UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE

TOWARDS A KNOWLEDGE-BASED ECONOMY

YUGOSLAVIA

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 Schmőgnerová
Executive Secretary
United Nations Economic Commission for Europe

For the developing countries, the Information Society has become a moving target. As the pace of change increases, one would think almost daily, it is more and more difficult for the late-comers to catch up with the leaders.

At the same time, the inherent quality of information and communication technology (ICT) to allow leapfrogging presents an opportunity for the less developed to enter the world market in this sector at any point, including the very top.

To turn this ICT potential into a tangible result, to make one's knowledge-based economy relevant in the regional or global marketplace, a developing country needs information. Not just any information, but structured, relevant, timely and well organized information on what the trends are, where the developed countries are going, what are the pitfalls and the shortcuts.

This information needs not be exclusive. On the contrary, unlike the Industrial Society, where success was a zero-sum-game, Information Society is based on a win-win strategy, where sharing of information, cooperative effort and joint action can bring greater benefit to each participant than any of them would achieve by going alone.

The comparative analysis UNECE has initiated by these country assessment reports is exactly the right kind of information for the rapid development of the knowledge-based economy in the less developed countries. It fosters both competition and cooperation, allows for easy identification of best practices and focuses national efforts on creating the most effective policy and strategy.

Branislav Andjelić
Director
Information Technology and Internet Agency

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.

Content

Introduction

After ten destructive years for the Yugoslav economy and information community it is surprising that the country's infrastructure has not emerged devastated, and that the country's population has not remained in ignorance regarding the Internet and the knowledge-based economy. However, this is certainly not the case.

In fact, during the last decade, a large number of circumstances and events stimulated the population of the Republic to implement Information and Communication Technologies (ICT). At a minimum, application of ICT became a prerequisite for business development, and for the advancement of personal activities. In addition, the war in former Yugoslavia (from 1991), UN sanctions, the NATO bombardment (1999) and controlled media activity (until 2000) strongly affected the way in which people operated and encouraged them to search for the information they wanted via new means and services.

After the Internet was introduced to the Yugoslav market in mid-1996, the number of people connected to the web grew at an average rate of 150% per year. At the end of 2000 about 5% of the population were using the Internet. At the beginning of 2002 there were over 600,000 users, constituting around 7% of the population.

Over 200,000 locally educated people have left Yugoslavia because of difficult economic conditions, and have succeeded in obtaining jobs across the globe. Many people in the country have purchased computers to communicate with the world, and sometimes just to keep in touch with relatives and friends abroad. The Internet has enabled its users to keep operating and to practice, and perform professional and social activities. It is considered invaluable and irreplaceable for the access it provides to current information, and for the compensation it offers for lack of publications/literature and resources, and of course, money.

During 2000, Yugoslavia had eight major Internet Service Providers and more than 40 local ISP subcontractors. The telecoms infrastructure is a something of an obstacle to the growth of the number of ISPs and to widening the bandwidth of the Internet connection. There are only two public providers, in Serbia and Montenegro respectively, and their cooperation is minimal. In addition, they are the sole providers of many of the services required by business and government institutions - leased lines, ISDN etc. Their monopoly positions in each of the Republics increases the costs of services and limits the number of users, as well as the development of the telecoms sector in the country.

Another issue is the infrastructure developed by the ISPs. Currently it is possible to establish mutual ISP-to-ISP links or local traffic exchange points only between major Internet traffic knots. Thus the traffic between two local ISPs travels via international knots.

Limited development of the telecommunications sector is often associated with the decade of instability in the country, UN sanctions and problems involving Telecom Serbia. The partial privatisation of this company was completed during the Milosevic era. For a number of years Telecom Serbia did not invest in fixed telephony infrastructure. Instead, it introduced a new range of profitable services, such as mobile telephony. It is expected that this situation will be resolved once the international

telecoms and ISP markets settle. Utilising the experiences of the developed countries would be of immense value in achieving this goal.

As proposed by the UNECE Coordinating Unit for Operational Activities, the assessment of the progress made in developing the foundation of the knowledge-based economy in the Republic of Yugoslavia was carried out on the basis of a common benchmarking (suggested by the Centre for International Development at Harvard University in its Guide "Capture the Benefits of the Networked World").

Nineteen different categories of indicators, recommended by the mentioned Guide, were used in Chapters 1-5. Levels of advancement (Stage 1- 4) were listed at the beginning of each chapter/category, as well as concise answers to the questions from Annex II of the Guide. Progress made in the development of each of the critical areas (categories) is described.

Chapters 6-10 begin with answers to questions from Annex II of the Guide, and continue with other relevant information and are also elaborated.

Chapter 11 is dedicated to strategies and programmes, already developed by the relevant authorities in the country.

1. Network Access

1.1 Information Infrastructure

Stage 3 marks fixed line/telephone services
A sizable portion of the community has good access to telephone services. Growth in wireless telephony is accelerating. Teledensity is between 8 and 40 mainlines per 100 people.

Stage 4 corresponds to the penetration of mobile wireless telephony
Penetration of mobile wireless telephony is more than 14% of households, subscribing.

Stage 2 applies to cable services
Cable penetration is below 5% of all households in the community.

- Telephone penetration (number of mainlines per 100 people)
  Telephone penetration is 32.92 mainlines per 100 people.

- Mobile wireless penetration (%) growth trend
  The number of mobile telephone subscribers currently increases at the annual rate of 50%.

- Total number of mobile telephone subscribers
  There are over 3,000,000 mobile telephone subscribers (prepaid and post-paid).

- Total number of mobile telephone subscribers per 1,000 people
  There are at least 318.47 mobile telephone subscribers per 1,000 people.

- Wireless penetration (percentage of the population)
  Wireless penetration is around 0.3 % of the population.

- Growth trend
  Wireless telephony has not grown for a number of years. There is strong demand for wireless telephony in rural areas. It is expected that these services will eventually be introduced, upon the liberalisation of the telecoms market.

- Total number of cable TV subscribers
  There are around 60,000 subscribed households, constituting an average of 230,000 viewers.

- Cable TV subscribers, % of households
  2.72% of households subscribed to cable TV.

Telecom Operators

The slow development of the telecommunications sector has often been attributed to the decade of instability in the country, UN sanctions and problems involving Telecom

Serbia. The partial privatisation of this company was completed during the Milosevic's era, when the prices of telecom services were controlled by his government. Telecom Serbia did not have sufficient business interest to invest in a fixed telephony infrastructure and the reduce revenue that would result from low cost telephone services. Instead, it introduced a new range of profitable services, such as mobile telephony.

Since 1996 Telecom Serbia has been the sole provider of many services required by businesses and government institutions - leased lines, ISDN etc. Its monopoly position and economic control until 2001 increased the costs of these services and limited the number of users, as well as company development.

Although it had initial competitive advantage, Telecom Serbia often failed to be first on the market to launch new services and offer better conditions to the subscribers. In the years leading up to 2000, when democratic changes in the country occurred, the company concluded several agreements with private companies associated with the former regime. These agreements are still valid, despite damages caused to the company.

Due to complicated business relations between the stockholders (OTE, STET, and the Government of Serbia - exclusive rights expire in June 2005, but are unlimited), Telekom Srbija's current activities and the services the company provides still do not following market demands. It has, however, advanced its mobile telephony business operations and some improvement has been achieved in fixed telephony, with new digital equipment installed in 2001-2002. It is expected that once the differences between the partners are resolved, and international telecoms market becomes stabilised, the information infrastructure in Serbia will be considerably improved.

Telekom Srbija

The Serbian company, "Telekom Srbija" a.d., is a joint stock telecommunications company. Since June 1997, 49% of this company has been owned by Italian STET (29%) and Greek OTE (20%). Public Enterprise PTT Traffic "Srbija", i.e. the Republic of Serbia, as its founder, retains 51% ownership of the company, and has the right to veto all important strategic decisions made by the Managing Board.

The business activities of "Telecom Serbia" a.d. include:

- all types of fixed telecommunications services within and outside the borders of the Republic of Serbia;
- other fixed voice services;
- data transmission, telematic services, value-added services, ISDN, intelligent network, fixed satellite services, fixed services for using DECT standards, Internet, multimedia;
- mobile telephony (Mobilna Telefonija Srbije MTS); and
- other activities (planning, design, construction, maintenance, repairs, etc.)

Telekom Srbija has built the Internet backbone network, which offers the possibility of access to all currently available standard Internet services and to the largest global computer network connecting more than 200 million computers (according to the data for 2000) communicating via IP protocols.

Telecom Montenegro

The activities of Telecom Montenegro are very similar to those of Telekom Srbija (apart from the unsettled business relations between partners). The Montenegrin operator is the sole provider of telecom services in that Republic. However, the demands of the telecom market in Montenegro are not as advanced as in Serbia.

The ownership of the Montenegrin telecom operator is divided between:
- the Government of Montenegro (89%)
- the employees of the company Telekom Montenegro (11%)

Exclusive ownership rights will expire by the end of 2003, but are extensive. The company has a stake in both Montenegrin mobile telephony operators: 9% in Pro Monte; and 100% in Monet.

Telephone Services

Telecom operators in Srbija and Montenegro publicly announce data on telephone penetration. The results are compared and presented in the following table (Table 1).

Table 1.1.   Telephone penetration -number of mainlines per 100 people

Telephone penetration	Serbia (July 2002)	Montenegro (June 2002)	Yugoslavia/Total (Serbia + Montenegro)
Operator	Telekom Srbija	Telekom Crne Gore	2 Operators
Number of connected subscribers	2,290,664	177,600	2,468,264
Number of connected subscribers per 100 people	26.94	27.16	**26.98**
Number of installed lines	2,562,754	235,481	**2,798,235**
Telephone penetration (number of mainlines per 100 people)	**30.15**	**35.7**	**32.92**

Mobile Telephony

Mobile telephony is considered to one of the best businesses in the country. It was introduced in 1996, initially through NMT systems. The GSM system was introduced in 1996 in Montenegro, and in 1997 in Serbia. The total number of subscribers and the number of mobile telephone subscribers per 1,000 people are given in Table 1.1.

Table 1.1.   Mobile telephone subscribers - total number and
Total number per 1000 people

Mobile telephone penetration	Serbia		Montenegro		Yugoslavia/ Total (Serbia + Montenegro)
Operator	**Mobtel (063)**	**MTS (064)**	**Promonte (069)**	**Monet (067)**	**4 Operators**
Data provided by the operator in	June 2002	April 2002	June 2002	June 2002	
Territory coverage (%)	87%	46%	N.A.	N.A.	
Population coverage (%)	94%	84%	96%	94%	
Number of mobile telephone subscribers	Over 1,500,000	1,150,000	Over 200,000	Over 150,000 *	**Over 3,000,000**
Number of mobile telephone subscribers per 1000 people	176.47	135.29	307.69	230.77	**318.47**
Per Republic (total, 2 operators)	311.76		538.46		

*Estimation

Despite expensive subscription fees and call costs for subscribers (bigger than in EU countries), networks are extending rapidly. Perhaps the best indicator of the growth of mobile telephony is the number of subscribers of the biggest network in the country - Mobtel (Table 1.2).

Table 1.2.   Growth of Mobtel's mobile network -
territorial and population coverage and the number of subscribers

Year	1997	1998	1999	2000	2001	2002
Territorial coverage (%)	30	40	N.A.	85	87	N.A.
Population coverage (%)	40	60	N.A.	90	94	N.A.
Subscribers	50,000	150,000	355,000	765,000	1,000,000	1,500,000

One of the reasons for the rapid development of mobile telephony is that it enabled people without access to fixed lines to use telephone services. There are also indicators

that aggressive development of mobile telephony was in the interest of the former regime, since the former government controlled Telecom Serbia. Mobile telephony was a source of immense profit, developed and managed by private companies, whose owners were associated with Milosevic's establishment. Agreements concluded before 2000 are still valid, and there is are constant attempts by the new Government to reduce the consequences and damages relating to this fact.

It is expected that the liberalisation of the telecom sector will advance services and introduce bigger international players, significantly reducing the costs for users. Currently, mobile providers reduce rates only for new subscribers.

Wireless Telephony Services

Wireless telephony is not widely spread. Only around 0.3 % of the population use these services.

Typical examples of areas where wireless telephony is available are two Belgrade suburbs - Kaludjerica and Partizanske Vode (Bezanija). Kaludjerica is a settlement of family houses on the outskirts of Belgrade with over 15,000 citizens. The settlement is famous because it was built without a defined architectural plan or appropriate installations/facilities. For example, there is no sewerage system.

Because there was a demand for telephone lines in settlements 15 km away from the centre of Belgrade, and with no possibility of laying cables without affecting individual properties, a private company introduced wireless telephony in 1995/6.

Wireless telephony is in demand in many rural areas across the country. However, it has still not been introduced, primarily because of unresolved issues regarding Telecom Srbija. Rather, its development has been terminated and partly compensated by the aggressive growth of mobile telephony.

Cable Services

Cable services in the country are not sufficiently developed. Currently, there are around 60,000 subscribed households, around 2.72% of the total. 24,000 are in the town of Subotica. Other subscribers are located in Belgrade (15,000) and other cities, where cable services were recently introduced. Since the average household has 3.85 people, the number of cable TV viewers exceeds 230,000.

There were practically no attempts to provide cable services until 2001. At the end of the 1980s, Radio-televizija Srbije (RTS- the National Broadcasting Corporation) had exclusive rights on cable TV distribution, and an agreement with a Canadian partner company, unwilling to invest during the war. After that, these rights were legally transferred to PTT (the public enterprise/postal company).

Since 2001, the demand for cable TV has brought several private providers to the market. According to data of the Association of YU Cable Providers, there are currently 22 operators, 10 of which are in Belgrade. Unofficially, their number exceeds 33. Although they advertise connections to the Internet "in the second phase of the installation process", they are mostly offering cable TV via coaxial cables. These

installations are often amateur, using joint building infrastructure. Such services are growing rapidly, at an annual rate of 200%.

The public enterprise PTT, through its independent KDS sector, is currently introducing and planning cable distribution systems across the entire territory of Serbia. Their fiberoptic coaxial network will also provide access to the Internet and other services (home banking, VOD, entertainment etc.). In its three-year project KDS will respect all legal, technical and technological standards. It plans to install 600,000 connections in Belgrade, 1,200 in Petrovaradin, 30,000 in Jagodina, and additionally in the cities of Nis, Kragujevac Smederevo, Soko Banja, Vranje, Vladicin Han, Paracin, Ub and others. The officials of KDS state that their biggest competitive advantage is access to rapid Internet.

The new Telecommunications Act (likely to be adopted during autumn 2002) will affect private cable providers, operating without appropriate authorisation. It is likely most of these will sell their businesses to a number of licensed companies (such as Kablprojekt, Telefonkabl and other).

1.2 Internet availability

Stage 3 describes availability of Internet, except for the provision of leased lines.
There are more then 2 ISPs per 1 million inhabitants. ISPs provide full Internet access. Subscribers may have some options between various service packages. There are some opportunities for public Internet access (libraries, University facilities, Internet cafés etc.). It is normally possible for users to establish a dial-up connection to a local ISP, except during peak hours.

Stage 2 corresponds to the provision of leased lines.
There is no competition in commercial leased line provision. Businesses may only lease lines from a single telephone operator.

- Total number of ISP providers?
  In 2000 there were 48 ISP providers - eight major ones and more than 40 local subcontractors.

- % of successful local calls?
  Percentage of successful calls is around 70%.

- Is there competition among local ISP providers?
  Various Internet providers offer different packages, compete in Belgrade and bigger cities. In smaller towns there is no competition.

- What are the opportunities for public Internet access (libraries, Internet-cafes, etc.)?
  There are hundreds of Internet Café establishments. Public libraries also offer this service to their members.

- Are there dedicated line lease possibilities?
  It is possible to lease lines from a single telecom operator in each Republic.

Internet Service Providers

In 2000, Yugoslavia had eight major ISPs and more than 40 local ISP subcontractors. About 8,000 telephone lines (nodes) are distributed among them for dial-up connections. The number is increasing literally on a daily basis and still cannot satisfy the rising connectivity demand.

