 regional companies, each one controlling a single province or district (*oblast* or *krai*). Electrosvyaz, Ltd. became responsible for the Primorye region. Moscow MMT already joined with Rostelecom. So, we clearly see the process of enlargement of telecommunication service providers, but it did not lead to separate, business-like components as intended.

In 1982 the book *The Theory of Contestable Markets* changed views about natural monopolies, which led to the deregulation of traditional monopolies. For example, after Bell Telephone in the USA was deregulated, it became clear that the free market works more effectively, creating lower prices and higher quality. The most important change was the improvement and development of both telecommunications systems and management systems in the newly-created companies. The term natural monopoly, which is still ascribed to power and telecommunications resources in Russia, becomes obsolete. We can now consider natural monopolies only roads, power lines, and airports.

Two competing roads or airports make no economic sense. Developed countries have already reached the point where telecommunications networks are treated as roads, and a truck driving along a road doesn't belong to the road's owner. Here in Russia, we still experience the obsolete methods of the vertically-integrated state monopoly whereas in the USA there are several private vertically-integrated companies.

but in the world, with 30,000 telephone stations and 28 million subscribers, 93% of all Russians who use the Internet ("The Connection").

Rostelecom is the only operator of long-distance connections in Russia, so we can call Rostelecom the largest ISP to the intermediary ISPs. However, we don't have an ISP that operates in all regions of Russia, as, for example, AOL does in the USA. ISPs are usually local, though some of them, such as Global One, try to cover several regions. For instance, Daltelecom monopolizes the telecommunications market in the Russian Far East, and what is important for us is that the quality of telecommunications is very low in this region and that Daltelecom doesn't allow any other companies to enter this market from the central part of Russia, for example. It's not surprising when we find a classical example of a monopoly trying to further its influence on complementary industries such as telecommunications equipment production and trade. For example, Rostelecom has organized with Inkom, Ltd. and several foreign companies (Ericsson, Ericsson Nikola Tesla -- Sweden and Mashinoimpeks -- Horvatia) to sell telecommunications equipment to regional providers.

We can give another example of a successful company that operates in the telecommunications market: NetDialogue (www.netdialogue.com). NetDialogue has operated from 1991 in the sphere of system integration of computer software for information networks, the creation of computer communications as well as cable networks, collective satellite TV reception systems, complex security systems, etc. It's interesting to look at the changes in this company's market. While the first clients of the company, said NetDialogue president Yuri Yashnev, were the newly founded companies of so-called "new Russians," after 1994 they were large commercial banks. After the crisis of 1998 they were large regional telecommunications operators such as Tulatelecom, and now they are large industrial corporations. In 1991 NetDialogue had

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Moreover, according to Valeri Yashin, the executive director of Svyazinvest, these changes have been made not because of claims that his company is a monopoly but because of market trends and the business activities of his company. However, the changes proposed to improve the situation somehow don't change the nature of the problem.

10 clients; now in 2001 it has 500 clients. During the last year alone, the number of clients has doubled. Now, many clients return for modernization of their equipment and networks. The firm started out selling hardware, and now it is working with designing, providing, installing, and maintaining telecommunications equipment. Moreover, the volume of its contracts has drastically increased, from 10,000-20,000 US dollars (USD) before 1994, to 200,000 USD after 1995, to 1-6 million USD now. For example, Tulatelecom first received the contract for the whole city in 1997 and in 1998 for the region (*oblast*) as well as providing equipment to the city's telephone stations. NetDialogue has had a strategic partnership with Lucent Technologies in the USA since 1993 and with Alcatel in Europe since 2000 because there are no Russian producers of telecommunications equipment, except for optical cables. Nowadays, Lucent Corporation has such a trusting relationship with NetDialogue that even the question of credit lines can be decided through phone calls (Yashnev).

The main reason why Russian companies prefer to work with NetDialogue and not directly with American or European producers is that NetDialogue gives long-term credit to its clients. Foreign companies don't risk long-term credit or even use prepayment methods often. Interestingly, lately there is growing influence by European telecommunications providers on the Russian market. In 1992 there were about 20 small telecommunications companies, and the number was rapidly growing, but after the crisis of 1998 this number decreased significantly. For example, Ankei, which was five times larger than NetDialogue, went bankrupt, and many other firms were sold to Western companies such as Price Waterhouse (Yashnev).

According to Max Smetannikov, "Russian development is slowly gaining favor in the USA. Bruce Waldack, founder of Web hosting firm DigitalNation, which sold out to Verio for $100 million, is now head of a new venture, Thruport Technologies. He attributes part of his success to a Siberian connection. 'We have been using Novosoft, a Russian firm in Novosibirsk, for software development both at DigitalNation and at my new firm, Thruport,' Waldack says" (qtd. in Smetannikov 54). While he has never been to Russia, he describes his relationship with his contractors as very stable. That's great praise coming from Waldack, who has been known to take extreme punitive measures against employees who arrive at work as little as one minute late (Smetannikov 54).]

Other entrepreneurs go as far as setting up firms focused entirely on soliciting business in the West and executing projects in the East. Emmy Gengler, founder and CEO of the Fremont, California start-up Softjourn, plans to use her stable of 70

programmers in Kiev, Ukraine to complete projects for Silicon Valley and European customers (Smetannikov 54).

The largest employer in Novosibirsk, the Russian-owned but northern Virginia-based Plesk is a poster child of sorts for the latest thrust in the globalization of the information technology (IT) industry: Russians attacking offshore software development full force**.** As an industry, Russian offshore software development is off to a modest start. In 2000, only 8,000 professional programmers were working in an organized fashion on cross-border projects. Overall revenue for the industry is roughly $60-100 million, a fraction of India's $6.3 billion, according to the American Chamber of Commerce in Russia (Smetannikov 54).

