FORESIGHT on INFORMATION SOCIETY TECHNOLOGIES
FISTERA in the EUROPEAN RESEARCH AREA

Thematic Network on Foresight on Information Society Technologies in the European Research Area

Information Society Technologies

Institute for Prospective Technological Studies

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IT STAR – FISTERA WORKSHOP

"ICT and the Eastern European Dimension"

22 October 2004 - Prague, the Czech Republic

FINAL REPORT

IT STAR

IT STAR-FISTERA Workshop on "ICT and the Eastern European Dimension"

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FINAL REPORT

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1 FOREWORD

In May 2004, **FISTERA**, the EU's Thematic Network on Foresight on the Information Society Technologies, invited the **IT STA**nding **R**egional Committee in Central, Eastern and Southern Europe to join it in organizing a workshop in the FISTERA series of events by soliciting the involvement of IT STAR's member societies.

The general theme of the IT STAR-FISTERA Workshop was "ICT and the Eastern European Dimension". The objectives were to identify visions, challenges and bottlenecks that are specific to Central and Eastern Europe and need to be taken into account for the 2010 Vision and the Lisbon 2010 Objectives for new member states and candidate countries.

The Czech Society for Cybernetics and Informatics (CSKI), an IT STAR member society, was invited to host the workshop. CSKI, in cooperation with the Institute of Computer Science of the Czech Academy of Sciences, provided the local support and logistics.

The invited participants were requested to prepare national reports on ICT and the transversal themes related to industry-academy-government. It was further recommended that the country reports should concentrate on the specifics of the respective countries and should elaborate on national Information Society policy documents. The representatives were free to select specific topics which they felt were important, including the background information and an outline of the current state-of-affairs of ICT in industry, research and governance, the legal basis, governmental institutions and policy documents. They were asked to identify existing problems and bottlenecks for the more efficient use of ICT and to come up with recommendations on future developments nationally, regionally and within the EU. FISTERA invited its own experts to help set the stage for a creative debate.

23 participants from 11 countries took part in the Workshop: Austria (1), Bulgaria (1), Czech Republic (5), Croatia (1), Finland (1), Hungary (5), Italy (1), Lithuania (1), Serbia and Montenegro (3), Slovakia (2) and Slovenia (2). In addition, 3 speakers represented FISTERA. [Please refer to the list of participants, p. 4.]

Close coordination on all matters was maintained between FISTERA (*R. Campano, C. Pascu and W. Koehn*), IT STAR (*N. Schlamberger, B. Domolki and P. Nedkov*) and CSKI (*O. Stepankova and J. Stuller*).

The workshop proceedings offer interesting perspectives for understanding the current situation related to ICT in the region and are intended as a contribution to the ongoing discussions within the FISTERA and the IT STAR constituencies.

P. Nedkov
Rapporteur and Editor of the Workshop Proceedings

Baden, 29 November 2004

2 ORGANIZERS AND VENUE

Organizers:

FISTERA is a Thematic Network on Foresight on Information Society Technologies (IST) in the European Research Area established by the EU within the Fifth Framework Program. Its mission is to strengthen a network of institutions that fosters the understanding of the key factors that would enable Europe to become the leading area in the innovation and application of IST. Detailed information on FISTERA and its activities is available at http://fistera.jrs.es.

IT STAR is a regional information technology association whose mission is to promote, assist and augment the activities of its members and to support regional and international cooperation. It aims to encourage and organize ICT activities and projects related to education, research, development and applications in Central, Eastern and Southern Europe and to disseminate information and results internationally. At present, 13 leading national computer societies are members of IT STAR. A list of IT STAR member societies and the IT STAR newsletter are available at http://www.starbus.org.