It is normally possible for users to establish a dial-up connection out of 5 to 10 tries. Several major ISPs have set standard for establishing the connection with less then three tries, except during peak hours.

Subscribers have some options between various Internet service packages. Also there are hundreds of Internet Café establishments, offering Internet access for approximately 0.5 US$ an hour. Public libraries recently introduced the Internet, free of charge for their members.

All major ISPs provide leased lines to business users. Higher bandwidth solutions such as DST services or cable modem access are still not available.

There are no free ISP services. Some ISPs offer free hosting for private and public websites and presentations.

1.3   Internet affordability

Stage 3 marks Internet affordability, except for the fees for leased lines.
Telephone charges for Internet access reflect emerging competition in the telecoms market, yet they are high enough to discourage extensive use by some potential users. Internet is priced within the reach of the majority of citizens.

Stage 2 applies to leasing fees.
The lack of competition in the provision of commercial leased lines is reflected in prohibitively or very high leasing fees.

- What are the prices of Internet access (unlimited access, per minute charge)?
  The prices for Internet access are the following:
     - *For 100 hour subscription, the price is $0.25 - $0.60 per hour,*
     - *For 10 hour subscription, the price is $0.30 - $0.70 per hour*
     - *Flat rates are charged around $50 per month.*

- Is it affordable for majority/minority (compare with average salary/income)?
  Internet access is priced within the reach of the majority of citizens. Although the average salary in the country is around 150 US$, salaries in urban areas are several times bigger.

- What are the rates for leasing lines?
  The rates for leasing lines are the following:
  - *For the 16Kb/s bandwidth, the cost is $0.30 per downloaded Mb.*
  - *Flat rates are offered for higher bandwidths: 33.6 Kbps costs $130, 64 Kbps costs $520; 128 Kbps costs $750; and 256 Kbps costs $1350.*

- Are the rates affordable for small business or individuals?
  Rates for leasing lines are not affordable for small businesses or individuals.

Internet access is considered affordable for the majority of the population. Although the average salary equals the three-month flat rate subscription fee, moderate use of Internet by computer literates is quite inexpensive. Adding up the numbers of dial-up connection users at home, and those in cafes, at work and schools, the result is around 20,000 people on-line at any time of the day, which accounts for 0.3% of population. Since only urban areas have access to the Internet, this means almost 0.8% of the urban population in Yugoslavia are on-line at any given time during a day. The number falls steeply at night.

Internet access is priced by the hour for dial-up connections, by double rate for ISDN access and by traffic for leased lines. Two major ISPs offer flat rate pricing.

Dial-up connections are charged by the hour. The range of the prices is the following:

- $0.25 - $0.60 per hour for 100 hour subscription, and
- $0.30 - $0.70 per hour for 10 hour subscription.

It is possible to subscribe to Internet services on a monthly basis (fixed amount of hours per month) at the rate of around $0.15 per hour. The remaining hours - if any, are not transferred to the following month.

Flat rates are priced around $50 per month and are worth the price only if the subscriber spends more then 100 hours per month on-line.

Leased lines are priced per used bandwidth and traffic. For a bandwidth of 16Kb/s, the price is around $0.30 per downloaded Mb. There are options for larger bandwidths on a monthly subscription basis, where 33.6 Kbps costs $130; 64 Kbps costs $520; 128 Kbps costs $750; and 256 Kbps costs around $1,350.

ISDN connections are also charged per hour, at rates 1.5 to 2 times the dial-up connections. The users are obliged to pay ISDN connection fees (250-600 US$), monthly subscription fees (4-50 US$), and fees for additional services to Telecom Serbia. Connection fees do not include terminal equipment (ISDN modems) and installation costs from the relevant sleeve to ISDN connection. For the most expensive connection (to ISDN 30), the user bears the costs for the transmission system from his location to the corresponding public telephone exchange (HDSL modem).

Wireless Internet Access is provided only in certain parts of Belgrade. It provides bandwidths of 1 and 2 Mb/s, and is charged per used bandwidth and traffic (like leased lines).

Higher bandwidth solutions such as DSL services or cable modem access are still not available.

There are no free ISP services. Some Internet Service Providers offer free hosting for private and public websites and presentations, which carry their banners or logos.

1.4   Network speed and quality

Stage 3 corresponds to network speed and quality
70% to 90% of domestic telephone calls are successful. Connections are dropped with noticeable frequency and are somewhat disruptive. Fewer than 50 faults are reported per year for each 100 mainlines. Users have access to dial-up modem transfer speeds up to 32.2 Kbps. Leased lines with transfer speeds of up to 64.4 Kbps are widely available for businesses and ISPs. Limited higher-speed lines are available in some areas. Backbone facilities servicing the community are usually sufficient, although regular peak demand periods result in slower network response times. Packet loss by the network may occur but is not generally disruptive.

- What is the percentage of successful calls?
  Around 70% of local calls are successful.

- What is the quality of voice connection?
  The quality of voice connection is acceptable, except during peak hours.

- How many faults are reported per year for each 100 telephone mainlines?
  Data on reported faults per year is not available.

- How long it takes to clear faults (48 hours, a week, month)?
  It takes 48 hours to clear faults related to telephone mainlines.

- Which services are supported by local telecommunications infrastructure: e-mail, high-speed modem connection, what is the maximum speed?
  All standard services are supported by local infrastructure. Users can access transfer speeds between 33.6 and 56 Kbps (majority), and 128/256 Kbps ISDN (minority/privileged).

- Are there any sufficient backbone facilities/networks? Even for peak demand?
  The available network facilities are insufficient to meet peak demands, although currently they enable normal activities in big cities.

- What is the percentage of packet loss by the network?
  Data on packet loss by the network is not available, but occurs very seldom.

Due to insufficient capacities of the telephone infrastructure users sometimes have difficulties with network speed and quality. Reported communication problems with mainlines are usually resolved within 48 hours by telecom operators.
It is normally possible for users to establish a dial-up connection with 5 to 10 tries. Several major ISPs have a standard of establishing the connection with less than three tries, except during peak hours. Around 60-70% of local calls are successful.

Dropped connections are frequent especially in non-urban communities. Voice quality is acceptable, except during peak hours when double connections, intermingling lines, echo problems etc. may occur.

There are problems related to network speed and quality, due to fusion of digital (7-number capacity) and prevailing analogue (6-number capacity) telecommunication

switchboards. Problems appear during the process of interconnection between telephone switchboards, or communication via analogue switchboards.

However, digitalisation of Telecom Serbia's landline switchboards is increasing. In 1998 it was up to 22%. In December 2000, completed digitalisation was 52.97%.

Users can access transfer speeds between 33.6 and 56 Kbps (the majority of users – dialing from home and office) and 64/128/256 Kbps ISDN (the minority- a small number of privileged users). Bandwidth intensive activities, such as large files or video files slow down the transfer speed or cause faults due to mainlines.

1.5   Hardware and software

Stage 3 marks availability of ICT products on the market
Most ICT products are soured from abroad, but there is a strong and growing localisation industry to adapt products to local needs. Some software appropriate to local needs and language is available. A variety of hardware and software solutions are available and affordable to most small and medium-sized businesses, as well as to many individuals.

- Are there local IT hardware/software sales points?
  There are many hardware/software companies and sales points in urban areas.

- Is the price of hardware/software affordable for majority/minority of citizens/businesses?
  Software and standard hardware are affordable for the majority of citizens in urban areas. A small minority of citizens, and small and mid-sized businesses can afford the latest technology.

- Is there software in local languages?
  Software in Serbian (local language) is available only for specific applications - government institutions, postal & telecom offices etc. Otherwise, it is in English.

- Is software imported or adapted locally? (Percentage of the imported, adapted, produced locally hardware or software in total number of circulation)?
  All hardware is imported. Software is mainly imported and locally adopted. There is a growing trend towards locally produced software.

- Is there a broad variety/some/very few software business applications?
  There are some software business applications - produced for specific activities or various businesses.

- Are the IT software/hardware retail and wholesale markets competitive and vibrant?
  Hardware resellers are not competing, but rather sharing the market. Software companies are competing and developing/expanding their activities.

Hardware and Software Market

In 2000, the value of the hardware market in Yugoslavia was 80 million US$. In 2001, this value increased to 120 million US. Most of the communications equipment and 6% of computer equipment constitute brand name products with legal software.

There are no bonuses, discounts or special terms for educational institutions, schools and universities.

Three large resellers share most of the market by holding the same prices and trade policies. This dates from the former (until 2000) monetary policy which prevented banks from supporting clients and providing customer loans. However, in June 2002 bigger banks introduced short-term loans for consumer goods.

Hardware and software are priced within the reach of the majority of citizens. A small minority of citizens, and small and mid-sized businesses can afford the latest technology. The cost of an entry-level computer is roughly five times that of the average monthly wage (about 600 US$).

1.6   Service and support

Stage 2 ranks the installation of landlines
Mainlines take at least six months for installation.

Stage 4 marks the time taken to resolve reported problems
Reported problems are usually resolved within 48 hours.

Stage 3 corresponds to ICT maintenance and technical support services
There is a growing customer service among service and support providers, although it is not a priority for most. Some ICT maintenance and technical support services are available. A nascent software industry is present in the community, and there is a growing number of hardware technicians, web designers and network administrators.

- How long is the waiting period for telephone line installation? (total number of those on the waiting list; waiting period: days, weeks, months, years)
Total number of those on the waiting list is not available. It is estimated that there are tens of thousands of citizens waiting for telephone connections or for additional lines.
The period for telephone line installation can be measured in months. In urban areas serviced by digital telephone switchboards this period can be reduced to several days. In non-urban areas where the installations do not exist, citizens wait for years.

- How long is the waiting period for a reported telephone line problem to be fixed (minutes, hours, days etc.)?
Reported telephone problems are usually fixed in 48 hours.

- Are there software developers, web designers, network administrators and other technical personnel, and how many (working where, employed/unemployed)?
The number of technical personnel is around 5,000 and increasing. Formally, most of them are not full time employees, but are paid per project. Most are part-time software developers and web designers working from their homes.
Companies employing technical personnel deal mainly with communications (media, postal, telecom...), government institutions, finance (banks etc.), science and technology (institutes) and many other fields.

Technical Support

Due to insufficient infrastructure capacities it takes at least six months for the installation of new landlines. In areas where landlines exist, the installations are faster. Communication problems are usually resolved within 48 hours. There is no competition and therefore the landline operators (Telekom Serbia and Telecom Montenegro) do not provide appropriate technical support or customer services.

On the other hand ISPs and mobile operators provide better attention and customer services. Major providers offer services that can be tailored to meet different demands for access, speed, service, security, quality and cost. The prices are neither uniform nor dictated from one centre. Rather, they are freely set, depending on the current local market trends.

Software developers, web designers and network administrators are present mostly in the cities/urban communities and their number is growing. There are over 5,000 certified software programmers in Yugoslavia. New and licensed training centres appear on the market, offering the latest courses and internationally valid certificates. These numbers are increasing, simultaneous with the process of economic emigration (refer to Chapter 9 - Labour Force).

The number of technical personnel is increasing. Formally, most of them are not full time employees, but are paid per project or receive monthly fees for their services (without social and pension insurance). Part time software developers and web designers usually work from their homes. They are usually young /students, although they sometimes have another profession/job. The number of companies hiring full time network administrators is increasing.

Companies employing technical personnel are competitive, of various sizes, with international contacts/activities and considered successful on the market. Companies implementing ICTs are from the following fields: communication (media, postal, telecom...), government institutions, finance (banks etc.), science and technology (institutes) etc.

2. Networked learning

2.1 Schools' access to ICTs

Stage 3 marks university level ICT
Computers can be found at the University level. Generally, there are around 20 computers for classroom group work. Computer labs are generally only open for computer studies during the day and closed after school, or may be open for teachers for class preparation but closed for students. Computers tend to be older generation models, such as 486 PCs or higher, and they may be networked with a file and mail server. There may be an internal LAN in place. If there are multiple computer labs, they may be connected through the school network. Where there are stand alone PCs, they may have a limited CD ROM library. The network lab achieves connectivity through a dial-up connection to the Internet, which supports limited WWW access.

Stage 1-2 corresponds to primary and secondary school ICT
In primary and secondary schools, there are either no computers, or less than five. Access to computers is limited to some teachers/administrators. Computers tend to be older generation models, such as stand alone 486 PCs or the equivalent. Where there are multiple computers installed, they are not networked. Use of the computers is limited to electronic documents that are available on hard drive or diskettes. There may be connectivity for store-and-forward e-mail.

- Are there computers in schools? How many students per computer? On which level (university/primary/secondary)?
  University schools on average have less than 20 computers, although some faculties have over 500 computers. Most primary and secondary schools have either no computers or very few. Several secondary schools have computer labs.

- Who has access to computers (technical staff/faculty/students)?
  Teaching and technical staff/faculty have unlimited access to computers.
  Students use computers during working hours of computer labs or computers in other labs/rooms when they are available (not used by staff).

- What is the quality of hardware (386/486/Pentium...)?
  Computers are mainly older generation, such as 486 PCs or the equivalent. Universities also have Pentiums.

- Are there LAN in schools? Regional WANs? National school networks?
  All Universities in the country and two high schools are connected to the Yugoslav Academic Network. The Belgrade Academic Network is the heart of this network, and is owned by Belgrade University.

- Do schools have Internet connectivity? Is it dial-up, through a leased line, wireless?
  Belgrade University Computing Centre is connected to the Internet via a leased line. Other schools mostly do not have access to the Internet. If they do, it is dial-up access.

University ICTs

The heart of the Yugoslav Academic Network is the Belgrade Academic Network, which belongs to Belgrade University. The Academic Network has over 100,000 users and more than 10,000 e-mail accounts. Computer labs are generally only open for computer studies during the day and closed after school, or may be open for teachers for class preparation but closed for students.

Table 2.1. Universities, faculties and art academies
(Available information taken from the Federal Statistics Bureau 2001 Year Book)

Number of schools	87
Number of students	151,568

All Universities in the country are connected to the Belgrade University Computing Centre at the speed of 2 MBPS. They are also connected to the Internet via a local

commercial provider at the speed of only 512 KBPS. The existing 100 MBPS city optical backbone (Belgrade) connects two central nodes of the Belgrade Academic Network, as well as 63 Academic institutions.

Telecom Serbia allocated 60 landlines to the University lecturers, for accessing the Network from their homes. More information about the Academic Network can be found on the net (http://servlet.rcub.bg.ac.yu/). Unfortunately, details are available only through member's area.

Differences between the faculties and the available computers connected to the Academic Network are considerable. The Faculty of Electrical Engineering has 5,000 e-mail accounts and 500 computers, while some other Faculties have less then 20. Most of the computers tend to be older generation.

The University of Nis is the second node of the Yugoslav Academic Network. The Computing Centre of this university is connected through the 2Mb digital connection, which is sponsored by the Federal Secretariat for Development.

The University of Novi Sad is the third node. Connection to the Yugoslav Academic Network is established through the 2Mb digital connection, and was sponsored by the former Ministry of Science.

Kragujevac and Pristina - two remaining University centres in Serbia connected to the Yugoslav Academic Network are poorly equipped. Pristina is the capital of the Kosovo and Metohija province.

Other details on higher education in the country are presented in Chapter 8 - Higher Education.

Computers in Primary and Secondary Schools

In primary and secondary schools there are either no computers, or less than five per school. Access to computers is limited to some teachers/administrators. Computers tend to be older generation models, such as stand alone 486 PCs or the equivalent. Where there are multiple computers installed, they are not networked. Use of the computers is limited to electronic documents that are available on hard drive or diskettes. There may be connectivity for store-and-forward e-mail.

Yugoslavia has over 4,000 primary schools and 500 secondary schools (Tables 2.2 and 2.3). Belgrade has 16 municipalities with 163 primary and 73 secondary schools.

Table 2.2.   Primary schools - beginning of 2000/2001
(Available information taken from the Federal Statistics Bureau 2001 Year Book)

Number of schools	4,087
Number of students	787,423

Most of the schools in the country do not have appropriate IT facilities with either no computers or an average of less than five. If computers do exist, they are older generation types and stand-alones.