There are still serious obstacles preventing Russia from massive development of LANs and from connecting to the Internet, including the following:

- Insufficient development, low capacity and bad quality of local telephone lines all over Russia and particularly in the provinces.[3]
- Limited and controlled access by the state to automatic international telephone lines.
- Limited number and capacity of international telephone lines in general.
- General suspicion about the possibility for abuse if there is broad access to information by the public and by private organizations, and general underestimation by state agencies and the enterprise sector of the development opportunities arising from connection to information networks inside and outside the country.
- Shortcomings in the availability of information and information telecommunications technologies and equipment all over Russia.
- Severe lack of investment capital from both state and private sources for information technologies and for the development of the country's telecommunications infrastructure.
- Underestimation by the state and academic organizations that already have access to LANs and to the Internet of the possibilities for financing and further development of LANs and connections to the Internet arising from their commercial use.

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[3] Nowadays, this situation is rapidly changing in the western part of Russia due to its closeness to the main capital flows. Rostov-na-Donu has reached the highest telephone density figures in Russia--22,500--whereas average Russian telephone density is 21,400. About 70 families out of 100 are known to have home telephones.

A total of 900,000 personal computers was reportedly sold in Russia in 1994. About 60 percent of them were bought by Russian federal authorities. There was considerable improvement in the technical quality of those PCs (most had 386, 486 or Pentium processors) (Mendkovich and Rusakov). There was also growth in the number of portable PCs sold**.** In 1998 we could already speak about the figure of 866,000 Internet users (Kuz'min), so the number of computers significantly increases since not every computer is connected to the Internet.

Seventy percent of Russians use the Internet at work, and 42% use it at home. The figures don't add up to a nice 100% total since 38% of those using the Internet at home have it at work and as few as 4% of people use the Internet only at home. Importantly, all people using the Internet comprise only about 2 million people out of approximately 146 million (Kuz'min). If you compare these figures with those on numbers of users in 1998 and 1994, you see the speed with which Internet access has spread. But a high level of computer competency can be achieved only if you have a computer not only at school or work but also at home.

However, Russia's requirements, according to both Russian and American experts, are estimated to be at a level of about 30 million PCs, which shows that the Russian market is still very modest and has great potential for further growth. There is also great demand in Russia for information network and communications equipment. The government has a big role to play in creating conditions conducive to the further growth in sales of PCs and other telecommunications equipment and in fostering development. The government needs to pursue a special policy to promote trade in the telecommunications sector. In spite of all these deficiencies, Russia already possesses high potential for the development of a national information network of networks, regional and local, and for its connection to the Internet.

It is estimated at present that there are about 800 LANs in Russia, more than 90% of which are in research and educational institutions; the remaining LANs are in state or public organizations. They are mostly concentrated in the big cities, including Moscow and the Moscow region (more than 250), Saint Petersburg (more than 50), Novosibirsk (about 40), Perm (about 30), Yekaterinburg (about 20) and Irkutsk (about 20). The use of those LANs and connections through them to the Internet is almost completely noncommercial. It is believed that in the near future, there will be rapid growth in the number of such noncommercial organizations having LANs--up to about 1,500 (however, the figures given here are for the year 1999 (Kuz'min).

There are still very few enterprises in the private sector that have their own LAN or that are commercially connected to LANs and the Internet. The Russian press reports that Demos, one of the first Internet service providers in Russia, registered in 1989, has connected 3,500 collective clients, including the Administration of the President of Russia, Russian Central Bank, the Moscow Mayor's Office, and the press agency ITAR/TASS. Demos created the well-known network Relcom, operating in TCP/IP and having 104 basic ports of access in Russia. Another smaller network using TCP/IP is Glasnet. Regional backbones are in turn forming interregional IP networks in such areas as Siberia, Ural, Altai, St.Petersburg, Ukraine, Far East and others (Mendkovich and Rusakov).

According to unofficial data that have been reported in the Russian media and information from the experts at Demos, there were only 133,000 e-mail users in Russia in 1993 (*Global Internet*). Currently, it is hard to define the number of Russian e-mail users, but this figure is estimated to be close to two million (*Rambler*). This shows that there is great potential in Russia for further growth in the number of e-mail and Internet users.

During the rise of the ARPANET, researchers also tried to create computer nets to calculate the results of nuclear weapons testing. By the 1980s, Russian scientists had some experience in the creation and exploitation of X.25 nets. However, access to the Internet as a network of networks combined by TCP/IP was prohibited. Soviet and later Russian engineers had two main problems: the embargo on contemporary Western COCOM equipment, which was abandoned only in the early 1990s, and poor infrastructure, especially in telephone lines. Soviet scientists looked with interest and attention at Western technologies, and, in copying and replicating Western technologies, they were like the scientists from the South African Republic who managed to copy the French Mirage-3. For example, the first *marshrutizator* (router) LSI-1 was known to Soviet scientists under the name of DVK or Elektronika ("Computers and War"). So, from the earliest stages of technological development, there has been a long-term tradition of copyright violation. Today, this problem undermines technological development in Russia because "intellectual property" is still a very new and unfamiliar concept in our legal system whereas those who commit illegal acts have been accustomed to impunity. Moreover, we might even add that the diffusion of software and hardware products has been possible due to the theft of new technologies and purchases of stolen technology from neighboring local producers.

However, many Russian networks work in the standard X.25 of ISO/OSI (Rospak: 114 basic ports of access; Rosnet: 34 basic ports of access; Rosprint). The difficulties of their use for connection to the Internet arise from an insufficient number of information gateways/locks between the X.25 and TCP/IP Internet protocols.