Local organizers and hosts:

CSKI, the Czech Society for Cybernetics and Informatics, was founded in 1966 as the Czechoslovak Society for Cybernetics. CSKI is a direct descendant with a current membership of 300 regular members. It is the largest informatics society in the Czech Republic and has the objectives to support and promote cybernetics, informatics and related fields, to advance the professional standing of its members, to provide services to its members and to help organizing conferences, seminars and other activities. The Society supports annually several conferences and more than 100 seminars and other events. It publishes two periodicals: “Kybernetika”, an international scientific journal published bimonthly and a monthly newsletter, “Zpravofaj pro Kybernetiku a Informatiku”. More information on CSKI is available on its web-site http://www.cski.cz.

The **Institute of Computer Science** of the Czech Academy of Sciences is a leading scientific organization, which conducts basic research in computer science and is involved in higher education and postgraduate studies. It organizes international conferences and supports joint activities with many universities and research institutes in the Czech Republic and internationally.

Venue:

Institute of Computer Science
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	Matthias **Weber** <matthias.weber@arcs.ac.at>	ARCSys (Austria)

4 PROGRAM

09.00-09.30	**Opening and Welcome**	O. Stepankova & N. Schlamberger
09.30-10.00	**Methodology and Main Results of FISTERA**	C. Pascu
10.00-10.30	**Technology Trajectories in ICT**	R. Saracco
10.30-11.00	**ICT Capabilities in Europe**	M. Weber
11.00-11.30	*Coffee break*	
11.30-12.00	**Factors and Impacts in the Information Society** (Analysis of NMS and ACC)	P. Gaspar
12.00-13.30	**Country reports**	
	Slovenia	V. Dolnicar
	Slovakia	I. Privara
	Serbia and Montenegro	O. Stankovicz
	Lithuania	E. Telesius
13.30-14-45	*Lunch*	
14.45-16.00	**Country reports (contd.)**	
	Hungary	B. Domolki, G. Eszes, P. Hanak
	Czech Republic	O. Stepankova
	Croatia	M. Frkovic
16.00-17.00	**Panel on National Information Society Strategies**	
	Panelists: G. Eszes, I. Privara (Facilitator), N. Schlamberger, E. Telesius	
17.00-17.30	Coffee break	
17.30-18.30	**Panel on R & D Policies**	
	Panelists: P. Hanak, C. Milenkovic, B. Rovan, J. Stuller (Facilitator)	
18.30	Closing	N. Schlamberger

Web-site: http://www.cs.cas.cz/itstar

5 SUMMARIES OF REPORTS AND PANELS

5.1 Executive summary

The Workshop on ICT and the Eastern European Dimension" was formally opened by Mrs. O. Stepankova, President of CSKI, and Mr. N. Schlamberger, Coordinator of IT STAR.

The Opening was followed by presentations of 4 background reports planned to outline the broader landscape of activities carried out by FISTERA and to set the scene for a more specialized debate on ICT in Central and Eastern Europe. These reports were on "Methodology and Main Results of FISTERA", "Technology Trajectories in ICT and Thoughts on Research Investment Strategies", "ICT Capabilities in Europe – Findings of the FISTERA Project" and "Factors and Impacts in the Information Society: Analysis of NMS and ACC".

On this basis, 7 country presentations were delivered with specific information on multifaceted aspects of the Information Society development in Croatia, the Czech Republic, Hungary, Lithuania, Serbia and Montenegro, Slovakia and Slovenia. The issues highlighted in these presentations related to the legal basis of the Information Society in these countries, the role of government, PC availability, ICT skills, Internet penetration at home and in the public space including governance, academia, industry and business.

For an additional insight, 2 panel debates were organized on the topics "National Strategies for the Information Society" and "Research and Development Policies".

Part 5 "Summaries of Reports and Panels" contains concise summaries of the country reports and the two panel debates. It is intended to facilitate those readers who wish to quickly scan through the summaries for a good sense of the proceedings before concentrating on the parts they are most interested in.

A full transcript of the panel debates is offered in Part 6 and the national reports are contained in Part 7. Part 8 represents a conclusive section, developed on the basis of the workshop proceedings and intended to deliver a more synthetic view of the major workshop findings. It also incorporates some recommendations to national and international decision-makers in the field, based on expert opinions.