Table 2.3.   Secondary schools
(Available information taken from the Federal Statistics Bureau 2001 Year Book)

Number of schools	518
Number of students	355,424

The contrasts between high school IT facilities is exemplified by the following:

- Palilula, one of the larger Belgrade municipalities has 17 schools. Four of them have some old generation 286 & 386 computers;
- one of the best-equipped schools is the Secondary Philological School, also known as The Second Belgrade Gymnasium. This school has 15 computers: 3 x PIII; 3 laser printers (provided by a Cyprus humanitarian organisation); 7x PII and 5x PI (+ older generation: 2x286, 3x386). Computers are stand-alone.
- there are two secondary schools connected to the Academic Network: the Railway Technical School (sponsored by the Railway company); and the Mathematical School, a renowned school, attended by talented students. Recently, the latter received computer equipment through donations/IBM.

2.2   Enhancing education with ICT

Stage 3 ranks the use of ICT in higher education
University teachers and students use computers to support traditional work and study. Teachers who use computers are generally proficient with work processing applications and may access information offline from CD-ROMs. They may employ computers in some drill-and-practice lessons. In some cases, teachers access and organise information from the worldwide web in their work; share information using e-mail; and create information in electronic format to share with others both inside and outside the school.

Stages 1-2 correspond to ICT education in primary and secondary schools
Most of the primary and secondary school teachers and students do not use computers. Only a few teachers use computers in a very limited fashion. The basic computer literacy of teachers involves skills such as use of keyboards and a mouse; a basic understanding of the computer operating system; manipulation of files; and cutting and pasting. Computers are mainly used at the university level.

- What is the percentage of students and teachers using computers in universities/primary schools/secondary schools?
  90% of university students and teachers use computers. This percentage is 20% in secondary schools, and less than 5% in primary schools.

- What are the computers used for? What is the level of computer literacy/skills?
  Computers are mainly used for ICT education, science and technical courses, as well as word processing/office applications. The level of computer literacy is high at universities and in urban secondary schools. In other secondary schools and in most primary schools the level is low.

- To what extent are information and communication technologies integrated into the curriculum?
  Information and communication technologies are not integrated into the curriculum, except at university schools of science and engineering.

University Level Education

The use of ICT in university education is gradually increasing. In addition to science, engineering and IT teachers, other teachers support their courses with information gathered via the Internet. This tendency has grown in recent the years, since professional literature (books, magazines, conference papers etc.) are not available or affordable to the majority of staff. CD ROMs with organized data/software are also widely used in practice lessons.

Students are trained to use enhanced information and communication technologies to improve their learning. University graduates are highly-educated professionals. During the past 10 years, around 200,000 graduate students have migrated. This proves that educational improvements and the application of computer technologies enables graduates/professionals to obtain jobs worldwide. Major development opportunities are to be found in the software domain.

Primary and Secondary Schools

A small number of teachers use computers in a very limited fashion. Theoretical education prevails with the use of non-graphic operational systems (such as DOS, UNIX), as well as the use of programming languages (such as Basic, COBOL).

Teachers do not have access to online information. Students/pupils do not use the Internet or advanced software at school. Teachers are not trained to a level where they can incorporate computers into teaching.

2.3   Developing ICT workforce

> **Stage 3** marks training in ICT
> *Technical classes and programmes on ICT-related subjects are available from a variety of public and private centres. Some limited online access to training is available. Some employers offer training in the use of information and communication technologies to their employees.*

- Are there training opportunities for programming, maintenance, and support?
  There are a large number of training opportunities for programming, maintenance, and support.

- Who is offering them (public/private centres)?
  Universities offer training in hardware/IT engineering/computer science. It is primarily private centres that offer training in programming, maintenance, and support, but there are public institutions as well.

- Are they affordable for the majority/minority of the population?
  Programming, maintenance, and support training is affordable for the majority of the population. Secondary schooling is free, as well as formal public education.

- Is there an on-line training available
  On-line training is not available. There are plans to introduce such training.

- Do employers offer training?
  Only select employers offer training - international/bigger companies; those requiring the use of computers in their activities; government institutions; telecoms and media organisations; etc.

Developing ICT Workforce

Universities have good opportunities for developing the ICT workforce. The Belgrade University Faculty of Electrical Engineering is the ICT development leader. The faculties of Mathematics, Natural Sciences, and Organisational Science also provide courses/training in ICT. As concerns primary and secondary schools, opportunities for training/developing ICT skills are very limited, existing in high schools specialising in Mathematics.

There are many private and some public centres offering licensed courses in ICT - from basic computer skills and office applications to programming, Flash, web design, network administration, etc. Many people attend these institutions and advance their computer skills, even if they do not need them for their work.

Some employers offer training - mostly international/bigger companies whose operations need to comply with international standards. Training is also offered by companies that widely use and upgrade ICT, such as government institutions, telecoms, media organisations etc.

3.   Networked society

3.1   People and organisations online

Stage 3 ranks the regular use of the Internet
Most of the population has heard of the Internet, although few have used it. Less than 10% of the population use the Internet regularly.

Stage 4 marks Internet users
Males between the ages of 10 and 35 no longer present the overwhelming majority of Internet users.

Stage 3 corresponds to the number of registered domains
The number of registered domains locally is at least two per 1000 people.
Advertising in traditional media for online companies or resources is frequent.

- What percentage of the population
  - is aware of Internet existence?
    At least 51.8% of the population (urban population) is aware of the Internet existence. Accurate information is not available, but estimates suggest this percentage to be at 60% to 80%.

- has used the Internet recently?
7.06% of the population used the Internet recently, which is more than 600,000 people.

- uses the Internet regularly?
There are around 500,000 regular users of the Internet, which is 5.88% of the population.

- What is the structure of users by gender, age, social and educational status?
A variety of people use the Internet. Males are no longer the predominant users - approximately 30%-40% are female. Age structure is between 10 and 70 years old, with the majority of the users younger than 40. There are many English-speaking users between 50 and-70 years of age. About half of the users are university graduates, and all of them have completed secondary education. Socially, the majority of the users are students and active (working) citizens, such as engineers/technicians, scientists, journalists, architects/designers, IT people etc.

- What is the number of locally registered domain names (per 1000 people)?
There are 1.70 registered domain names per 1000 people. This number does not include ".com" domain names. This is the due to the "old" registration procedure. It is estimated that the total number of registered domains by local subjects exceeds three per 1000 people (if ".com" domains are included).

- Is there advertising for online companies, and how common is it?
Advertising for online companies is beginning to appear in the traditional media, but as yet there are few examples of this. Usually, companies include their online offers to other promoted services.

Internet Users

During the last decade, a large number of circumstances and events stimulated the population of the Republic to implement Information and Communication Technologies (ICT). At a minimum, application of ICT became a prerequisite for business development, and for the advancement of personal activities. In addition, the war in former Yugoslavia (from 1991), UN sanctions, the NATO bombardment (1999) and controlled media activity (until 2000) strongly affected the way in which people operated and encouraged them to search for the information they wanted via new means and services.

Since 1996, the Internet has become extremely popular in Serbia and Montenegro. Many people have purchased computers to communicate with the wider world. Keeping in touch with relatives and friends who have emigrated has also stimulated the market. The Internet has enabled users to continue with their usual practices, and to perform professional and social activities during the country's years of unrest. During this period it has also proved invaluable for accessing current information and replacing, to some extent, publications/literature and resources which are no longer readily available, and of course – income opportunities.

The first Internet users were engineers, scientists, and university students. Subsequently, the media began to use it extensively. Since the introduction of the Internet to the Yugoslav market in mid-1996, the number of people connected to the Web has grown at

an average annual rate of 150%. At the end of 2000, about 5% of the population were using Internet. At the beginning of 2002, there were over 600,000 users, around 7% of the population.

Since there is no Internet regulation, it is difficult to determine the exact number of users. The above figures are estimates, based on the number of individual users of three biggest Internet providers (EUNET, PTT and YUBC), as well as the users of the University/Academic Network and of government institutions. The actual number of the users is higher, since there are several users of a single PC.

There is a single institution for the registration of domain names (**www.nic.yu**). According to their data, there are 14,421 domain names, which include **edu.yu, org.yu, co.yu, ac.yu** and second level **YU TLD.**

3.2 Locally relevant content

Stage 3 marks locally relevant content
Some local websites are available, though most carry static content and are updated infrequently. Websites carry diverse types of information relevant to different groups within the community. Many websites are available in local languages or a dominant Web language spoken locally. There is some use of online bulletin-board systems, Usenet groups, newsletters, and/or listservs. There are opportunities for Web-related training, although the courses may be expensive and accessible only in certain areas.

- Are there (and how many: no, few, some, many) websites:
- providing local topics?
  Many websites provide local topics in Serbian (local language).
- in a local languages?
  About one third of the local websites also provide information in English.

- How often are they updated and is the content static or dynamic?
  They are not frequently updated. Although there are sites updating content simultaneous to events, or on a daily basis, others only upgrade content once a year. Content is, therefore, predominantly static.

- Are the above websites created in the community?
  All websites are created in the community.

- Are bulletin board systems, Usenet groups, newsletters, and/or listservs in use?
  There are many board systems, Usenet groups, newsletters, and/or listservs in use.

- Are there opportunities for Web-related training?
  Many private/public training centres provide Web-related training.

Local Websites

There are over 10,000 websites hosted by local ISP providers. Almost all websites are created in the community by young, locally trained people. Their content is mostly in Serbian, but about 30-50% of websites also have "English versions".

English is the dominant Web language. Most of the Internet users speak English, which is also the case with the urban population who have learnt the language in the course of their studies.

Local content is not frequently updated. Although there are sites updating content simultaneous to events, or on a daily basis, others upgrade their content only once a year. Therefore, content is predominantly static.

There are several web browsers (www.krstarica.com is the best). There are some online bulletin-board systems, Usenet groups, newsletters, and/or listservs are mainly used by young people, proficient in computer skills.

3.3   ICTs in Everyday Life

Stage 3 marks ICTs in everyday life
Public telephones may be found in most parts of the community and are heavily used. Some members of the community have Internet access at home. Growing numbers of community members use telecentres, cyber-cafes and other businesses that offer computer use and online services to the public for a fee.

- Does the population include information and communication technologies (phones, faxes, pagers, computers) in everyday life?
  Information and communication technologies are being used in everyday life.

- 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.)?
  Telephones, wireless phones, digital assistants pagers, PCs are used regularly for social and commercial interaction, and professional/educational and other activities. The B2C infrastructure is neither established nor regulated by relevant laws. There are several online shopping outlets.

- Are there PCs with e-mail capability available (cyber cafes, telecentres), and are they being widely used?
  Computers with e-mail capability are widely available (and used by several people). There are several hundred Internet cafes and similar establishments in the country.

Use of ICT in everyday life

Telephones are widely used in the country. Public telephones, installed by Telekom Srbija, are available in all public places. A prerequisite for using the public (HALO) telephone is a calling card, which can be purchased on newsstands. There are other public telephones in postal offices, where the user pays with cash/cheque. Elsewhere coins are required.

Since 1997, mobile telephones have become a communication, social and business standard. The general public use them heavily throughout the country despite relatively high costs.

Faxes are used mainly for business activities. People with small businesses, or performing trade activities, often have faxes at their homes.

Computers are widely used in urban areas. E-mail is becoming a prerequisite for communication, and many people buy computers in order to communicate. There are over two million Serbs worldwide, and their relatives keep in touch via ICT.

The Internet is considered a powerful information resource. Many people use it for entertainment. Chat groups and bulletin boards are mainly used by young people.

The number of Internet cafes is increasing. There are hundreds of cafes in towns, attracting primarily the younger population (teenagers and students). These establishments are becoming very popular, and are looked upon as communication and entertainment points. Use of a computer in these locations for one hour costs 0,5 US$.

In non-urban communities, due to the network infrastructure and/or low income, levels of individual access to the network are quite low.

3.4   ICTs in the workplace

Stage 3 marks ICTs in the workplace
Organisations achieve some efficiency gains through a degree of deployment of ICT systems in their internal workings. Many computers in business offices are internally networked for data processing, management reporting, and other enterprise applications. Some employees conduct research transactions over the Web, though most often use a shared workstation to do so. Some employees use e-mail for internal communications.

- Do employees have:
  - (Un)limited access to phones?
  Most employees have limited access to telephones. Telephones are available, but dialing mobile or international numbers is restricted.

  - personal e-mail accounts?
  Most employees do not have e-mail accounts.

  - Internet access from personal workstations?
  Most employees do not have Internet access from personal workstations. If access to Internet is possible, it is usually from a shared workstation. Some companies provide the Internet on all workstations, but most of them limit the access.

  - e-mail and web addresses on business cards?
  If e-mail and web addresses exist, they are printed on business cards. This does not apply to the majority of companies.

- What percentages of businesses and government offices have computers? How many of them? How many employees use them?

This information is not available.

- Are they networked?
  All computers in offices are internally networked.

- Is business mostly conducted in person or by e-mail, or are there data sharing, enterprise, reporting, transaction, and research applications? How intensively are they used?
  Business is mostly conducted via telephone, faxes and in person. Some business activities are completed via e-mail (specification, ordering etc.). Documents, reports, applications and other data are shared between employees and their business partners/clients. Electronically available information and ICT equipment is intensively used.

- Are there efficiency gains resulting from the use of ICT systems?
  Efficiency gains resulting from the use of ICT systems are widely recognised. A major obstacle for more intensive implementation is the cost of equipment/services and employee structures.

ICTs Application in the Corporate Sector

ICT is not effectively applied in corporate activities, despite the demands of various businesses. As a consequence of the war and of economic crisis in the country, companies are unable to provide funding for equipment. Many companies have redundant workers. In addition, the age and educational structure of the workers do not favour innovations.

However, most of the companies have some computers, which they use for word processing, office applications and accounting. Existing computers are internally networked for data processing, reporting, and or/and enterprise applications. Old and new generation equipment is integrated into the same network.

Many workstations are shared between employees. This is particularly the case where computers have access to the Internet. Some employees use e-mail for communication, even if the companies do not provide e-mail accounts for employees.

Efficiency gains resulting from the use of ICT systems are widely recognised. Major obstacle for more intensive implementation is the cost of equipment/services.

Employees are advancing their skills and are willing to attend additional training. Most of them understand English and have no difficulties in understanding computer commands/interfaces. They are open to innovation. They learn quickly and share ICTs and ICT related experiences among themselves. Employees apply new knowledge to working assignments and seek methods to upgrade office equipment and software with great enthusiasm.

4. Networked economy

4.1 ICT employment opportunities

Stage 3 ranks the demand for technically-skilled workers
Technical skills in the community are becoming a source of competitive advantage and are beginning to attract investment and employment opportunities from companies outside the community.

Stage 2 marks employment opportunities
Although there are some employment opportunities that call for technical skills, most workers with ICT experience leave the community and search for professional challenges abroad.

- Are there opportunities for technically skilled workers in the country?
  Opportunities for highly-educated workers exist in the country, although the conditions/packages and professional challenges cannot compete with those abroad. Opportunities for technically/IT skilled people with secondary education are limited.

- Are companies from outside of the country investing in ICT related projects?
  A small number of foreign companies are investing in ICT related projects.

- What is the portion of knowledge workers and information related business in the economy? (Percentage of labour force, percentage of GDP)?
  This information is not available. The classification of businesses does not recognise telecom, ICT and information related businesses as specific categories.

- Are businesses considering ICT in their strategies?
  Most small and medium-sized businesses do not consider ICT in their strategies because of the low cost of the labour force. International companies and larger corporations do consider applying and upgrading ICTs.

Opportunities for Employment

Opportunities for highly-educated workers exist in the country, although the conditions/packages and professional challenges cannot compete with those abroad. Telecom operators, scientific and engineering institutions, international and other active companies cannot succeed in employing and keeping a sufficient number of engineers. A small number of companies specialise in developing software/hardware solutions and establishing international cooperation, and manage to keep their employees (please refer to Chapter 9 - Labour Force).