What can we conclude from the figures on Internet use? Nothing, if we do not connect two factors--the spread of Internet access and the spread of computers.

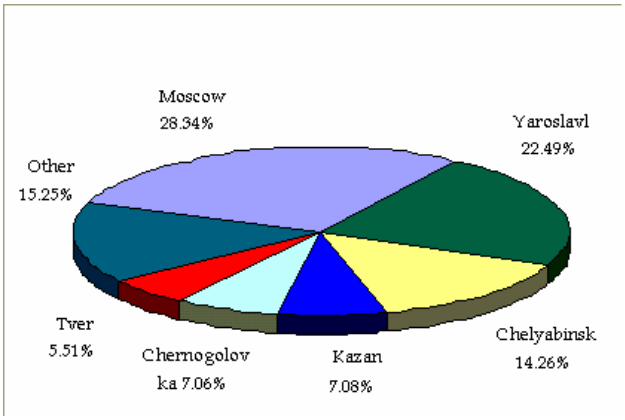
One of the typical features of the Russian market for network services is the presence both of numerous domestic and foreign Internet service providers (Relcom, Demos, Sprint, SovAm, etc.) and of a rather large group of academic and research networks (FREEnet, RADSIO-MSU, RUNNet, RELARN-IP, RSSI, etc.). The latter is caused not only by the size of the market but also by some of its specific features.

The Russian academic networks (Radio-Moscow State University, RSSI, FREEnet/UNICOR, Sovam Teleport, RUNnet, United Institute of Nuclear Research-UINR, etc.) are noncommercial and have limited distribution and a limited number of clients, mostly those in the research and educational institutes of the Russian Academy of Sciences.

One of the features is that the most active, large and well-educated group of Russian Internet users is made up of the employees of state scientific, educational, cultural, and health services institutions. Moreover, this group also tends to exploit the most advanced types of network services. At the same time, due to the extremely low level of state funding, it is impossible for these organizations to purchase the network services they need from commercial Internet service providers. These factors stimulate the creation and usage of noncommercial computer networks within the institutions. Lower related expenses related to the installation and support of this kind of network are due to their not being tax deductible. That the institutions are state funded qualifies them for special rates for a number of services--such as leasing telephone lines. Access by these centers to Internet resources can be best provided by one noncommercial academic and research network.

Almost simultaneously with the first commercial network, Relcom, the first noncommercial academic and research network, FREEnet, was established under the Soviet government and continued to develop successfully despite the serious political and economical changes the country faced (Mendkovich and Rusakov).

Serious financial support for the development of noncommercial academic local Internet centers at “33 classical regional universities outside Moscow and Saint-Petersburg was provided by the International Fund of George Soros.” The program was



begun in 1992. The Soros Foundation has allocated $100 million toward realization of the program; the contribution of Russian government amounts to $30 million ("Programma Internet"). Further development of internal digital telecommunications infrastructure, high rate and LANs in Russia and of new high-capacity fiber-optic telecable connections to the Internet is certainly a necessary prerequisite to ensure massive connections of commercial clients in Russia to LANs and the Internet (Bulashova and Cole).

However, the limited financial state resources and support from noncommercial Russian and foreign organizations are not sufficient for the construction of a modern expensive telecommunications infrastructure in the vastest country of the world (Crepin-Leblond). The possible solution in this regard may be found in a simultaneous, parallel involvement in the financing of the building of the national telecommunications infrastructure by the private enterprise sector and perhaps by the public through their direct payments for commercial connection to the Internet. As a matter of fact, their massive and active connection to the Internet could be promoted right now in many parts of the country by public and private service provider firms, through existing lines controlled by state and noncommercial organizations, which, in spite of all their deficiencies, represent, particularly in big cities, a solid basis for the initial commercial development of LAN and Internet connections. Only accumulation of financial resources, both from the state and private sectors and from individuals, can provide the required level of investment for basic infrastructure development. It is still not clear if the state in Russia will be ready to accept the broad participation of private enterprise in a sensitive information sector. Is the state ready to share with commercial service providers responsibility for and to some extent control over Internet development in the country?

In the meantime there is discussion in Russian academic circles about the establishment of a national network for science and higher education.

The objectives of this National Network (NN) should be the following:

- To establish a basic telecommunications network for the science community as an integral part of information and telecommunications space in Russia.

- To provide services enabling broad access by scientists, researchers, teachers and students to world and national information resources.
- To create the possibility for information/data treatment, evaluation, conversion and transformation directly by specialists and research workers at every work place.
- To create wider access to supercomputers and other powerful computer resources at big research centers and universities.
- To provide a reliable network for information exchange among research institutes and universities in the same region and in different regions of the country.
- To provide for international exchange of information with foreign countries and for connection to the Internet.

Although the authors of the concept want NN to be noncommercial, they recognize that to build NN only with financing from budgetary and charity sources is impossible. Therefore, they support the idea of cooperation with other networks, including commercial ones, but urge keeping the initiative in NN development in order to satisfy primarily the needs of research and educational organizations for exchanging information and to ensure first of all the development of key elements of telecommunications infrastructure like ISDN, principal ports of access, etc.

They suggest the following principles for the establishment of NN:

- It should be an integral part of the Comprehensive Communication Network of the Russian Federation (CCN RF).
- A common technical policy should be strictly observed at all the stages of the construction of NN by a Special Working Group of the project, which should include representatives of all participating networks and recognized technical specialists.
- It will consist of the Russian Backbone Network (RBnet) and regional networks.
- The regional networks will be independent, may be public or private property and should be connected to RBnet through standard basic ports of access.
- Services to local users should be provided mostly by regional networks.
- NN as well as its backbone should be an open system although possibilities for information security should be provided by special software and hardware (e.g., secure encryption techniques, cryptography, firewalls).