5.2 Background reports

Methodology and Main Results of FISTERA
(presented by Mrs. Pascu)

FISTERA, the thematic network on 'Foresight on Information Society Technologies (IST) in the European Research Area', was launched by DG Information Society to support the creation of a European Research Area (ERA) in IST by providing new elements for the definition of a European vision and approach in the field. The term "IST" is used mainly in reference to the societal reality of ICT. Foresight is understood as a vehicle to debate possible alternative futures, rather than a means of predicting the future.

FISTERA strives to understand the key factors driving IST in a future Europe. It reviews the current literature and carries out its own research in order to facilitate the debate towards the Lisbon Objectives (2010) and beyond. One of its main aims is to elaborate options on how to strengthen Europe's position in crucial IST areas. FISTERA identifies key factors, which influence IST development and deployment.

The Network has carried out analyses of national foresight studies from several EU Member States. These studies focus mainly on identifying subjects worthy of support at a national level and do not generally cover the whole chain from technology assessment to its impact on society. Consequently, a European foresight exercise or recommendations for a European R&D strategy cannot be based on their aggregation alone.

In methodological terms, FISTERA relies mostly on established foresight methods and tools but some of these had to be adapted. For instance, the well-established Delphi methodology was replaced by an online system to allow inexpensive pan-European application. FISTERA developed a novel approach to monitoring technological progress and performing ICT foresight (Technology Trajectories). Current and future IST applications areas were studied and the conclusions are that major application areas are likely to expand around healthcare, education, transportation and governmental services.

FISTERA aims to understand the perception of Europe's technological strengths and weaknesses in ICT. The general impression is that Europe lags behind the US and East Asia in a number of critical ICTs and the gap has not diminished since the Lisbon Objectives were set in 2000. Europe has, however, maintained its leadership in a number of technologies.

Using reviews of major scenario studies of the emerging Information Society, FISTERA analyzes factors with a social component. 'Healthcare', 'aging population', 'transport and mobility', 'education', 'governmental services', 'leisure' and 'changing social relationships', including 'cultural diversity and migration' are important topics. Social challenges and drivers for ICT have stabilized and this is important for the creation of the European Knowledge Society. The only exception is 'security' which became a major concern after the 11th September 2001.

[*The full text of a comprehensive report is available from the European Commission's JRC-IPTS web-site at http://www.jrc.es/home/publications/publication.cfm?pub=1204*]

Technology Trajectories in ICT and Thoughts on Research Investment Strategies (presented by Mr. Saracco)

This presentation provided an outline of the FISTERA approach to identify technology trajectories and to evaluate their potential impact.

The artificial life trajectory was presented in detail, as an example that was also fit to the audience skills and interest. This trajectory includes the areas of robotics, virtual reality, self-creation (assembling, replicating), self-adaptation (reconfiguration/healing). Robotics, it was noted, is in full swing. We already have plenty of applications. In the future, it is expected to have an evolution towards greater flexibility and relative decrease of cost. Today, production robots are very expensive and can only be justified in terms of high production volume or for specific areas (surgery) where benefits far outnumber cost issues. In the next decade we are likely to see a much greater use of robots, also in SMEs, and there may be robotic plants made available to any business (share factory).

Production robots are crucial to ensure a leading edge in productivity and quality. Huge investment is being made in research by the US and Japan. Europe is well advanced in some areas but has to consider research in order to increase the capability as more and more business will be affected. Another direction of evolution will be towards increased autonomy and some robots will assume a symbiotic character by partnering with humans.

Further down the line we will be seeing micro robots and a multitude of them acting in swarm.

Likewise, the presentation touched on the other areas: Is there any way to really predict the future and to steer its evolution? Yes and no! A study was presented, still in a preliminary phase, carried out within the FISTERA project that through analyses of the relationship among technologies seems to indicate that technological evolution is indeed beyond control. At the same time, certain clusters tend to form and an investment to speed progress in a certain domain is likely to have more impact on the overall progress than in other areas.

More data, however, are needed before drawing conclusions, particularly data on the evolution of the market.