Opportunities for technically/IT skilled people with secondary education are limited. Many companies use the services of technically-skilled people on a full or part-time basis. These employees work as network administrators, web designers etc., and solve ICT related problems for colleagues who do not have the appropriate skills. These employees are very useful, particularly in assignments related to the integration of old generation computers and the latest IT equipment. Workers with complete licensed training are beginning to receive more credits.

It is difficult to establish the earnings of IT/information related professionals. The classification of businesses does not recognise telecom, ICT and information related businesses as specific categories. They are partly included in the category of "transport, storage and communication". Even the current Telecommunications Act does not establish/refer to the Internet, Internet services etc.

Most small and medium-sized businesses do not consider IT in their strategies, due to low labour force costs and the comparably higher cost of ICT equipment. International companies are larger corporate bodies do consider applying and upgrading ITs.

4.2 B2C electronic commerce

Stage 3 marks B2C electronic commerce
Many businesses post key information on their websites. Information is not updated regularly and may be inaccurate. Websites provide information on goods and sales services. Purchases are completed primarily by direct contact between those involved, by fax or by telephone, though e-mail may expedite the process. Some businesses have introduced online ordering.

- Do local businesses have websites and how many? Is content current or static?
  Many local businesses have websites with mainly static content. There are 12,528 registered company domains. The number of websites is around 10,000 (estimation).

- Are there online B2C transactions, or are transactions mainly oral and/or paper-based, phone or fax-based?
  There are very few online B2C transactions. Transactions are mainly phone- and fax- based.

- Is online retail a noticeable component of overall commercial activity?
  Online retail is not a noticeable component of overall commercial activity.

B2C Infrastructure and Transactions

The B2C infrastructure is neither established nor regulated by relevant laws. There are several online shopping outlets, dedicated to Yugoslavs living abroad or other valid credit card holders.

Many trade companies or retail businesses post key information on their websites. They do not upgrade content frequently - approximately one to two times a year. Websites are used primarily for advertising. Agile buisnesses provide information on their products and services on the web, and update lists of sales points etc.

Purchases are completed primarily by direct contact between the parties involved, by fax or by telephone. A signature is still required for money transfers. E-mail is used to accelerate the ordering process and some data transfer, and expedites the process.

Change of the current B2C situation will occur upon the introduction of the electronic banking system and appropriate legislature on both levels (Federal and Republic).

4.3 B2B electronic commerce

Stage 2 ranks B2B electronic commerce
B2B interactions remain insufficient with little transparency. Faxes and telephones are commonly used to facilitate orders or for remote client support, although some paper-based transactions (e.g. signature) are still required.

- What are the sources of market information? Are they sufficient for providing transparency?
  Market information is mainly provided by the stock exchange, brokers, and companies. A few companies, primarily international, publicise their financial statements. Transparency is insufficient.

- Are there online B2B transactions, or are transactions mainly oral, paper-based, phone or fax-based?
  There are very few online B2B transactions. Transactions are mainly phone- and fax- based.

- Can transactions be conducted online without any paper documents? Is the process automated? Does it allow online tracking, monitoring?
  Transactions cannot be conducted online. Signature is required for money transfer.

- What portion of B2B activity is conducted online? Is there gain in efficiency?
  Online B2B activities are not a noticeable component of overall transactions.

B2B Related Activities

The B2C infrastructure is neither established nor regulated by relevant laws. Many businesses post key information on their websites. Information is not updated regularly and may be inaccurate. Websites provide information on goods and sales services. Financial statements and other relevant information on products/services and companies cannot be found. Purchases are completed primarily by direct contact between the parties involved by fax or by telephone. Some businesses have introduced online ordering. B2B interactions remain inefficient with little transparency.

Only a few businesses have B2B transactions supported by electronic systems (e.g. systems and databases), but even in these cases paper-based transactions (e.g. signature) are still required at some point. All company transactions (business) are conducted via ZOP -Zavod za Obracune i Placanja/Bureau for Accounting and Payments of the National Bank. From 1 January 2003 the banks will perform money transfers, and relevant ZOP activities will terminate.

Electronic B2B transactions take a small share in overall B2B commerce. According to the transactions report for 2000 of a web organisation dealing with electronic money, the amount of transactions in all directions was slightly less than 500,000 US$.

Electronic systems, on-line transaction security systems and formal banking establishments do not support online transactions, shopping or e-commerce.

4.4   E-Government

Stage 2 marks the number of government websites
Most governmental agencies provide basic information, often directed at parties outside the community.

Stage 3 ranks government websites' content
Some government agencies post key information on websites, including service directories, hours of operation, and downloadable forms. Information is often not kept current and relevant. Transactions take place primarily in person, by fax or telephone, though electronic mail may expedite the process.

Stage 2 corresponds to the distribution of government information
The government distributes some information about services, procedures, rights and responsibilities in hard copy.

- Number of government resources online? Does it include information, hours of operation, services? Is information current and relevant?
  Most government institutions have websites. Contents are not updated regularly, although there are examples of accurate/relevant information (i.e. Government of the Republic of Serbia).

- Is there online interaction between government and citizens or is interaction mainly oral, paper-based, phone or fax-based?
  Interaction between government and citizens is mainly paper-based, phone and fax-based, and oral. There is some online interaction with specific institutions.

- Is there online interaction between government and suppliers and contractors, or is interaction mainly oral, paper-based, phone or fax-based?
  Interaction between government and suppliers and contractors is mainly fax-, phone and paper-based.

- Is it possible to download applications from the websites?
  It is possible to download the existing applications.

- Can citizens apply for permits, licenses and taxes online?
  Online application for permits, licenses and taxes is not possible.

Government Online

Many governmental sites exist, providing basic information, often directed at parties outside the community. This information is static and infrequently updated, with some exceptions.

Some limited interaction is possible by telephone or fax. Interaction with citizens, however, is infrequent, and is mainly paper-based. There are only few electronic services, such as checking the election polling lists.

There are several current e-government projects or projects under consideration by the relevant authorities. Since there are no similarities with other countries regarding the organisation of the government, it is difficult to establish appropriate models.

Discussions on the platforms and principles still continue, as well as presentations of the solutions proposed by internationally-renowned companies (Oracle, Compaq) to government officials.

5. Network policy

5.1 Telecommunications regulation

Stage 2 marks telecommunications regulation
Plans for the liberalisation of telecommunications services are being formulated. Provisions for universal access to services have been established, though they are ineffective.

- Is liberalization of the telecommunications sector planned or implemented?
  There are plans to liberalise the telecommunications sector. The draft Telecommunication Act is prepared. Adoption procedure will start in autumn 2002.

- Is there competition between telecommunications service providers?
  There is no competition between telecom providers.

- Is broadband Internet access offered?
  Broadband Internet access is still not offered.

- Is regulation set and enforced by an independent body?
  Currently, regulation is not set and enforced by an independent body. New regulation will introduce the independent regulatory authority for telecommunications (likely in autumn 2002)

Telecommunications Market in Yugoslavia

Ten years of economic crisis, international isolation and stagnation reversed the country's overall economic development and had a devastating impact on its telecom and ICT sectors. The current situation can be described as lagging far behind the highly-developed industrial nations, but still comparable to conditions in the countries in the region.

The new Government has committed to taking vigorous steps towards political and economic reform and industrial development. One of these steps will include upgrading the telecoms sector so that it can be used as Yugoslavia's powerful leverage to catch up with the developed world and leapfrog into the Information Age. This important task includes the following:

- painstaking efforts in terms of legislative reform;
- liberalization of telecoms equipment, networks and services;
- creation of a competitive environment with equal conditions for new entrants and incumbents alike; and
- attraction of direct investment.

Beginning the upgrading of the telecoms sector from scratch will help the country's policy-makers to avoid mistakes by learning from the experiences of other countries in the region.

Current Telecommunications Act

The current Law on Telecommunications, adopted in 1991, has been supplemented several times. This Law does not apply to many contemporary telecom issues.

The Law does not refer to numerous available telecom services, provided by operators on the existing/local market. For example, the law does not refer to Internet services, interconnection between telecom operators, leased lines, Internet crime etc.

The law does not comply with international principles, regulations and standards in this field.

Division of Powers between the Federal and the Republic Ministries

Regarding the current relations of the constituent Republics within the Yugoslav Federation, and the fact that Montenegro has already adopted its own telecoms legislation, the new regulatory framework will envisage a division of powers between the federal and the republican levels.

The Federal Telecommunications Act sets basic principles and contains provisions governing the fulfilment of FRY obligations arising from its membership in the relevant international organisations. It also ensures normal activities of private networks on the federal level, whilst details regarding the rights and responsibilities of telecom operators and service providers are governed by the Republican Acts.

Federal Ministry of Telecommunications

The Federal Ministry of Telecommunications is responsible for the following:

- making policies in the telecommunications and postal sectors;
- regulating telecommunication and postal activities in FRY;
- participating in international organisations in telecom and postal sectors;
- bringing domestic practices in line with standards and recommendations thereof; and
- coordination of relevant authorities of the two constituent Republics.

New Telecommunications Act (also listed in Chapter 11)

Adoption of the new Law is a prerequisite for substantial/fundamental changes in the field of telecommunications. The new Law will be based on the following:

- a free and open market;
- equality and non-discrimination between all participants;
- prevention of monopolistic behaviour;
- improvement of the quality of telecom services and protection of users; and
- deregulation or transfer of regulation to an Independent regulatory Body/Council.

These principles aim at creating a suitable environment and provide continual development of existing and prospective telecom operators.

The proposed regulatory framework fully corresponds to ECU directives and international telecoms legislation. It also applies to the current status and limitations of the telecoms sector in the country.

The key innovation in the new legal framework is the introduction of the independent regulatory authority for telecommunications. Adoption of the new law (probably in autumn 2002) will mark the beginning of the reform and the development of Telecommunications in Serbia.

The following defined principles will be respected in the new Law:

- actions of all subjects shall serve the development of telecommunications;
- relations in this field shall promote the interests of end-users of telecom services;
- equal and non-discriminating positions shall be created for all participants on a free and open telecoms market;
- rational and efficient use of the radio-frequency spectrum shall provide conditions for the development of telecommunications; and
- establishment of relations shall be in accordance with international standards, practice and technical requirements.

Strategy and Development Plan

Part of the "Strategy of Industrial Development of Serbia until 2010" is dedicated to the "Strategy on Electronics Industry, Information Technology and Telecommunications" and includes the following:

- analysis of products and services in the international market, in the fields of information technology, telecommunications, electronics and basic technologies;
- analysis of the current state of local industry foundations, in the aforementioned fields;
- identification of development potentials in these fields;
- establishment of strategic aims and a proposal for priorities;
- proposal on primary legal, institutional and other measures; and
- training of human resources.

This document is elaborated and supplemented by the "Plan for the Development of Telecommunications in Serbia until 2006".

5.2   ICT trade policy

> **Stage 2** marks ICT trade policy
> *Trade barriers for ICT equipment have been reduced, but are still relatively high. There has been some opening in services sectors related to electronic commerce and ICT networks. There is some foreign direct investment in the ICT sector (networks, etc.).*

- Do tariffs or other restrictions (technical standards, domestic regulation etc.) exist?
  There are no restrictions on ICT trade.

- Are there restrictions in the service (including information services) sector?
  There are no restrictions in the service sector.

- Are there disproportional taxes on electronically delivered services?
  There are no disproportional taxes on electronically delivered services.

- Is Foreign Direct Investment in the IT sector existent, and is it encouraged, discouraged, restricted?
  There is some foreign investment in the IT sector, but there are still not specific inducements to attract this.

ICT Trade Regulation

The Yugoslav regulatory framework does not recognise ICT as a specific trade category. ICT equipment is treated the same as other merchandise. New trade (2001) regulations specify the amount of import duties - 5%. Trade and servicing taxes are 20%.

Banks do not have prerequisites for adapting electronic commerce and building up ICT. Licensing requirements considerably increase the price of ICTs.

There is great interest by international companies to invest in the IT sector, particularly in infrastructure, trading of ICT equipment and the services sector. However, the current legislation presents an obstacle for direct investment. It is expected that the new regulatory framework will encourage such activities and mark the beginning of a new era.

6.   Media

6.1   Radio, TV and Newspapers

- Number of Radio and TV stations, newspapers
  According to the Federal Agency for Media and PR, there are (in 2002)

  - *513 radio-programmes*
  - *216 television stations*
  - *656 printed media*

- The size of audience/circulation

  - *TV audience: 7.2 million (85 % of population - Table 6.1)*
  - *Circulation of newspapers: 900.000 copies (of main dailies/about 10)*

6.2.   Employment in the media

- Number of employees in the media

    - *Electronic media: 25,000 (estimation), 10,000 full-time and 15,000 part-time (estimation)*
    - *Printed media:10,000 (estimation)*
    - *Also many part-time employees*

- Trend: is the number increasing/decreasing?

The total number of employees in electronic media will decrease to about 15,000 because of new regulations in the field of broadcasting. An additional drop in numbers will occur as a result of the latest television technology and the abandonment of old production/broadcasting practices. Luckily, the age and educational structure of employees in the media is quite favourable. Apart from employees at RTS, most employees on radio/TV are between 25 and 35 years of age, and will probably succeed in career change/promotion.

Electronic Media

"Serbia is the European recorder in the number of local radio and TV stations. There is no precise evidence on their exact number, although it is often mentioned that there are 1300 electronic media. Everyday new media appear or the existing ones terminate broadcasting activities. No analytical research is performed regarding broadcast content, programme editors, equipment maintenance and procurement. This field can be called 'the jungle', and it is about time to introduce order."

This is how Dr. Zarko Korac, the Vice-president of the Serbian Government, describes the inherited situation in the field of media in an article entitled "The road through the media chaos".

Development of Electronic Media

The development of the Yugoslav media began when pluralism was introduced to the former country's political life. Until then, every Federal Republic had its own broadcasting centre. Locally relevant content was produced by local subsidiaries of the National Broadcasting Corporation, as well as by several local stations in bigger cities (owned by the Municipalities).

In the past twelve years, three quarters of all media in Yugoslavia have been founded (74.4%). The record years were 2000 with 157 new media, 2001 with 132, and 1997 with 123 new media.

Electronic media, especially local media blossomed following the victory of the former Serbian opposition in 1996 in numerous towns and municipalities. In order to compete with the National Broadcasting Corporation, which held the monopoly on news, many communities launched their own stations with modest broadcasting facilities.

During 2000 there was a real explosion of new radio and TV stations. As the former regime creation more and more stations in order to discredit the opposition via

controlled content and entertainment, the opposition fought back with even more local media, content and re-transmissions of foreign programmes.

During Milosevic's regime there was no regulation in this field, except for the State television that he controlled. Copyrights were not respected, piracy was widely spread, and radio and TV stations were created through "home production". All these stations operated under temporary licenses. In addition, there were strict laws in this field at both Federal and State level.

In October 2000 the new democratic government of Serbia/Yugoslavia inherited the existing chaos. One of its first steps was to repeal the notorious Public Information Act and to return money paid in fines by independent newspapers. Soon after, work on the new media legislation started, with high expectations from the public, various broadcasting, government and international organisations. No broadcast licenses previously granted were revoked, but nor were any new licenses issued. However, every consecutive year the number of electronic media increased.

New Regulation

Media regulations are different in the two Republics, but the way in which they were created and in which they operate are not dissimilar. At a federal level, new rules are virtually inexistent. In Montenegro they have only been updated.

The Serbian Parliament adopted the new Broadcasting Law in July 2002. The Law will soon establish an independent Broadcasting Agency to supervise the broadcast media and the distribution of broadcast licenses. It is expected that genuine democratisation of the electronic media in line with prevailing European standards will follow. This will mark a clean break with the practice of allocating frequencies in return for political obedience.

The new Law will start from "ground zero". Everybody will compete under the same conditions on a public tender in order to obtain broadcasting licenses and the right to use specific frequencies. The exceptions are the Serbian Broadcasting Corporation (Radio-televizija Srbije - RTS) and RTV Novi Sad (RTV of the Vojvodina province), which will become public services. Prior to that, the new Law on Telecommunications will be adopted, containing the frequency plan and technical conditions for an optimal number of radio and TV stations in Serbia. It is estimated that the number of stations will be reduced from the current 1,300 to around 300.