- Only the latest high-technology solutions for the construction of NN recommended by the best telecommunications specialists should be used.

The realization of the NN conception has to solve the following tasks:

- Construction of RBnet as an ISDN with standard basic ports of access at the level of the regions.
- Development of regional networks by direct connection to the ports of access of big research centers and universities and first of all by connection of those which already have their own LANs.
- Provision of services to local clients by regional networks.
- Connection of NN to the Internet at the initial stage through the lines of existing service providers, which later should be replaced by NN's own independent telecommunications lines.
- Savings of part of the expenses for connection of the clients to regional networks and the Internet by centralized connections within the framework of this joint program.
- Maximum use of the existing lines and ports of the CCN RF.

- Reservation for commercial use of part of the information resources of NN and its RBnet, to ensure a full or partial self-repayment regime of NN work for academic research and educational organizations (*Development of Russian Internet*).

One important financial issue of the project is a need to use the same high-quality switching equipment for the connection of LANs in all regional ports of access of NN and to ensure its centralized purchase in accordance with the technical recommendations of the best experts.

The intensive development of Internet connections in Russia depends on many political, economic and social factors, which are all subject to further implementation of reform in the Russian society and economy and of conversion of Russia into a modern, open, democratic state that will play an active role in the world market in all economic sectors, including sensitive information and telecommunications.

It is also clear that only further development of economic reform in Russia will permit state, local, private and international financial resources to be mobilized so that the required amount of investments needed for the development of Internet telecommunications infrastructure in a region as big as Russia will be available. Only commercial use of the Internet by the enterprise sector along with noncommercial provision of its services (which are mostly developing in Russia at the present time) can guarantee the real connection of broad Russian society to the global information network and provision of its services to every interested Russian organization and private person. However, the commercial distribution of Internet services in Russia will require special development of a national database of common and business uses (e.g., flights, train guides, time-tables and availability of tickets; weather information; all kinds of reference directories for the whole country; special business, financial, banking, stock and commodities exchange information). The growth of economies throughout the world since the Industrial Revolution began has been driven by continual technological innovation through the pursuit of scientific understanding and application of engineering solutions.

Peculiarities of Information Technology Development in the Russian Far East; Comparative Analyses of Russian Primorye Province and Chinese Guangdong Province

Source: *Far East Geological Institute Home Page*

Absolute numbers do not adequately represent the true picture of the contemporary situation of technology development in Russia, unless we compare them to the figures of the closest neighbor who shares a similar background. Ten years ago China was far behind Russia regarding access to modern technology. Since it is practically impossible to consider data about all of China, we have decided to include the numbers about telecommunications development and compare these figures with the Primorye region of the Russian Far East. Due to significant demographic and economic differences between these two regions, for presentation purposes, we include the figures about the whole of Russia. You may find them in the table below.

Russia/ Primorye (as of 1999, est.)	
Population	146 million/2 million est.
Internet Users	2 million/30 thousand
Internet users per 100	1.36/1.5
Telephones per 100	35
Literacy (age 6 and over)	85%
Per Capita GDP	$3,500 (after 1998)
GDP	593.4 billion (1999) 623.1 billion (2000)
China/Guangdong	
Population	1 trillion/71.43 million
Internet Users	Not available/800,000
Internet users per 100	1.12 (for Guangdong)
Telephones per 100	21.11 (for Guangdong)
Literacy (age 6 and over)	82%

GDP	1.03 trillion USD/ 95,86 billion USD

Sources: "Russia Country Analysis Brief"; Foster, Goodman, and Tan; "China Business Guide"

China has come to the information technology sphere later than Russia, yet in the case of telephones, the mobile phone system in China is currently more developed than in Russia due again to the governmental policy towards the speed of disseminating new technologies. The first years of Chinese Internet development couldn't have been imagined without the Institute of High Energy Physics in Beijing, China (www.ihep.ac.cn). The pages of this institute became the starting point for many other projects.

According to information from *China Daily*, by July 2001 a super-media holding will be formed in China, which will unite the country's largest electronic mass media B Central TV of China, Radio of China, and International Radio of China (ctd. in Smetannikov). This State giant will be able to compete with Western mass media corporations such as Viacom, Walt Disney, Rupert Murdoch's News Corp., and AOL Time Warner, whose analysts actively work at the Chinese market**.**

This $1.2 billion (US) media empire will be created by specialists from the so-called Committee on Radio, Cinema, and TV. Hu Chuanchun, the head of this committee, declares that China doesn't have the unified all-country structure of television and radio broadcasting and that the main companies in this field are weak and separated so the whole industry needs drastic changes (Mazharov).

The electronic mass media market will be represented by this one State holding. This monopoly will have the most powerful cable TV network with access to 80 million households. On the other hand, reform is urgently needed because of China's prospective membership in the World Trade Organization. Obviously, China will become more open to foreign investment, and Chinese broadcasting companies will have to compete sharply with Viacom and Disney.

The Chinese have more than 300 million TV sets and almost the same technical equipment for cable networks as in the developed countries. Also, International Radio of China is one of the three largest radio stations in the world. It broadcasts in 48 languages in 150 countries using a satellite network, electronic-laser arrangement and multimedia techniques..

Right now Chinese hackers consider themselves the experts and winners in an undeclared hacker war with the USA. The union of Chinese hackers "Honker Union" has claimed responsibility for breaking into American websites. This is just another example of the level of information technology development in China.

Even Tibetan society is developing from decline and desolation into modern civilization. The breakthrough development of Tibet's post-telegraph system can be monitored by an optical fiber network between LyanChzhou, Xian, and Lhasa. The ground satellite stations centered in Lhasa were built to connect the areas and cities of the whole region and have become the backbone of internal satellite communications. There are major achievements in Tibet's informational development: an automatic international and local telephone communications system has been established, all Tibetan administrative units are included in the all-Chinese automatic international communications network, and ordinary people can afford cellular phones. There is Internet access even on the mountain plateau.

And there are many other examples of rapidly growing information technology development in China (you may find more at http://www.asiatimes.ru).

The main ISP is the Guangdong Data Communications Bureau (GDCB), part of the Guangdong Telecom Bureau, which supports 90% of all commercial users in Guangdong. The Guangdong Telecom Bureau is the provincial body of China Telecom, which is in turn one of the main service providers in China. Internet access is sold through city telecom offices such as Guangzhou Telecom (Lovelock).

Scope Body	**Web Address**

Provincial Guangdong Telecom	http;//www.gdcb.gd.cn
City Guangzhou Telecom	http://gztelecom.com.cn
National China Telecom	http://chinatelecom.cninfo.net

Besides China Telecom, there are many other ISPs in Guangdong (see the table on major ISP providers in China). Most of the ISPs have built portal sites with links to sites of interest and very powerful Chinese website search engines.

Major ISPs and Content Providers in Guangdong	
Feihua Telecom	http://www.fhnet.cn.net/feihua
Guangzhou Netease Computer System Ltd.	http://www.nease.net
Karsing Online	http://www.kol.com.cn
Great Trend Internet Services	http://szwd.net.cn
Shenzhen Newsnet	http://newsnet.szppt.net.cn

If we compare this data with the Russian situation, we will see a more complex picture: while the number of providers increases at a high rate of speed, the quality of services and the number of subscribers does not change substantially. This is partially due to the emergence of smaller providers who act as intermediary firms. They increase the prices in the Russian markets, creating unfair situations for customers. However, at the regional level, we see the monopoly of big firms and the State telephone company; thus the Russian Far East experiences larger tariffs for fewer services than in the western part of Russia.

In the USA AT&T recently proposed access to the Internet via modem for 29.95 USD per month B compared to the average US salary, this is a minimal payment. In Russia, on the other hand, the Internet and new technologies can, justifiably, be called luxury products due to high prices (usually stated in dollars) when compared with the average Russian salary (the average price for customers is $0.5 per hour).[4]

Major ISPs and Content Providers in Russia	
Russia Online	http://www.online.ru http://www.online.marine.su*

4 The difference between western and eastern parts of Russia at these prices is also obvious. Whereas Moscow may enjoy cheap IP telephone services and in the near future high speed ADSL-network for Internet and multimedia purposes, the Far East still copes with problems of poor telephone systems while local telecommunication providers lock cheap services like IP telephones out of the market.

Global One	htp://www.global.ru*
Relcom Relcom-Pacific	http://www.realcom.ru http://www.vladivostok.ru
FREEnet	http://www.freenet.ru
Relarn	http://www.relarn.ru
RUNNet	http://www.runnet.ru

As the table indicates, only the providers indicated by asterisks serve the Far Eastern region, and most of the major Russian Internet providers tailor their market to the western part of Russia, particularly Moscow. Thus, the situation creates favorable conditions for the development of local ISPs, but economic factors undermine this possibility. Moreover, the addition of a new ISP business in the Russian Far Eastern region demands economy of scale that can be achieved today only by huge oligopolies or partially State-owned firms.

The Chinese public sector has an extensive Web presence. This presence has been developed by the information offices of the province and each city. GDNet, run by the Guangdong Information Center, has extensive statistics on economic indicators at the provincial and national levels. The Russian public administration sector, however, persistently develops at much slower rate due to the lack of financial resources devoted to information programs. Though the information provided is extensive, it rarely links to separate websites of the various branches of the government that gather the information. This is probably due to the fact that most branches of the provincial government do not yet have their own departmental websites. There is a separate Guangdong government domain that provides information on the various provincial decision-making bodies. These sites are maintained by the Guangdong Information Center. Each city information office also has its own website that provides information on the city and its government. Both the provincial and city sites are part of the China Economic Information Network (CEInet) that is operated by the State Information Office. The city, provincial, and national sites all link to one another, a reflection of the fact that they are all loosely organized branches of CEInet (*China Economic Information Network*).

Information Offices in Guangdong China		
Network	**Body**	**Web address**

CERnet	Includes education resources	http://www.edu.cn/
China Economic Information Network (CEInet)	State Information Office	http://www.cei.gov.cn
Guangdong Information Network	Guangdong Information Center	http://www.cei.gov.cn http://www.gdic.gd.gov.cn/xxzx_e.htm
Guangzhou Information Network	Guangzhou Information Office	http://www.203.207.178.12
Information offices in Primorye Russia		
This is a very typical site of regional administration the site of Vladivostok municipal administration consisting of one page saying: "This is a website of Vladivostok municipal administration."		http://www.vladcity.ru
Another very typical website for the *krai* administration of Primorye. It's hosted on the institutional website of the Far East department of Russia		http://www.fegi.ru
Virtual server on Far East (commercial organization, but some of the materials are for the public use)		http://www.farpost.com
Khabarovsk informational center (official)		http://www.khv.ru

Khabarovsk informational and statistical center (non-commercial)	http://www.khb.ru
Publishing house "Khabarovskiy OPTOVIK"	http://www.dvonline.ru

Here we see the ISPs in the Russian Far East:

Vladivostok State Telephone company	http://www.vstn.marine.su/
Vostoktelecom	http://www.vtc.ru/
Far Eastern department of Russian Academy of Science	http://isp.febras.ru/
Linkor	http://www.linkor.ru/
Relcom-Pacific	http://www.farpost.ru/isp/telegraph.htm
Primorye-Online	http://www.primorye.ru/
SiTel	http://www.stl.ru/
“TeleRoss Vladivostok” Russia Online.	http://www.online.ru/
Global One	www.gin.ru

If we look at the same level of information for Russia, here we find more diversity in domain names but less content. These differences are due to the number of intermediary providers and the absence of governmental policy about providing information in the public sector. However, in China the government plays an important role in content development.