The Draft Laws on Telecommunications, Information and Advertising are discussed in public, and should be submitted for the adoption procedure. Following this process, a complex and lengthy phase of the application of the new regulatory mechanisms will follow. Key effects cannot be achieved during the current year.

Number of Radio and TV Stations

It is very difficult to obtain exact data on the number of media through existing agencies, regulatory bodies or ministries. As mentioned above, the figures circulating in public include about 1300 media. However, unofficial estimations go up to 5,000 radio and 1,500 TV stations. Certainly, the media differ in their size, quality, influence and content. The most reliable local market research agency, Strategic Marketing, states that

currently only 600 radio and 250 TV stations comply with industry standards regarding the size of the audience and are worth consideration.

However, recently an attempt was made to provide an exact or comprehensive review of the existing media. In June 2001 the Media and Public Relations Research Agency (MPRRA, a Federal Institution) published the second edition of "The Guide through Yugoslav Media". Based on the variables that determine only the existence of specific media, this guide establishes the media scene in FRY (Serbia + Montenegro). It also contains information on tens of media from the province of Kosovo and Metohia to newspapers and stations in Serbian language.

The basic criterion for listing a specific media in "The Guide through Yugoslav Media" was that the media was "operating" - either publishing editions or broadcasting programmes. All other parameters such as ownership, registration, licenses, contents and financial details were not considered for the project.

"The Guide through Yugoslav Media" collects 1,454 entries, and lists basic data for:

- 513 radio-programmes
- 216 television programmes
- 656 printed media
- 16 internet media
- 53 news, media or professional organisations

The MPRRA found that there are still unallocated media, in addition to the media that refused to submit any information, or were unlisted in other databases.

Table 6.1. The size of TV audience - by Strategic Marketing
January - June 2002, Population: Age: 10-70/refer to Appendix 3

Main TV stations in Serbia without Kosovo	Areas Covered	Technical Coverage (in %)			Average Audience (in %)	
		Very Good	Good	Fair	Weekly	Share
National BC Channel 1 (RTS1)	Serbia	66.7	25.1	5.6	83.5	22.9
National BC Channel 2 (RTS2)	Serbia	62.5	28.4	6.6	45	8.7
National BC Channel 3 (3K)	Serbia	52.7	31.0	10.4	54.8	7.5
TV PINK	Serbia	62.8	22.2	6.6	80.3	28.9
BK TV	Serbia	47.6	24.1	10.0	59.9	10.1
YU INFO	National (Serbia+ Montenegro)	22.7	22.9	12.1	22.1	1.9

Employment in the Media

It is difficult to determine the total number of employees in electronic media in Yugoslavia, primarily because more than half of them work part-time. Permanent positions are offered to highly-trained employees (i.e. editors, graduated engineers, and financial personnel). Other workers, including production staff and newly employed journalists, mostly receive hands-on training/experience, and work for years on monthly-based contracts. Their social and pension insurance is seldom regulated through professional associations.

Number of the Employees in the Media

The new Law will transform state-run Radio Television Serbia (RTS) into a public broadcasting service. This process will provide more independence from Serbian government authorities to RTS. However, some delicate issues will be raised. For instance, out of 7,500 employees at RTS, 3,500 are considered redundant.

Trends

It is expected that the new law will regulate frequency allocations and significantly reduce the number of broadcasters by 50 – 70 %. As a consequence, the number of the employees will decrease to about 15,000. Additional reductions will occur due to the latest television technology and abandonment of old production/broadcasting practices.

Luckily, the age and educational structure of employees in the media is quite favourable. Apart from the employees at RTS, most employees on radio/TV are between 25-35 years of age, and will have good prospects in the transitional period.

Additional Statistical Information

According to the invaluable MPRRA data, the press is published and radio and TV broadcast from 202 settlements in FRY, which is almost equal to the number of towns in the country (233). But some of the "media centres" are extremely small and relatively obscure, and their supporting infrastructures need to be taken into consideration.

Belgrade is a powerful media centre with 418 printed and electronic media and organisations. Out of these, 52 are radio programmes, 17 are TV programmes, 305 are newspapers and magazines, 10 are Internet media and 34 are organisations. Novi Sad holds the second position with 122 entries in "The Guide through Yugoslav Media", followed by Podgorica (56), Nis (31), Kraljevo (23), Kragujevac, Cacak and Subotica (20 each), and many other towns.

Exactly 1,000 media and media organisations have e-mail, which equals 68.8% of the total number, and can be graded as very good.

479 media and organisations have websites, which is about one third (32.9%) of all media. The increasing tendency to launch internet presentations and webcasts is very favourable for the development of many small RTV and publishing enterprises, which operate on the edge of existence, often in environments that can not provide any assistance.

Thanks to the latest technology and human creativity, new media has appeared in the field. Last year a magazine having all features of a traditional publication(such as contents, field of interest, editors, journalists, distribution across the country) was published on CD instead of the paper.

The number of radio stations providing their programme via Internet (webcasting) is increasing. Also increasing is the number of TV stations that offer downloads of their shows via websites. In addition, the first Internet TV station has appeared, offering commercial content. This phenomenon is even more interesting since the current telecommunications infrastructure cannot support the appropriate data rates and connections that enable reception of such programmes.

The general and professional public recognizes the over-saturation of the media. The majority of the population also admits that the quality of the content provided is insufficient.

Many people and environments/communities are active in the production of media content.

Yugoslav TV stations use 55 channels, from channel 5 to 68, but not all of them are equally used. Mostly intensively used is channel 40 (13 programmes), followed by channel 37 (12 programmes), channels 26, 31, 47 and 50 (10 programmes per channel), etc.

Some TV stations use several VHF and UHF channels. The appropriate telecommunications authorities have more precise technical data on the positions and broadcasting conditions of all TV stations in the given regions.

In the radio domain the situation is even more complex. 192 frequencies are being used for broadcasting radio programmes, ranging from 86.5 MHz to 107.9 MHz. Obviously, power, locations and other broadcasting parameters are different. Some stations use several bands and frequencies. Others have transmitters that do not operate in the same regime, or broadcast on a time-scheme etc. It is very inconvenient that several stations use close frequencies on different locations (i.e. 97.8 MHz and 105.5 MHz are used by 10 radio-stations). 47 radio-stations use Medium Wavelength (MW) band.

There are many warnings that the number of media does not reflect the needs of the population or economy, but the two dominant forces of current media development - politics and marketing.

7.   Intellectual Capital

Exact data can be given only on industrial property patents and trademarks. These rights are assessed and registered by the Federal Agency for Intellectual Property.

It is difficult to provide information on the scale of copyrights and related rights, because authorisation on these rights is not obligatory. Instead, they are protected without any formalities, from the day the work was activated/used, or from the date of the creation of the object.

7.1   Patents

- The number of patents issued per annum
  Total number of applications in 2001: 1045 applications
  The number of applications issued per annum/1992-2001 average: 853 patents

- What are the trends?
  From 1992 to 1997 there was a considerable decrease in the number of submitted patents. From 1998 the number of patents started to increase, despite the fact that between 1999 and 2001 the Federal Agency for Intellectual Property did not approve any patents. The total number of applications in 2001 (1045) still did not reach the number of submitted applications in 1992 (1125).

Number of Patents

Between 1992 and 2001, there were on average 853 patents (applications) submitted per annum. This number included the patent applications for small patents. From 1992 to 1997, there was a considerable decrease in the number of submitted patents (from 1125 to 667 applications), whilst in 1998 the number of applications started to increase (from 729 to 1045). The total number of applications in 2001 (1045 applications) still did not reach the number of submitted applications in 1992 (1125 applications).

Regarding the number of registered patents in the past decade, there were on the average 336 registered patents per annum.

However, between 1999 and 2001, the Federal Agency for Intellectual Property did not approve any patents, due to inadequate facilities (lack of office space). Taking that into account, the statistical parameters do not reflect the appropriate value of technology (innovation, level of invention and application) for which patent protection in FRY was requested. In other words, the small (39%) ratio of the number of registered patents and the number of submitted applications does not indicate that the patents concerned were of low patentability. Rather, it shows the objective inability to examine the submitted patent applications within a specific period (three years).

7.2   Copyrights

The comparative law generally accepts that copyright works are protected since the day of their creation. The Yugoslav Law on Copyrights and Related Rights from 1998 does not establish any conditions for consideration of copyrights by the Government authorities (for acquiring copyrights). Therefore, neither the number of subjects of legal copyrights, nor the number of subjects on the protection of related rights is known (the right of the interpreters, manufacturers of phonograms, manufacturers on videograms, manufacturers of the programmes and manufacturers of databases).

Property rights of the authors of music pieces are handled by/paid to SOKOJ - the association of the Yugoslav composers/ the organisation for the collective execution of rights of music authors. The scale of using (performing) music pieces can be summarized through the report of this organisation.

7.3   Licenses

7.4   Trademarks

The number issued per annum
In 1992-2001 average: 4,743 patents

What are the trends?
To determine trends regarding the number of issued trademarks, it is more helpful to consider the number of applications for trademarks (see the possibilities of the Federal Agency on Intellectual Property to examine submitted applications referred to in the text below). This number decreased between 1992 and 1996 (from 6,199 to 4,990 applications), but started to increase between 1997 and 2001 (from 6,130 to 7,054). Compared with the year 2000, the number of applications of local companies doubled in 2001 (from 462 to 969).

Number of Trademarks

Between 1992 and 2001, there were on average 4,743 trademarks per annum. As in the case of patents, the number of registered trademarks is not exclusively the result of the fulfilment of requirements for protection, related to the number of submitted applications. It represents the possibility of the Federal Agency on Intellectual Property to examine submitted applications. Therefore, for the purpose of evaluating trends, a better indicator is the number of applications for trademarks. This number decreased between 1992 and 1996 (from 6,199 to 4,990 applications), but started to increase between 1997 and 2001 (from 6,130 to 7,054).

In Yugoslavia, the number of applications has increased, regardless of whether the applications were submitted by local or international/foreign companies. It is important to note that, compared with the year 2000, the number of applications of local companies doubled (462 to 969). That is not only an indication of the launch of new products on the market. It also reflects an awareness of protecting trademarks of products and services, thanks to the considerable amounts invested in advertising/product promotion.

7.5   Scientific and/or tech associations

- List with a brief profile
According to the data of the Federal Statistics Bureau, there are 506 scientific and technical associations. It is estimated that the actual number of scientific and technical associations in Yugoslavia is around 550.

The list submitted in this report (Appendix 4) and containing 506 items, was obtained by selection from the list of 2,605 professional associations and societies in the country. Selection was made using subjective methods – a simple elimination of associations from the list, according to their titles (activities/fields).

The Policy on Intellectual Property

Since 1990 Yugoslavia has abandoned the practice of applying "original solutions" to patent protection (a socialist economy practice). Instead, solutions for patent systems originating from countries with market economies have been implemented. Such policies on intellectual policy focus primarily on the following:

- solutions given by WIPO;
- directives on harmonisation of legislation in this field, given by the EU to their members;
- recommendations of the AIPPI on regulating specific issues on industrial property.

Yugoslavia submitted a report on "The Regime of Trade Aspects of the FR Yugoslavia" together with its application to join WTO. This material contains a statistics report on submitted and registered patents, trademarks, models and samples between 1992-2001.

Institutional Regime

The Federal Agency for Intellectual Property is a Government organisation responsible for establishing and applying policies on intellectual property. The Agency is within the Federal Ministry of Economy and Trade.

8. Education

8.1 High education

- Total number of high education establishments:
  - *87 high education establishments (in 2000/2001 - 77 faculties, 10 academies)*
  - *7 public Universities - one in Montenegro, six in Serbia (inc. the University of Arts)*
  - *5 private faculties/Universities in Serbia*

- Total number of students (total average per annum, in the private and in the public sector)
  - *202,469 students in 2000/2001*
  - *74,500 students are enrolled annually, 73,000 in the public, 1,500 in the private sector*

- Prevailing specialisations (distribution of students among fields)

  Students of Belgrade University are distributed among fields in the following way:
  - *40% are enrolled in the social sciences and humanities,*
  - *28% are enrolled in engineering,*
  - *17% are enrolled in natural sciences, and*
  - *15% are enrolled in medicine and medical sciences.*

- Cumulative number of population with higher education degrees

- o   Population with higher education degrees: 400.000 people;
- o   (1969 - 2000: 346,831, 1969 - 2001: ≈ 360,000)
- o   120,000 people hold degrees in science and technology;
- o   (1969 - 2000: 107,572; 1969 - 2001: ≈ 112,950)

8.2   Distance learning

- Distance learning facilities:

  The British Council KLC in Belgrade integrates print and electronic media resources and consists of three components:
  - o   *Video-conferencing studio (up to 3 other sites at once) and 30 computers with Internet access for educational and training purposes;*
  - o   *Cyber cafe offering ten Internet enabled computers for use by the public;*
  - o   *Library containing 7,000 books, 80 journals and newspapers, and more than 1,000 audio and videocassettes.*

  The online library resources comprise British journals, databases, directories, and encyclopaedias, as well as Four Internte- enabled multimedia computers for information searching.

- Number of students trained per centre
  In 2001/2002 there were 50 students trained at the British Council KLC in Belgrade. An additional 20 are expected in 2002/2003. Information for other semi-centres is not available (estimation - 10).

Higher Education

During the last decade of the twentieth century the Yugoslav education system was ruined and impoverished. The educational infrastructure was left without built-in mechanism for fast recovery and development. It presents one of the most difficult challenges for society.

Although Serbia embarked upon an era of profound changes and introduced a process of internal reforms, sustainable and efficient reforms in education cannot happen overnight. However, in planning this important process, the Ministry of Education and the relevant educational authorities are strongly relying on the best European and broader international experiences.

Education is a priority for Serbia. It is expected to provide a powerful impetus for its economic recovery and democratic transformation and integration into the international community. In order to fulfil this mandate, the current education policy in Serbia focuses on:
- improving the quality and efficiency of education for all in order to supply the new Serbian economy with a highly skilled labour force and human resources for social development;
- restructuring the education system in order to provide a genuine democratic framework for the development of education, respecting local needs, appreciating diversity and the ability to respond to new and forthcoming challenges.

Experiences and best practices from countries that have already embarked upon the pursuit for similar changes are of invaluable help, and they are being analysed and integrated to the new educational programmes.

Higher Education Institutions

Higher education in the country is provided by public and private Universities/faculties (please refer to Appendix 5). In order to enter university, students have to complete twelve years of education (eight years at the primary and four years at secondary level).

Table 8.1. Basic facts on public Universities in Yugoslavia

Public Universities	Bel-grade	Novi Sad	Nis	Kragu-jevac	Podgo-rica	Arts	Total
Founded in	1905	1960	1967	1976	1974	1937	-
No. of faculties	30	13	10	6	12	4	75
Number of students	120,000*	30,000	24,000	12,000	10,000	2,000*	≈ 198,000*
Cumulative number of population with higher education degrees	270,000	50,000*	33,000	15,000*	20,000	8,700	≈ 400,000*
Masters	15,000	5,000*	1,340	4,000	116	1312	≈ 27,000
Ph.D.	9,000	3,000*	850	2,000	80	30	≈ 15,000

*Estimation - exact data are given at the beginning of the chapter.

There are six public Universities in Serbia (one of them being the University of Arts) and one in Montenegro. The University of Belgrade, the biggest and the most renowned in the country, suffered the consequences of the "brain drain". Teaching stuff, graduates and post-graduates left during the war in former Yugoslavia. Other difficulties for university employees were caused by the difficult economic situation, inadequate funding of the University and its resources, unfavourable laws for universities (political influence) and many others.

University of Belgrade

The University of Belgrade is the biggest and most renowned educational institution in the country, with 30 Faculties, eight Scientific Institutes, a University library and other facilities.

The University of Belgrade was formally founded in 1905. However, the origin of higher education in this region can be traced back to the beginning of the 19th century, to 1808, when the Superior School was first founded in Serbia providing three-year studies for the needs of rebellious Serbia.