The government is an integral part of technology development. As Lovelock points out, the development of the Internet and e-commerce in China is primarily a top-down effort on the part of the Chinese government because it believes that not only will the Internet boost the economy but it will greatly enhance the central government’s ability to control the country.

In 1993, the Chinese central government embarked on a series of Golden Projects to give the central government information on and control over the rapid decentralization of decision making that was taking place as a result of the move to a market economy. The Golden Bridge Project (GBNet) connects ministries and State

Owned Enterprises (SOE) through an IP network and provides support for the other Golden Projects. The Golden Card Project aims to promote the use of credit cards by providing a credit card verification scheme and an inter-bank, inter-region clearing system. The Golden Tax Project computerizes work unit tax receipts and enables the electronic transfer of funds (Foster, Tan, and Chan).

The Golden Gate Project aims to improve the import-export trade management by linking the Ministry of Foreign Trade and Economic Cooperation, trade organizations, and the Customs Bureau. It uses EDI and provides access to statistical databases. The Golden Gate Project aims to make the customs process more efficient, but it also aims to give the government better monitoring power over the more than 9000 trading organizations in China. It is hoped that such monitoring will reduce smuggling. However, many of the SOEs that have implemented EDI as part of the Golden Gate Project have been slow to extend the use of EDI to their customers and suppliers. The central government is particularly concerned about improving its ability to monitor rapidly expanding companies in Guangdong. The central government has been shaken by the ability of companies to hide massive foreign debts, as in the case of Guangdong International Trust and Investment Corporation, now bankrupt (Foster, Tan, and Chan).

It is very difficult to estimate how many firms in Guangdong are resisting implementing effective information systems out of fear that the central government will be able to monitor, tax, and control them more effectively. The lack of such systems will impede the use of the Internet to support higher levels of electronic commerce.

However, it is hard to place blame since historically in both China and Russia the importance of national security has been a primary issue. An expanded definition of the "national interest" relative to information would include its impacts on trade agreements and conflicts, bilateral and multilateral treaty negotiations, economic development, foreign investment and international standardization issues. Traditional national military concerns remain a critical component. This expanded notion of "national interest" is intended to reflect the evolution and growth of the concept of national security and to include non-traditional "security" issues--such as trade and the environment--that are increasingly important in the post-Cold War era.

This is especially important in light of newly appearing threats of so-called cyber war, pitting Chinese and Russians against Americans. There have already been

some claims from both sides, and this tendency becomes more acute with the prospect of a new Russian-Chinese agreement on collaboration for the next twenty years.

However, even nowadays at the beginning of Internet emergence, Russian authorities have tried to implement the so-called SORM project, which was challenged by what should have been absolutely predictable reactions among the Internet user community. Russian authorities have attempted to achieve the same level of control as their Chinese counterparts but have chosen to work in the opposite direction. Instead of developing successful IP links to all governmental bodies with statistical databases as well as the commercial sector, facilitating the spread of e-commerce and bank system development, Russian authorities have started with total control and monitoring systems. Apparently, they want to hear and see secretly everything that people are doing via the Internet at the user's expense. Moreover, as in the case of China, the monitoring system is heavily used in business for taxation purposes. In Russia this system should have been devoted solely to national security tasks.

During 1994-1995 the FSB (Russian Federal Security Committee) launched a program of eavesdropping on all pager and mobile telephone services. Russian users of these services pretend that they are unaware of the government's activities and ignore the capability of our bureaucratic entities. However, later, when the FSB attempted to do the same with the Internet by installing special devices that would record transactions on an ISP's computer, there was a huge negative response from the Internet community.

Ultimately, effective management of the intersection of new global information realities and traditional policy paradigms will require that some federal units, offices, or agencies be given the authority to identify, track and, where appropriate, act on the national interest implications of both traditional and non-traditional security concerns. However, total control and censorship of the system, as was seen in the early days of the Internet, is inappropriate. Moreover, such attitudes toward Internet diffusion from Russian governmental bodies subvert all efforts to implement ATMs, credit cards, and e-commerce because they are all seen as highly unreliable ways of conducting business.

Chinese authorities have gone several steps further. First, they set out rules for using computer networks (available online at www.redfish.com/USEmbassy-China/sandt/netreg.htm). Since it's pretty hard to manage and censor as huge a market as China, all the costs of censorship fall on the ultimate users' shoulders. First of all,

before becoming an Internet service subscriber, a person must obtain a special certificate from the local police and only afterwards go to a local ISP. ISP providers are obliged to install filtering and monitoring systems (reminiscent of the Russian SORM project to a large degree). These systems block out not only pornographic sites but also Reuters, the *New York Times*, and hotmail.com as well as all sites that include such words as "Taiwan," "Tibet," "dissident" and so on. Some local ISP providers have on their staffs people from the Ministry of Public Security (Foster, Tan, and Chan).

Nowadays, according to the China Internet Information Center (www.china.org.cn/index.html), more than 80% of Internet users access information in technical and science fields, a situation similar to the beginning of Russian development. However, the majority of these users are young people between 21 and 35 years old. So, we understand that the barriers to Internet use might prevent China from fulfilling its plans to create a new network of high technology parks (similar to Silicon Valley) across the country.