On average, there are just over 65,000 undergraduate students enrolled every year. In addition, 2,500 students are involved in different forms of postgraduate studies. However, two thirds of the enrolled students drop out (never completing their studies at Belgrade University)!

From its foundation to the present day, almost 270,000 people have completed their higher education degrees and graduated from one of the University's Faculties. This includes approximately 3,700 foreign students. Over 15,000 people have received their Master's degrees from the University of Belgrade, and approximately the same number have received the title of specialist in a specific field of work. The University has granted over 9,000 Doctoral degrees. The University of Belgrade employs over 3,300 teachers and 2,600 teaching associates.

University of Novi Sad

The University of Novi Sad (founded in 1960) is nowadays a fully-developed system of science and education with more than 30,000 students and a teaching staff of over 3,000 professors and associates. It is comprised of 13 faculties offering undergraduate and postgraduate studies. Its headquarters and nine of its faculties are in Novi Sad. The remaining four faculties are on the territory of Vojvodina, but outside Novi Sad (Subotica, Zrenjanin, and Sombor).

University of Kragujevac

The University of Kragujevac was founded in 1976 by the Republic of Serbia. Higher education in the region originates from 1838. Apart from cooperating with other constituents of the higher education system in the Republic, the development of the University of Kragujevac was based on the needs of the region in which it is situated.

Today the University has approximately 12,000 students. Up till now more than 14,000 students have graduated, and more than 400 M.Sc. thesis and 200 Ph.D. thesis have been completed. The university has approximately 1,000 employees, from which more than 600 are specialists actively joined to educational programmes in different faculties. New programmes are continually developed in basic courses of studies and various R&D.

University of Nis

The University of Nis was founded 35 years ago. It has ten faculties in Niš, the Faculty of Technology in Leskovac, and the Teacher-Training Faculty in Vranje. Most of the mentioned faculties have composite structure, i.e. various departments, divisions or majors offering wide and diversified study and research opportunities at both the undergraduate and the graduate level, including opportunities to obtain Ph.D. degrees.

The University of Nis has 1,300 teachers, and more than 24,000 students (including 360 foreign students). So far, more than 33,000 students have graduated from the University, 1,340 have earned master's degree and 850 have successfully presented their doctoral dissertations.

The University of the Arts in Belgrade

The education of artists began in Serbia in the 19th century. Two university-level schools were formed in Belgrade in 1937: the Academy of Music (which also included a drama section;) and the Art Academy, dedicated to the study of the fine arts. The Academy of Fine Arts and the Academy of Theatre Art were founded in 1948.

The University of the Arts in Belgrade was established in 1973 and represents the association of the four faculties of the arts - the Faculty of Music, the Faculty of Fine Arts, the Faculty of Applied Arts and Design and the Faculty of Dramatic Arts (theatre, film, radio and television).

University of Montenegro

This University was founded in 1974, and is based in Podgorica. It consists of 14 faculties and one college. The majority of students study Economy and Law. Recent addition to this educational institution is the Faculty of Medicine.

Private universities

Private universities are relatively new educational institutions. The oldest private faculty was founded in 1992. Most of these institutions establish their own educational programmes/curriculum, but some that offer programmes in cooperation with foreign universities. Generally speaking, private higher education institutions provide some advantages over the state universities – a smaller number of students attending classes; constant availability of professors; residence/practice at international companies etc.

There are five private faculties/universities, which are based in Belgrade. Two of them are art schools (Akademija Lepih Umetnosti/Academy of Fine Arts and BK Univerzitet Umetnosti/BK Art University), whereas other three offer mainly business-oriented undergraduate programmes - business, economy, management, marketing, tourism, banking etc. These institutions (BK Univerzitet, Megatrend Univerzitet Primenjenih Nauka and English School of Business) have "subsidiaries"/schools in bigger towns in the country.

Recently these schools considered expanding their programmes by offering disciplines related to the IT sector. The English School of Business will launch the first such programme in October 2002 - they are currently enrolling students wishing to earn a degree in computing in association with the University of Cambridge.

It is very difficult to determine how many students attend private institutions. Although their programmes are heavily advertised, the schools do not announce annual admittance quotas. It is not even possible to obtain such information on request. The estimation of the author is that the total number of students attending private universities is around 2,000, including graduated students.

Most of the staff at private universities (i.e. professors) are former employees of state educational institutions. Some of them even carry out the two jobs simultaneously. However, these institutions are still attempting to establish their reputations due to their short history and the:

- high cost of tuition/expenses;
- low competitiveness of such institutions on local market;
- unfamiliarity of the environment with their curriculum;
- inadequate information regarding the progress of graduated students;
- lack of (foreign) companies/investors ready to employ students with the degrees in relatively "new" disciplines (MBA etc.);
- correlation between the quality of education and owners of the institution (reputation/reliability).

Private educational institutions in Yugoslavia were recently introduced. Their development is in its early stage, but they are progressing well by introducing new disciplines and methods of teaching (for instance, in the domains of art and language proficiency testing). Further success is expected once the educational market grows and the economy becomes more knowledge-based.

Distance learning centres are relatively new educational facilities in the country. Although the introduction of distance learning programmes in not stimulated by educational authorities, some research on the subject is performed by Ph.D. candidates at Belgrade University.

However, since Yugoslavia is a member of the Stability Pact (SP) for South-eastern Europe, it implements the decisions and recommendations of this organisation. In 2000, a Distance learning Initiative (DLI) was proposed within the framework of the Stability Pact for South-eastern Europe (SEE) and its E-SEE Initiative. The SP-DLI promotes innovative information and knowledge-sharing technologies which foster cooperation, education and development in South-Eastern Europe while acknowledging the importance of other approaches to distance learning found throughout the world. The core of this initiative is the World Bank's successful Global Development Learning Network (GDLN), which uses broadband connectivity and links multi-media centres in more than 30 countries.

This project is coordinated from the World Bank Institute with the participation of regional departments. In Serbia the first Distance learning Centre was established through the British Council, as a local partner institution. The Swedish International Development Cooperation Agency (SIDA) also participates in this programme.

9. Labour Force

9.1 Employment in science and technical fields

- Number of employees and trends in the fields
  Number of employees: 11,000 - exactly 10,567 in Serbia (March 2002)
  Trends: The number of employees in science and technical fields is still decreasing (Table 9.2). An increase is expected upon the application of new legislation (ecology, quality control, safety measuring etc.) and creation of small businesses. Prospective development of the construction/construction materials industry, pharmacology, agriculture and food production, standards application, training activities and implementation of new production technology will require young scientists and engineers.

- Compensation rates in the field and trends in the fields (average salaries)
  Average net salary: 291US$ (March 2002)
  Typical net salary range: 200US$ - 400US$

9.2 Employment in electronics industry

- Number of employees and trends in the fields
  Number: Incomplete data (please refer to Table 9.1)
  Trend: The number of employees in electronics industry is decreasing. There are lots of redundant workers at factories that used to produce electrical (i.e. switches, heaters, production tools) and electronics equipment (TV sets, radios, signal circuits and devices etc.). Private companies have their own production (i.e. satellite antennas, signal receivers, microwave equipment). However, most of the companies in the private sector are engaged in import activities, trade/sales and product support.

- Compensation rates in the field and trends in the fields (average salaries)
  Average net salary: 250US$
  Typical net salary range: 50US$ - 500US$

9.3 Employment in the telecom industry

- Number of employees and trends in the fields
  Number: 20,000 (estimation)
  Trends: The number of employees in the field of telecommunications will certainly increase. The number of telecom engineers is insufficient to cover the existing market. With the development of new products and services (fixed telephony, cable & wireless services, mobile services, satellite communication etc.) and new legislation in this industry jobs will be created for thousands of employees.

- Compensation rates in the field and trends in the fields (average salaries)
  Average net salary: 350US$
  Typical net salary range: 150US$ - 700US$

Table 9.1. Existing data for employment in the fields of science, technology, electronics and telecommunications in Serbia

Republic of Serbia Statistics Bureau	Number of employees /end of			Net salary May 2002 US $
	March 2001	Sept. 2001	March 2002	
Research and development/ Science and technology	11,328	11,065	10,567	291
Manufacture of TV and radio receivers, audio/video players and accessories/similar eq.	1,019	815	625	78
Manufacture of electronic lamps, tubes and other electronic components	4,253	3,983	3,343	40
Manufacture of TV and radio transmitters and telephony/telegraphy equipment	1,786	1,763	1,653	289

Table 9.2. Decrease of the employment in scientific research and technology development activities in Serbia

Science and Technology	1999	2001	2002
Number of employees	13,191	11,328	10,567

Science and technology labour force

Faculties of Science and Technology are the toughest schools in the country. In addition, they are competitive institutions worldwide, providing solid theoretical grounding to University graduates. But due to low funding and inappropriate conditions for research and training activities, their students receive a limited insight into contemporary scientific methods and routines. Among more recent generations, the best and the most ambitious graduates have chosen to search for better opportunities abroad. This has also been the case with scientists and engineers that were already established in the spheres of education, industry, telecommunications etc. Consequently, several generations of experts have been lost for further development of various scientific and technical disciplines in the country.

Yugoslavia is suffering the consequences of severe brain drain. During the civil war and more than a decade of economic crisis, at least 200,000 people have left the country. It is estimated that more than 100,000 of these immigrants were highly-qualified (with university degrees etc.). Emigration continues, but fortunately, it is significantly reduced compared to the levels achieved in critical years (1992-1993, 1999-2000).

Despite these difficulties the country's labour force has succeeded in remaining agile and well-informed. It is aware of current practice and achievements, and easily communicates, using all advantages of IT technology. It is also aware of the necessity of receiving additional training and bringing experts/immigrants into some of the key positions in the country.

Scientists and engineers in Yugoslavia earn modest salaries that do not enable them to live comfortably. These amounts, on average twice the average salary, cover basic expenses (food, rent, telephone exp., heating and utilities) in Belgrade, where they are located. Home computer upgrades and accessories and other similar prerequisites are usually purchased from other income (private lessons, programming, trade etc.). Most of them cannot afford holiday travel, not to mention international scientific conferences and professional literature.

Situation is slightly better for ICT engineers, programmers and other employees in the sphere of IT. Some of the people in the IT sector are graduated electrical/mechanical engineers, physicists or mathematicians that have made a career change due to the difficult market conditions. Their income is higher and they have lots of smaller-scale jobs available.

Electronics/telecommunications engineers employed by mobile operators or the industry supporting these services, are among the best paid category of engineers in the country. This is not the case with their colleagues from the media sector, signal control, military and postal services, etc.

Although the exact number of employees in the fields of science, technology, electronics and telecommunications it not available (classification of jobs is described below), it is definitely insufficient to meet the demands of the existing market. The results of the analysis completed by the Labour Market Bureau (below) show that within the mentioned fields the labour force is fully employed.

Number of Employees and Trends in the Fields

The number of employees in the science and technical fields is known. Accurate information for the fields of electronics and telecommunications is not available. Two relevant authorities, the Federal and the Republic Statistics Bureaus, which gather such information, use the National Classification of Occupations (JNZ). The incompatibility of the (old) JNZ with the international standard classification, results in incomplete/insufficient data.

However, there is an analysis completed by the Labour Market Bureau (of the Department of Employment, the Ministry of Labour and Employment). This analysis shows that in the fields of electronics, telecommunications and information technology highly-qualified workers are fully employed.

The analysis covers occupations that do not fully correspond to the telecommunications and information technology profiles according to the International Standard Classification of Occupations (ISCO-88), but to the JNZ.

The analysis of registered and fulfilled requirements for occupations in the fields of electronics, telecommunications and information technology shows that during 2001 the

demand for full-time employees increased. The ratio between the demand and the offer is 19.26 to 6.99.

There is a significant deficit of experts (highly qualified employees). Demand is much greater than supply for electrical engineers who are specialised in electronics, telecommunications and ICT, as well as for programmers. This ratio is even bigger if requirements for temporary employees are taken into consideration.

Results of the Analysis

The analysis has certain imperfections. But its results, presented in two tables below, can be helpful to determine trends.

Registered requirements for full time employment (2 & 5) in the tables below- are:
- Vacant positions/jobs registered by the employers.

Fulfilled requirements for full time employment (3 & 6) in the tables below include:
- unemployed persons registered at the Labour Market Bureau,
- persons that changed their employment, and
- Persons unregistered at the bureau.

Levels of education IV to VIII:
- IV - technician (high school level); V- specialized technician; VI - engineer;
- VII - graduated engineer and/or master;
- VIII - doctor of technical sciences (Ph.D.).

**Table 9.3. Number of unemployed and required workers
in the relevant sectors/levels IV-VIII**

Type of occupation (Levels of education IV to VIII)		Electronic	Telecom.	ICT	Informatics/ Programming	Total
2000	Total No. of unemployed (1)	4,563	1,135	1,197	2,137	9,032
	Registered requirements (2)	804	286	338	727	2,155
	Fulfilled requirements (3)	602	217	287	640	1,746
2001	Total No. of unemployed (4)	4,932	1,260	1,330	2,141	9,663
	Registered requirements (5)	865	356	479	870	2,570
	Fulfilled requirements (6)	623	232	320	561	1,736
2000/ 2001	Index 2001/2000 (4/1)	108.09	111.01	111.11	100.19	106.99
	Registered requirements (5/2)	107.59	124.48	141.72	119.67	119.26
	Fulfilled requirements (6/3)	103.49	106.91	111.50	87.66	99.43

The results are different for highly-qualified employees (engineers etc.) It is notable, however, that some companies, especially private ones do not recruit their employees via the Labour Market Bureau. This is the case with software and ICT companies, media outlets and other powerful market players in particular.

Table 9.4.   Number of unemployed and required engineers in the relevant sectors

Type of occupation (Level of education VII - degree of a graduated engineer or similar)		Electro-nics	Telecom.	ICT	Informatics/ Programming	Total
2000	Total No. of unemployed (1)	343	246	157	48	794
	Registered requirements (2)	356	157	170	174	857
	Fulfilled requirements (3)	222	106	134	127	589
2001	Total No. of unemployed (4)	329	280	169	64	842
	Registered requirements (5)	344	236	253	149	982
	Fulfilled requirements (6)	201	137	135	68	541
2000/2001	Index 2001/2000 (4/1)	95.92	113.82	107.64	133.33	106.04
	Registered requirements (5/2)	96.63	150.32	148.82	85.63	114.59
	Fulfilled requirements (6/3)	90.54	129.25	100.75	53.54	91.85

General Conditions on the Labour Market

The labour market in Yugoslavia is experiencing the problems of transitional economies. Current trends and the state of the market can be summed up as follows:

- a relatively low level of work engagement among the population;
- a high unemployment rate which continues to grow (long term unemployment, structurally unfavourable). The current rate of unemployment in Serbia is 30 % (May 2002);
- a high rate of latent/hidden unemployment - redundant workers;
- low participation of employment in private sector;
- low level of mobility of labour force;
- high participation of informal employment market - "grey economy"; and
- low amount of earnings. (Average net salary in June 2002: 118 US$ in Montenegro; 145 US$ in Serbia)

In 2001, the overall employment rate was reduced by 2.6%. However, the employment rate of self-employed people (within the private sector) increased by 15.1%.

Employment decreased in industrial activities (primarily traditional). In the private sector and the services sector, employment increased.

To improve overall employment in the country the Ministry of Labour and Employment established a number of programmes through its own agencies. Some of these targeted the labour forces of the science, technology, electronics and telecom industry sectors, and are elaborated upon in Chapter 11.

Work Strategies of the Ministry of Labour and Employment in 2002

To meet the challenges of the transition and privatisation period, the Government of the Republic of Serbia established the Ministry of Labour and Employment in January 2001.

This Ministry focuses on the following issues:
- solving the problem of unemployment;
- harmonisation of labour legislation with European standards and ILO conventions;
- harmonisation of qualification structures of employees with international standards;
- improvement of working conditions;
- improvement of the Labour Inspection Department;
- suppression of illegal labour market, i.e. the grey labour market.