In comparison, the Guangdong Provincial government in China has a Steering Committee on the National Information Infrastructure (NII) that sets policy for the province on information technology and the Internet. The Steering Committee is appointed by the local government and is associated with the Guangdong Province Information Center. The Center was established in 1997 as a "co-department institution" under the Guangdong government, controlled by the planning commission. The Center's 108 employees work with over 700 others from the 20 cities and 100 counties in Guangdong. The Center has a broad mandate to be responsible for the organization and direction of the informatization of the economy. It gathers a wide range of macroeconomic indicators and makes them available through the CEInet site GD Information Network that was discussed earlier (Foster, Tan, and Chan).

According to Xu Zhi Biao, now director of the office of the Guangdong Steering Committee of NII, the government's strategy for promoting the informatization of the province involves these steps:

1. Putting government information online
2. Reforming laws and regulations to support e-commerce
3. Encouraging vendors to do business with the government electronically (ctd. in Foster, Tan, and Chan).

Though the provincial government has easily adopted information technology, Guangdong's rapid absorption of the Internet relative to the other provinces can

primarily be attributed to its economic growth as a result of the Open Door Policy. In 1979, the State Council gave Guangdong permission to implement special economic policies. As a result, three cities from Guangdong--Shenzhen, Zhuhai and Shantou--were designed as special economic zones. In 1988, the central government allowed Guangdong to experiment with economic reform province-wide. Guangdong has developed into an export-oriented economy and is regarded as China's frontier with the outside world. The relative prosperity of the province has allowed people to purchase Internet services. In addition, the Internet represents a significant opportunity for time and cost savings for those individuals and companies involved in international trade and, through the Web, opens up access to highly valuable information (Foster, Goodman, and Tan).

Multi-national companies have been attracted to Guangdong as a gateway for both manufacturing and marketing in China. The Institute for the Future recognizes Shenzen as a key node in the Global Silicon Network. As part of doing business with these high-tech multinational firms, Guangdong's businesses are exposed to the latest in information technology and are sometimes required to implement it as part of the their trading agreements. Multi-national companies also see Guangdong as a major market for their technologies and a gateway into the rest of China. For example:

- Cisco Systems and Lucent Technologies are upgrading Guangdong's telecommunications infrastructure.
- Intel is making special chips that allow Guangdong users to share the same online subscription.
- Compaq is building the first e-commerce Technology Center in Guangzhou.
- Microsoft is making Chinese software and implementing Web TV in Guangdong (Foster, Goodman, and Tan).

At the same time in the Russian Far East, Western companies ceased their activities after the August 1998 crisis. Moreover, infrastructure development and technology dissemination still require governmental support. Unfortunately, there is yet no comprehensive policy devoted specifically to informational change in Russia.

Far Eastern Universities

This new world of information might be affordable only to newly educated people with computer skills, who could interact with hyper-informational space and select among information flows. So the training of the information providers and users is the most important goal of contemporary educational system. We see three tasks:

1. The training of specialists who are able to create and maintain information technology systems.
2. The training of specialists in economy, culture and politics, who will implement new information technology.
3. The massive education of all people in basic information technology skills.

The developed countries have already implemented programs to computerize education. It is difficult to find an educational body there without a computer. Large educational centers have started to provide distance education. On the contrary, in our country only the universities in developed regions such as Moscow and St. Petersburg have modern information systems. The remote regions don't have any computer technologies at all.

In the Russian Far Eastern Province Primorye, universities are the main centers for information technology development and providers of the most affordable Internet access for thousands of students. In the EU, USA, Canada, Japan and China, universities have governmental support for the installation and maintenance of information technology equipment. For instance, American projects such as Internet-2 and Next Generation Internet were initiated by a group of universities and corporations (AT&T, Bay Networks, Cisco Systems, IBM, Microsoft, Sun Microsystem, etc.). Next Generation Internet was proposed by the US government, NSF, NASA and other scientific institutions and organizations. The US federal government gives financial support to these projects.

Far Eastern universities do not have serious financial support for the development of noncommercial academic local Internet centers. Because of the limited state financial resources and sharp economic crises in the region, financial support for Internet centers at local universities has been provided by the International Fund of George Soros and other sponsorship organizations.

If we look at educational institutions in the Russian Far East, we find numerous examples of foundation support and the conspicuous absence of government funding.

Far Eastern National University has been included, as previously mentioned, in the network of university Internet centers sponsored by the Soros Foundation (*Far Eastern National University Home Page*; "Programma Internet").

For example, these are the sponsorships instituted at Vladivostok State University of Economy and Service (VSUE):

- X Grant of the United States Agency for International Development (USAID) for support of small and medium business based on Business Incubator by the VSUE - 1994, $89,000. The grant is won in competition with 20 Russian institutes.
- X Grant of Eurasia Foundation for English Language courses for the VSUE professors who went for training in Washington University won in 1995-1996, $8,600.
- X Grant from USIA, awarded to VSUE jointly with California State University, Hayward and California State Polytechnic University, Pomona: $300,000 for the development of an executive MBA program in the Russian Far East. ("Grants Received").

And Far Eastern State Technical University has been using some grant support from IREX and Project Harmony.

Thus, the spread of Internet technology in the Russian Far East can be justifiably attributed to the existence of grant or other non-commercial support that has led to the development of various universities' information infrastructures. However, such sophisticated Internet centers, computer labs, and other technological resources for other institutions cannot be feasible in the foreseeable future without outside financial assistance.

Conventional wisdom holds that a university's strength obtains in its library resources; however, new technology has changed that conception. For example, 10 years ago, Far Eastern State University paid 10,000 USD for subscriptions to five foreign journals. Today, for 5,000 USD (half the original investment) the university can subscribe to the American database company UMI and receive full electronic versions of 10,000 foreign publications. Or, similarly, Vladivostok's filial of the Russian Custom Academy spends 95,000 rubles (3,400 USD) for 130 printed publications. A subscription to the WPS database, however, costs 500 USD per year (Gorchakov, Golodova, and Dianova).