Department of Employment within the Ministry of Labour and Employment

The scope of work of the Department of Employment of the Ministry includes legislation drafting in the field of employment, training and employment of disabled people; implementation of international conventions in the field of employment; implementation of Active Labour Market Measures and employment policies; special programmes for redundant workers during the period of transition and privatisation; surveying the changes on the labour market; and monitoring the work of Labour Market Bureau of Serbia.

In the fields of employment, organisation and functioning of the labour market the Department of Employment of the Ministry cooperates significantly with a number of international organisations and institutions, such as: the Stability Pact, the Council of Europe, the World Bank, the International Labour Organisation (ILO), the European Training Foundation (ETF) and many others.

Cooperation with the aforementioned organisations has contributed to the acquisition of broader experiences and better recognition of comparative legislation and practice in the field of employment, together with recognition of practice in resolving the problem of redundancies in other countries. As a result, the realisation of 24 prepared projects, conducted by the Labour Market Bureau of Serbia, is expected in 2002.

Programmes of the Labour Market Bureau of Serbia for 2002 (also listed in Chapter 11)

The bureau's programmes for 2002 are oriented towards stimulating employment by financing profitable development programmes, as well as programmes for youth employment. Among them, are several programmes of importance for the knowledge-based economy:

- "Training for Starting and Running a Small Businesses" for 500 unemployed persons. This is a three-month programme for selected candidates;
- "Incubator Centre" for the employment of 500 unemployed persons. This provides support for newly-founded shops and new/already established companies. This programme stimulates the environment and promotes local and regional development, innovations and creation of new businesses. It provides information and support to the creation of business plans, accounting, legal services, marketing and advertising, financing, consulting etc.;
- Programme for employment (preparation). This provides training for new technologies and organisations, re-qualification and knowledge innovation for new jobs. This programme will include training in basic IT (for 5,000 people), higher IT (for 500 people) and foreign languages (for 1000 people);
- Training programme for 2000 graduates. This programme enables additional employment of qualified young people searching for their first jobs, especially those talented in scientific and technological research and educational work (100 persons, 12-month programme). Also, another 900 University graduates (12-month programme), 250 people with higher qualifications (nine-month training for college degrees), and 750 people with high school diplomas;
- Pilot-programme "Training for E-business" for 500 unemployed people. This promotes new technologies established in contemporary business and stimulates new types of employment;
- Project "Identification of Talented Children and Youth" to be launched in cooperation with the Talent Centre of the Republic of Serbia; and
- Training for Microsoft licensed programmers.

10.   Research and Development

10.1   Research institutions

- Number of research institutions
  Institutions engaged in scientific-research activities: 212 (Total number in 2002).
  - *26 are specialized in natural sciences*
  - *67 are specialized in engineering and technology*

10.2   Investments in research and development

- The total amount
  Investments in science and technology: 6.4 million USD in 2001

- Government and private business breakdown of total investment in research and development
  Private sector mostly does not invest in research and development activities of research institutions.

Research Institutions

Yugoslav science and technology potential was seriously damaged during the past decade. There has had direct and indirect consequences.

One of the major direct consequences is the lack of human resources. Over 200,000 people left the country, at least 100,000 of them established professionals holding university degrees.

Owing to the economic crises, scientific and research institutions were not sufficiently funded. This resulted in poor laboratory and office equipment, low salaries, lack of professional literature, incapability to follow scientific achievements and other limitations.

Research institutions are facing serious problems in the domain of economy, organisation and education. However, the new government has begun to implement its strategy. Since 2001, conditions have gradually improved.

Number of Research Institutions

The Ministry of Sciences, Technologies and Development has 56 institutes. 12 of these are scientific institutes and 16 are technical/technological. Another 28 institutes specialise in medical, social and other sciences.

However, the total number of research institutions is actually bigger. According to the data of the Federal Bureau of Statistics (2001 Yearbook - refer to Appendix 6), there are 212 research and development institutions in total, 26 active in natural sciences, and 67 engineering and technology institutions. Data on institutions and the number of their employees is given in tables 10.1 – 10.12.

There are examples of partly-privatised research institutions (formerly the daughter companies of the Ministry of Science or successful companies during the socialist era). Some of them receive support for specific projects from the this Ministry. Among the research and development institutions, there are also proven partners of various businesses and industry. Their role was especially important during the past decade, especially during the period of the UN sanctions and NATO bombardment.

Some of the institutes are successful companies that produce equipment for the telecoms industry, hospitals and medical laboratories etc. They manage to conduct various projects and earn profits. With only modest financial support from the government, their biggest concern is how to keep human resources. Unfortunately, their highly-educated staff still emigrates.

Investments in Research and Development

The total amount of investment in science and technology in 2001 was 6.4 million USD. This sum was used for:
- Laboratory equipment
- Computers
- LAN (Local Access Networks)
- Tangible expenses of institutes
- Advance payments for apartments (housing)

It is interesting to compare the budgets of the Ministry of Science, Technology and Development for years 2001 and 2002.

Budget	Planned		Spent
2001	27,500,000 USD	0.2 % of GP	19,525,000 USD
2002	46,573,833 USD	0.3 % of GP	

Government and private business investments in research and development

The private sector does not invest in research and development activities of research institutions. When it does, it is mostly for the production of the missing, out-of-date or expensive components of machinery/equipment. Rather, private companies use the services which have already been developed by such institutions (testing/approval for various products and materials etc.). However, private companies hire experts (part-time) for consulting tasks in order to launch new products and services.

In addition, private companies also provide specific products and services due to insufficient funding of government-owned institutions. Cooperation is established in the domain of design, software outsourcing, measuring and analysis etc.

Institutional regime - Ministry of Science, Technologies and Development

The scope of work of the Ministry is established by the Law on Ministries and the Law on Scientific and Research Activities. The Ministry is entitled to deal with the following civil service affairs:

- development and advancement of scientific and technological activities;
- establishment of the policy on scientific and technological development, and measures on its improvement;
- development and operations regarding information on science and technology;
- application of scientific results and achievements;
- provision of conditions for the execution of programme assignments and technological development;
- establishment and completion of programmes regarding scientific and technological research;
- enabling of human resources for scientific and technological tasks and other activities of interest for science and technology.

In accordance with its scope of work, the Ministry of Science, Technologies and Development also complies with the following:

- application of Laws and other regulations of the Parliament and the Government of Serbia, as well as General Acts of the President of the Republic;
- providing solutions to the Civil Service in matters related to the fields of science and technology, and supervisory activities;
- formulating laws/acts and other regulations from its scope of work;
- adoption of regulations, directions, instructions and solutions related to scientific and technological activities;
- establishment of cooperation with appropriate subjects from foreign countries and international organisations in the field of science and technology.

Strategy of Scientific and Technological Development (also listed in Chapter 11)

The Strategy of Scientific and Technological Development is set by the Ministry of Science, Technologies and Development. It should be implemented through a two-phase process:

Phase 1 - Revitalisation of Serbian scientific and technological capacities (2001-2002) including:
- starting a new set of projects;
- provision of equipment for laboratories;
- building a new academic/higher education network;
- provision of better conditions for R&D activities;
- Setting a new plan for the following phase and focusing on the following:
  - new Act on Scientific and Research activities;
  - building the Scientific and Technological Policy;
  - creating the Strategy of Scientific and Technological Development.

Phase 2 – The Development of the Innovation Society and the Foundation of the Innovation Infrastructure and Sustainable Development of Serbia from 2003 to 2008, including:
- reorganisation of scientific and research institutions;
- affirmation of the Innovation Society;
- creation of Science and technology parks and innovation infrastructure.

Cooperation is already established with the following international organizations and programmes:

- EU – sixth-frame research programmes. COST programme for the exchange of scientists/researchers. EUREKA – programme for industrial cooperation and development
- Agreement with CERN on the participation of our physicists on the LHS project
- Bilateral agreements (Romania, Greece)
- Foreign funding (Italy, Japan). 750,000 US$ for cooperation programmes. 450,000 US$ for scientific conferences and short study abroad programmes

The table below show scientific research and experimental development activities classified by scientific fields (2000, 1999) in the 2001 Official Statistical Yearbook of FR Yugoslavia

**Table 10.1.   Number of Employees / Institutes and Units
in Research & Development activity - Total (2000)**

2000 Research&Development activity Total	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	26	N.A.	2,032
Engineering and Technology	67	N.A.	5,158
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	212	N.A.	14,979

**Table 10.2.   Number of Employees / Institutes and Units
In Research & Development activity - Total (1999)**

1999 Scientific-research activity Total	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	25	3,419	2,156
Engineering and Technology	69	9,782	5,362
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	223	25,326	15,163

**Table 10.3. Compared number of Employees / Institutes and Units
in Research & Development Activity - Total (1998 -2000)**

Scientific-research activity Total		1998	1999	2000
Institutes and Units		230	223	212
Employees	With University degree	15,301	15,163	14,979

**Table 10.4.   Number of Employees / Institutes and Units
in Research Institutes (2000)**

2000 Research Institutes	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	9	N.A.	590
Engineering and Technology	22	N.A.	2,206
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	85	N.A.	3,952

**Table 10.5   Number of Employees / Institutes and Units
in Research Institutes (1999)**

1999 Scientific-research Institutes	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	11	1,557	831
Engineering and Technology	22	4,718	2,145
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	80	9,010	4,280

**Table 10.6. Compared number of Employees / Institutes and Units
in Research Institutes (1998 -2000)**

Scientific-research Institutes		1998	1999	2000
Institutes and Units		84	80	75
Employees	With University degree	4,443	4,280	3,952

**Table 10.7. Number of Employees / Institutes and Units
in Experimental and Development Units (2000)**

2000 **Experimental and Development Units**	**Institutes and Units**	**Employees**	
		Total	With University degree
Natural sciences	5	N.A.	117
Engineering and Technology	23	N.A.	599
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	47	N.A.	1,062

**Table 10.8. Number of Employees / Institutes and Units
in Experimental and Development Units (1999)**

1999 **Experimental and Development Units**	**Institutes and Units**	**Employees**	
		Total	With University degree
Natural sciences	4	207	116
Engineering and Technology	24	1,408	609
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	51	2,194	1,069

**Table 10.9. Compared number of Employees / Institutes and Units
in Experimental and Development Units (1998-2000)**

Experimental and Development Units		1998	1999	2000
Institutes and Units		52	51	47
Employees	With University degree	1,202	1,069	1,062

**Table 10.10   Number of Employees / Institutes and Units
of Faculties (2000)**

2000 Faculties	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	12	N.A.	1,325
Engineering and Technology	22	N.A.	2,353
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	90	N.A.	9,965

**Table 10.11.   Number of Employees / Institutes and Units
of Faculties (1999)**

1999 Faculties	Institutes and Units	Employees	
		Total	With University degree
Natural sciences	10	1,655	1,209
Engineering and Technology	23	3,656	2,608
Total (including Agricultural, Medical, Social, Multidisciplinary Sciences, Humanities)	92	14,122	9,814

**Table 10.12   Compared number of Employees / Institutes and Units
of Faculties (1998-2000)**

Faculties		1998	1999	2000
Institutes and Units		94	92	90
Employees	With University degree	9,656	9,814	9,965

11.   Other Issues

11.1   Information Technology and Internet Development Agency (ITIDA)

The Agency was founded as a strategic orientation of the Serbian Government. It started working on 12 July 2001. Headed-up by the Secretary, the Agency consists of a working body of about ten information communication technology experts, as well as assisting technical staff.

The Government's aim in founding this Agency was to overcome the gap of the last ten years through the development of information technology, as well as to unite all the authorities in the field of information technology and the Internet in one coordinated body.

Since Mr. Zoran Djindjic, the Serbian Government Prime Minister, and Mr. Branislav Andjelic, ITIDA Secretary, visited the USA and met with Microsoft, including with its founder, Mr. Bill Gates, the development of ICT in the Federal Republic of Yugoslavia has gone into full swing and concrete steps for development have been taken.

The Agency is the fundamental source of contact and work coordination between international and local donors, Serbian Government and final beneficiaries of Agency programmes.

The Agency has authority over:

- coordination of the state authorities work concerning use and application of information and communication technology (ICT) in all state institutions, as well as regulation analysing, designing and monitoring the use of ICT standards country-wide;
- development of the intranet infrastructure of the state bodies and computerisation of the state administration work process: e-government, as well as cooperation with international organisations and agencies both in our country and abroad concerning this and all other ICT development issues;
- education – creating plans and proposals for ICT introduction into the educational curriculum, from elementary schools to universities, as well as providing funds for the realisation of certain programmes.

E – Government priority projects:

- preparing national ICT strategy - through national consensus on aims, funds and application methods, with the participation of the state, major companies, scientific institutions and interested individuals (please refer to Appendix 2);
- recording of the current state of information infrastructure and programme solutions in state bodies country –wide;
- achieving Net Readiness - It will include quantitative and qualitative analysis of ICT human resources, software and hardware, and telecommunications infrastructure;
- software designed for international and local NGO registers as well as computer networks in all parts of the country;
- software designed for a central voters register together with introduction of computer networks in all voting units country-wide;
- software designed for monitoring the working process of magistracy bodies accompanied by the introduction of computer networks in the courts country-wide
- software designed for a names of the streets register country-wide
- development financing - through establishing information technology and Internet development funds and Technological incubators which will provide funds for newly-established enterprises with good programmes which cannot otherwise find financing;
- formal education - educational programmes in schools providing basic computer literacy for everyone;
- informal education - specialist information technology courses for certain programme tools realised in cooperation with international companies;
- providing Internet access - providing cheap Internet access through alternative channels – e.g. Internet café;
- software designed for general distribution of medicines country-wide.

In detail, the scope of work of the ITIDA includes:

E-government:

Intranet: Universal network of the institutions of the Republic and a unique database on citizens, business subjects and space units, which enables data sharing between all government institutions.

Extranet: Enables citizens to submit requests and obtain information via Internet or self-standing electronic kiosks/workstations installed in public places.

Internet: Enables access to the Internet for government employees, and provides opportunities for the Government to present itself and its achievements.

Introduction of Standards: Setting and implementing unique technological standards and procedures for procurement of equipment, materials and programme solutions, performing activities and providing services in the sphere of information.

E-business

Change of regulation: Formulation of new laws and changing or abandoning current laws, in order to create a stimulating environment for the development of ICT economy in the country.

Enabling Internet access: Provision of universal and inexpensive access to the Internet through alternative channels.

Financing development: Establishing a Fund for the development of Information technologies and Internet, as well as a technological incubator which would finance the newly-established companies which have good programmes and would otherwise be unable to find financing.

E-education

Institutional education: Development of educational programmes at schools and universities that would enable fundamental information literacy for all, and would specifically train professionals to use computers in their activities.

Non-institutional education: Specific training in IT for selected products or software tools, in cooperation with international manufacturers.

E-neighbourhood

Self-organisation connecting communities through chat groups for discussions on local activities and projects.

Feedback: Enabling citizens to act at a micro level on government resolutions and to participate in public discussions on new regulations.

11.2   Ministry of Traffic and Telecommunications of the Republic of Serbia

New Telecommunications Act (also listed in Chapter 5)

Adoption of the new Law is a prerequisite for substantial/fundamental changes in the field of telecommunications. The new Law will be based on the following:
- a free and open market;.
- equality and non-discrimination between all participants;
- prevention of monopolistic behaviour;
- improvement of the quality of telecom services and protection of users; and
- deregulation or transfer of regulation to an Independent regulatory Body/Council.

These principles aim to create a suitable environment to provide of the continual development of existing and prospective telecom operators.

The proposed regulatory framework fully corresponds to ECU directives and international telecom legislation. It also applies to the current status and limitations of the telecom sector in the country.

The key innovation in the new legal framework is the introduction of an independent regulatory authority for telecommunications.

Adoption of the new Law (likely to take place in autumn 2002) will mark the beginning of reform and the development of telecommunications in Serbia.

The following defined principles will be respected in the new Law:
- actions of all subjects shall serve the development of telecommunications;
- relations in this field shall promote the interests of end-users of telecom services;
- equal and non-discriminating positions shall be created for all participants on a free and open telecoms market;
- rational and efficient use of the radio-frequency spectrum shall provide conditions for the development of telecommunications; and
- establishment of relations shall be in accordance with international standards, practice and technical requirements.

Strategy and Development Plan

Part of the "Strategy of Industrial Development of Serbia until 2010" is dedicated to the "Strategy on Electronics Industry, Information Technology and Telecommunications" and includes the following:

- analysis of products and services in the international market, in the fields of information technology, telecommunications, electronics and basic technologies;
- analysis of the current state of local industry foundations, in the aforementioned fields;
- identification of development potentials in these fields;
- establishment of strategic aims and a proposal for priorities;
- proposal on primary legal, institutional and other measures; and
- training of human resources.

This document is elaborated and supplemented by the "Plan for the Development of Telecommunications in Serbia until 2006".

11.3   Ministry of Science, Technologies and Development

Strategy of Scientific and Technological Development (as detailed in Chapter 10)

Strategy for the Reduction of the Immigration of Scientists

Reducing the emigration of scientists is among the priorities of this Ministry for 2002. This programme includes:
- provision of housing;
- provision of scholarships;
- purchase of laboratory equipment;
- installation of new IT network;
- better financing of scientific/research projects;
- provision of scientific/technology information;
- creation of business incubators;

- stimulation for small enterprises in the sphere of advanced technologies and knowledge-based industries;
- stimulation for foreign companies investing in science/technology parks; and
- stimulation for the establishment of international cooperation.

11.4   Ministry of Labour and Employment

Programmes of the Labour Market Bureau of Serbia for 2002 (as listed in Chapter 9)

Programmes of the Bureau for 2002 are oriented towards the stimulation of employment through financing profitable development programmes, as well as programmes for youth employment. There are several programmes of importance for the knowledge-based economy among them:

See complete list in Chapter 9.

Conclusion

Ten years of economic crisis, international isolation and stagnation reversed the country's overall economic development and had a devastating impact on its telecom and ICT sectors. The current situation can be described as being significantly behind the highly-developed industrial nations (Stage 4), but still comparable to conditions in the countries in the region (Stage 3).

Despite this, Yugoslavia has solid foundations to become a participant in the knowledge-based world economy. The following prerequisites exist in the country and are already highly ranked by the international partner institutions:

* availability of ICTs, information infrastructure and provision of ICT services;
* an educated and entrepreneurial population;
* scientific capabilities and capacities.

The new government has made a commitment to take vigorous steps towards political and economic reform and industrial development. One of these steps includes improvement of the telecoms sector in order to catch up with the developed world and leapfrog into the Information Age.

Adoption of the new Telecommunications Act is required for the substantial changes in the field of telecommunications and ICTs to take place. The new Act will be based on the following principles:
* a free and open market;
* equality and non-discrimination between all participants;
* prevention of monopolistic behaviour;
* improvement of the quality of telecom services and protection of users;
* deregulation or transfer of regulation to an Independent regulatory Body/Council. This is the key innovation.

The proposed regulatory framework fully corresponds to ECU directives and international telecoms legislation. It also applies to the current status and limitations of the telecoms sector in the country. Adoption of the new Act (likely to take place in autumn 2002) will mark the beginning of reform and the development of telecommunications in Serbia.

The Government is trying to utilise the initial advantages provided by globalisation, cross-border cooperation and the size and quality of the Serbian diaspora, to develop a vivid ICT sector. Strategies and plans are already set by government authorities, such as the Ministries of Science, Telecommunications, Labour and several newly-created agencies, including the Information Technology and Internet Development Agency.

Promotion of the community-wide use of knowledge and information, and ensuring their effective utilisation and universal access is limited. Unfortunately, political instability in the country, and numerous difficult social, economic and international issues present major obstacles for the expansion of the knowledge-based economy.

Assistance of the international community is both required and appreciated in order to change policies and institutional arrangements. With the new banking and telecommunications regulations, and a regulatory framework conductive to acquisition,

generation and effective utilisation of knowledge and information, Yugoslavia has the opportunity to join the Networked World by the end of 2004.

References and Contributions

Publications used in the preparation of this report included the following:

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- "Statistical 2001 Yearbook", Federal Statistics Bureau, Belgrade, Serbia, Belgrade 2002
- "Statistical Pocket Book 2002", Federal Statistics Bureau, Belgrade, Serbia, Belgrade 2002

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- Telekom Srbija/MTS, Belgrade, Serbia
- Telecom Montenegro, Podgorica, Montenegro
- Mobtel, Belgrade, Serbia
- Promonte, Podgorica, Montenegro
- Monet, Podgorica, Montenegro
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- Ministry of Education, Sports and Youth, Government of the Republic of Serbia, Belgrade, Serbia
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- Other related websites

Appendix 1 – Yugoslavia country profile

The Federal Republic of Yugoslavia (FRY) consists of the Republic of Serbia and the Republic of Montenegro. By its Constitution, proclaimed on 27 April 1992, the FRY is a State of pluralistic, parliamentary democracy committed to the rule of law, free market economy, freedom of public activities, social justice, human rights, equality and welfare of all citizens.

Basic Facts

Full country name: Federal Republic of Yugoslavia
Area: 102,173 sq. km
Border Length: 2,585.894 km
Coast Length: 294 km

Population: 8.5 million inhabitants in FRY without Kosovo and Metohija
(2002)

                       Serbia: 7.5 million
                       Montenegro: 650,000
                       Diaspora: 400,000

Capital city: Belgrade (population 2 million)
People: Serb 63%, Albanian 14%, Montenegrin 6%,
                       Hungarian, Croatian, Gypsy, Magyar
Language: Serbian (Latin & Cyrillic alphabets)
Religion: Serbian Orthodox, Islam, Roman Catholicism, Protestantism

Government: Republic
President: Vojislav Kostunica
Prime Minister: Dragisa Pesic
GDP/material: 5.72 billion US$ (2000)

The Republic of Serbia is a democratic state of all citizens who live on its territory. Its history and achievements make it an integral part of contemporary civilisation and the international community. The Republic of Serbia contains two autonomous provinces: Vojvodina and Kosovo and Metohija.

Belgrade is the capital city. With a population of two million inhabitants, it is the administrative, economic and cultural heart of Serbia and Yugoslavia.

Prime Minister: Zoran Djindjic
GDP/material: 5.17 billion US$ (2000)

Montenegro is the smaller republic. In 2001, it required reconsideration of relations within the Yugoslav Federation. On 14 March 2002 an agreement was signed between the two Republics. On May 31 it was decided that the name Yugoslavia would be used as the official name of the Federation, until the adoption of the new Constitution Act.

President: Milo Djukanovic
GDP/material: 0.55 billion US$

Appendix II – International conference on Yugoslavia

Federal Republic of Yugoslavia
Organisation for Economic Cooperation and Development
United Kingdom

Building an ICT Investment Strategy in Yugoslavia
An International Conference
December 3 - 4, 2001
Sava Centre, Belgrade, Yugoslavia

Conclusions and Recommendations

Conference attendance showed great interest for investing in ICT in Yugoslavia. There were a total of 269 participants, including 97 companies, six banks, 35 Diaspora, representatives of 28 governments and international organisations, 52 members of the media, and representatives of the Federal and Republican governments, universities, research and scientific institutions.

In two days, thirty speakers presented the views of the private and public sector, and foreign guests shared their best practices and country experiences. International investors listed their priorities when entering a new market and shared some of the key concerns they had about investing in Yugoslavia.

Perhaps the most important outcome of the conference was identification of issues and an understanding of the road ahead. Permanent education of knowledge workers and production of skilled entry-level workers for the new economy was identified as the most important issue.

The creation of universal, inexpensive access to the Internet was also identified as a prerequisite for development in this area. Deregulation of telecommunications was identified as the most urgent and crucial task.

It was suggested that domestic ICT companies must be encouraged and supported, both by being given a chance to develop local software solutions, and by partnering with large foreign companies to deliver localised versions of existing software and to incorporate best practices from the wider world.

The pivotal role of Diaspora in brain-gain and high-risk investment was identified. Expatriates are both able, and willing, to provide high-tech knowledge gained while working abroad, as well as to risk more readily in investing back home.

The conference concluded that a report containing conclusions and recommendations should be delivered to the Federal and Republican governments with a suggestion that they be adopted as official government documents.

Conclusions

- Society must be involved in its entirety thereby necessitating:

  o secure political support at the top -there must be constant, public, and strong leadership from the highest level. Without top politicians being actively involved in promoting these issues, lower ranks of government officials will not consider ICT and the knowledge economy as priorities, and society at large will not accept them as essential for its future;

  o participation of all stakeholders - all segments of society and the economy must be involved. Public/private partnerships are essential in securing common ownership of goals. There must be a constant and open communication process through which problems are identified and solutions agreed upon;

  o involvement of the media – the public at large must be made aware of the importance of these issues through constant media coverage. Media must be encouraged to report ICT issues in the mainstream, not only in science and technology programmes. The media should present positive examples and emphasise success.

- The priority is to invest in human capital by:

  o stimulating teachers - to attract and retain good teachers, salaries must be significantly higher than the national average, permanent retraining must be provided, and housing problems must be resolved. Temporary housing could be provided free of charge to top university graduates who choose to go into teaching.

  o Improving the university level education system which is good, but needs to be updated with the latest skills - university level teachers must be given access to the latest research through conferences, study programmes and exchanges with top world universities. Online and distance training in the latest tools and online access to modern curricula are inexpensive and effective ways to rapidly bring university level trainers up-to-date;

  o concentrating efforts at high school level – the economy will need thousands of high-school level workers, proficient in basic ICT skills. Special emphasis must be given to basic training in latest programming languages and standards: Java, ActiveX, Flash, C#, XML, etc. Additionally hundreds of thousands of entry level workers capable of using computers in their everyday jobs will be needed. A standard, internationally recognisable measure of basic computer skills must be established. "European Computer Driving License" certification should be adopted for all graduating high-school students. Programmes should be established to ease school to work transition.;

  o retraining for the new economy - thousands of workers are unemployed and many more will become so during the process of privatisation and restructuring. Social programmes should be used to retrain them for the new economy by emphasising training in ICT skills and reducing the number of retraining programmes for the old economy jobs. There is a need to create a national electronics job market that is skills based.

- Build infrastructure

  o Build alternative access - to provide universal and inexpensive Internet access which is essential for ICT investment, there must be multiple, high-bandwidth choices for businesses and consumers. Government should invest in the alternative fiber-optics backbone to compete with the Telecoms monopoly and later privatise this to recoup investment.

  o De-monopolise and deregulate

  o Adopt appropriate Telecommunications Act – the current Draft Telecommunications Act is not conducive to ICT investment.

    - In order to foster growth and encourage competition, the Internet and other value-added services must remain unregulated, with free entry into the market of any number of players. The market will determine the value of each provider, rather than the regulatory body.

    - Adopt latest European Union directives on telecommunications in order to avoid redrafting of the law in the near future. Adopt universal right to Internet access and local loop unbundling provisions at a minimum.

  o Raise the issue of the monopoly to the highest political level in EU and request assistance in resolving it. The European Union and the Stability Pact would be willing to sponsor a regional conference on telecommunications deregulation and demonopolisation in Belgrade where all countries of South Eastern Europe could adopt a common telecommunications policy based on EU directives.

- Stimulate private sector

  o Adopt tax laws to reflect priorities - Yugoslavia must have dramatically better commercial conditions than its region in order to be considered for the regional ICT investment centre. Corporate tax rates must be eliminated for new investment in ICT for a number of years and be substantially lower than in neighboring countries at all times. Sales tax for ICT products must be eliminated. Accelerated depreciation rate for ICT products must be allowed. Sovereign guarantees must be provided for capital investment in manufacturing plant and distribution centres.

  o Change administrative procedures to foster firm creation - new companies must be able to be formed within a few days and with a minimum of paperwork. Market, rather than high administrative and regulatory entry bars, should decide which companies are capable of providing quality services.

  o Improve access to high-risk finance - sovereign guarantees or other suitable investor protection, as well as greater transparency in firm operations would greatly encourage foreign investment.

  o Improve access to world markets - reduce tariffs and import/export barriers. Actively promote national companies through diplomatic channels. Provide substantial export financing. Adopt e-commerce regulations and actively promote use of Internet in marketing to foreign customers. Organise investor/local company workshops.

- o Foster innovation - government must fund research that has high economic and social benefits. Public/private partnership in research funding that leads to commercialisation of research results will reduce costs and foster innovation. Grants should be spread wide, rather than concentrated on a few large research institutes.

- o Rely on similar country experiences - experiences of other countries in transition should be carefully analysed and all relevant and applicable solutions should be applied in Yugoslavia in order to save the time and money. Do not "reinvent the wheel".

- Involve Diaspora

  - o Brain gain - programmes must be established for repatriation of highly-skilled expatriates, providing moving costs, temporary housing, child-care, and meaningful positions where their skills and experience would not be wasted. A separate Agency should be established to coordinate this effort.

  - o Consulting and teaching – a virtual bridge should be established with those expatriates who are not yet ready to return, but are willing to contribute their knowledge and experience, as well as the influence of their current position, to help in ICT development and international promotion. Marketing, business development and outsourcing to local companies are the most immediate areas of cooperation.

  - o Direct investment - expatriates have gained substantial wealth and are more willing to risk investment in Yugoslavia than foreign investors. Government should establish priorities and provide special benefits for expatriates who wish to invest in those areas.

- Establish legal framework

  - o Urgently pass necessary laws - in order to make Yugoslavia attractive for ICT investment. The Yugoslav legal system must be brought into alignment with EU regulations. Privacy protection and data handling, intellectual property rights, criminal code, contract law, electronic signature law, electronic commerce law, telecommunications law, and many others need to be enacted to provide a secure and stable business environment attractive to foreign investors.

  - o Provide meaningful enforcement for the existing laws - some modern and well-written laws exist, such as intellectual property protection law, but are lacking enforcement mechanisms. Passing laws is not enough – political will, funds and expertise must be secured for their proper enforcement.

- Act now!

  - o The best is yet to come – the recent dot-com collapse and current telecom trouble should not be taken as an indication that the ICT sector is on the decline. On the contrary, this first shake-up will deliver the best ideas and the healthiest players back to the market, and the growth in the coming decade will be exponential.

  - o The gap will be widening soon - developing countries must immediately and forcefully invest huge effort to participate in the reshaping of the world economy from the very beginning. Starting from the higher level

and enjoying exponential growth, developed economies will widen the gap so much and so rapidly that the developing countries may never again be able to catch up, unless they join the new economy now.

Recommendations:

The Conference recommends the following concrete steps to the governments of the Federal Republic of Yugoslavia and the Republics of Serbia and Montenegro:

- Strengthen and concentrate authority

The Government should form the Ministry for Information Society, or another appropriate authority, and invest it with exclusive and full authority in all issues regarding transition to the new economy, including information technology, telecommunication, public administration reform, change management and education.

- Integrate results of the debate at this conference into the forthcoming National ICT Strategy.

National strategies should not be created by the academic community alone. Wide participation of all stakeholders - government, business, consumers, investors, and the education community, are essential if National Strategy is really to be implemented.

- Establish a National ICT Forum to continue this debate

The national debate should continue continuously and indefinitely if the society is to self-correct and react rapidly to the changing environment. A formal mechanism should be established within a few months to promote this debate.

- Organise a regional round table on deregulation and demonopolisation in the telecommunication sector

Relevant regional Ministers, telecom presidents, regulatory body directors and owner representatives should be paired with EU and other international officials to come up with a regional win-win solution for providing universal and inexpensive Internet access.

- Organise conference on ICT Education

Education is the most essential element of the ICT investment. An international best practices conference should be organised within the first half of 2002.

- Organise investor workshop for local IT companies

This conference uncovered many Yugoslav software companies with marketable products. Government should organise a workshop during 2002 to promote these companies to venture capital.

- Organise selection of the best exporter

Government should select domestic software companies that do export and try to help them increase their trade. It should organise a promotional tour of IT and investment centres in the world for the best exporter of the year.

- Keep current

Government should organise frequent presentations of international programmes in research, education and innovation by the EU Information Society, OECD, UNDP, UNIDO, etc. to keep domestic audience abreast of the latest developments.