As published materials are very expensive for Russian universities to acquire, many are gradually changing their acquisitions policies from spending money for hard copy books and journal subscriptions for libraries to providing electronic access to information. Thus, it appears that the traditional role of universities, to collect specialized knowledge, is being replaced by its new role, to provide high-quality access to information.

Conclusion 00002Conclusion

All developed countries have sophisticated state programs for information technology diffusion and governmental financial support for their realization. Former vice-president of the US Albert Gore has connected the future of the United States with the development of the information superhighway. The European Union developed the concept of transition to an information society. This information society concept was accepted in Russia. Several governmental documents which orient the informatization of our society were created, and from these emerged ideas about common informational space and the formation and development of accompanying information resources, electronic connections, information security doctrines, and federal law about Russian participation in the international information exchange.

However, Russia has experienced a number of problems with the implementation of these concepts. The development of an information industry and new informational relationships in Russia are stimulated by global processes in this area. Since these processes are extremely dynamic, Russia does not have much time to take its appropriate place in the global information system. If Russia misses this opportunity, it could be marginalized to the information periphery and subsequently divided into several spheres of influence by the biggest world information empires. It could happen without blood and notice as the result of global telecommunications and information

market competition, lack of governmental regulations and support of national providers and producers.

According to international standards, to complete the telephonization of the country, Russia needs to achieve the level of 40 telephone apparatuses for each 100 people. Accomplishing this goal would require doubling the number of telephones presently existing in Russia. This standard cannot be achieved in 10 years. Importantly, in Russia computers are largely concentrated in commercial and state organizations. We can hardly expect, therefore, to achieve the computerization level of developed countries in the next 10 years. It is, therefore, a critical time in Russian information infrastructure development, which requires the government to take several specific actions.

The Russian government should pay special attention to control the development process of the information sector of economy. Taking into consideration the contemporary economic crisis in Russia, it is obvious that in the near future the Russian government will likely resolve the problems of investment in such sectors of economy as agriculture, food production, and consumer goods. However, the information sector specifically is a profitable but risky business. While investment in the information sector could lead to a fast economic growth, the Russian State cannot speculate with its own money in a risk-riddled, developing information sector. The government's role should more appropriately be to create the necessary conditions for the attraction of private initiatives in this sphere and among them to attract foreign and transnational corporations. From the state policy point of view, informatization has two major aspects. The first one is to develop information infrastructure as part of the Russian economy. The second is to create information and telecommunications systems and networks. Even such traditional service spheres as tourism, transportation, and medicine cannot develop and compete in the international market without using information technologies which require substantial networking capacity.

At the present time, discussion about the development of an information society in Russia needs to start from an analysis of the critical situation in the national information sphere, which connects to the deep business activity crisis in Russia.

1. The audio-visual sector is the most developed, but even here we may see a decline of profits from the placement of commercials and freezing of the commercial channels' programs. Neither government nor the private sector or foreign investors will put money into this sphere.

2. Telecommunications infrastructure has developed considerably in recent years, but further development is in question. We also can't expect significant investments in this sphere.
3. The computer market is currently experiencing deep stagnation. During a crisis, corporate customers prefer to save money through personnel lay-offs and information technology downgrades. State organizations also economize by cutting programs of technological innovation. We believe that private customers will buy computers especially for educational purposes, but this market is also very tight.
4. The software market has an opportunity for development because any product of local producers has a low-price advantage.
5. The Internet provider market also will develop because of low prices for telephone connections. We should subsequently see that this crisis will affect the printed mass media because of higher prices.

In conclusion, it appears that the producers of software products and Internet services have the best chances for survival in the conditions of crisis currently extant in the information sector of the Russian economy. We can also conclude that the creation of the technological basis of the information society in Russia is being delayed.

Appendix 1:

International Connectivity of Russian Networks, 1998 (by ISP and Capacity) [5]

Moscow

Glasnet: BBNplanet (U.S.), 1 Mbps, MCI (U.S.), 2 Mbps

Global-One: 3 channels to U.S. and Europe, total 8 Mbps

Demos: MCI (U.S.), 6 Mbps

Comstar: Concert/Btnet (Great Britain), 2 Mbps

Macomnet: Teleglobe (Canada), 2 Mbps

Relcom: Eunet/ (Netherlands), 4 Mbps; Eunet (Finland), 2 Mbps; MCI (U.S.), 4 Mbps

Rosnet: BBNpanet (U.S.), 2 Mbps; MCI (U.S.) 2 Mbps

PTT-Teleport Moscow: MCI (U.S.), 2 Mbps; UUNET (U.S.), 2 Mbps

Sovam Teleport: 3 channels to U.S. and Europe, total 6 Mbps

Teleport TP: NyserNet (U.S.), 2 Mbps

Elvis-Telecom: Teleglobe (Canada), 2 Mbps

FREEnet: DTAG (Germany), 256 Kbps

MSUnet: MCI (U.S.), 512 Kbps

ORC/RAS net: DFN (Germany), to Hamburg, total about 2 Mbps

RSSI: NASA Internet (U.S), 512 Kbps

St. Petersburg

RUNNet: NORDUnet (Finland), 2 Mbps; Teleglobe (Canada), 4 Mbps

WEBplus: Teleglobe (Canada), 2 Mbps

Metrocom: Teleglobe (Canada), 2 Mbit

NTO “Rusnet”: Telecom Finland, 512 Kbps

[5] Source: Bonnell and Breslauer