ICT Capabilities in Europe – Findings of the FISTERA project
(presented by Mr. Weber)

In its activities dealing with the strengths and weaknesses of the European IST research landscape, ARC systems research has analyzed the strategic plans of a selection of important public research centers and conducted an analysis of European specialization patterns in IST using triadic patent data of the OECD. Whereas the latter data allow assessing the recently emerging thematic strengths and corresponding key research actors in Europe in a global competitive context, the former foreshadow emerging themes that may become of major relevance to industrial research in the medium term.

The analysis of patents indicates that Europe has been catching up with the US and Japan since the mid-nineties, both in terms of the aggregate patenting activity and in terms of some technological areas. In the case of processing technologies, the picture suggests that European and national RTD policies of the Nineties have actually had a positive impact. However, the well-known “European paradox” of performing better in research than in commercialization, as reflected in the locations of inventors and patent applicants, still seems to be valid. Moreover, the data show that IST companies tend to diversify their sources of inventions and patenting, indicating opportunities for New Member States, but also for countries overseas.

The current strategies of research centers reflect a particular interest in a rather selected number of areas (e.g. microelectronics, systems integration and telecommunication), focusing on medium-term time to market. “Visionary” technologies (e.g. convergence of Nano-Bio-IST such as molecular computing, bio-printers or wetware) that only have a long-term potential for commercialization are hardly present in current strategies.

As regards the processes that underlie the definition of research priorities for the coming years, there is little evidence of very systematic approaches to priority-setting. Only in very few cases targeted and transparent strategy processes could be identified.

Factors and Impacts in the Information Society: Analysis of NMS and ACC
(presented by Mr. Gaspar)

The project “Factors and Impacts in the Information Society: A Prospective Analysis in the Acceding and Candidate Countries” was launched in 2003. The overall aim was to provide a series of national case studies describing and explaining the specific issues related to the development of supply of and demand for information and communication technologies and their impacts in these countries. Each national development was to be presented as a

comprehensive picture of the most relevant aspects. Based on these country monographs, the International Center for Economic Growth (ICEG EC), coordinator of the research project, prepared the final Synthesis Report which identifies the common factors affecting the development of the Information Society and the economy in the New Member States and in the Associated Candidate Countries. The Synthesis Report consolidates the findings of the 13 country monographs with the research results of other international research programs (SIBIS Report, OECD, World Bank, DG INFSO).

This final report consists of a review of the monographs, their prospective insights, their general conclusions and their policy implications. It offers comparative elements concerning factors and impacts related to the development of the Information Society, and integrates the elements developed in each single monograph but goes beyond the simple aggregation of discrete results and looks towards the NMS and the ACC-3 as a whole.

[The background reports are available at http://www.cs.cas.cz/itstar]

5.3 Country presentations

Slovenia
(National report presented by Mrs. Dolnicar)

The report outlines the current state of affairs with regard to ICT in the country. The findings from the 2003 Final eEurope+ Progress Report, SIBIS Slovenian Country report (2003), Research on Internet 2003 (RIS) and Statistical Office of the Republic of Slovenia indicate a relatively high level of Internet and online technology use in Slovenia. Whenever there was a question about the interest for ICT usage, Slovenia stood among the most exposed within the 25 EU countries, which is particularly true for the interest in governmental on-line services. The key document regarding the development of the Information Society in Slovenia is the strategy document "The Republic of Slovenia in the Information Society" (2003), which was prepared by the Ministry of the Information Society in cooperation with other ministries and state agencies.

Since 1994, the Ministry of Education, Science and Sport is supporting program RO – Computer Literacy Program: Computer and Information Literacy in Slovenian Schools – under which Internet access to all primary and secondary schools is provided and teachers and pupils are educated in ICT. ARNES, the Academic and Research Network of Slovenia, provides free Internet access to all educational and research institutions. Slovenia is approaching the European target of 5-15 PCs per 100 pupils. (eEurope 2003+). As for research, it is worth pointing out that Slovenia is actively engaged in the Information Society Technologies Program (IST).

In the 1995-2001 period, the ICT industry (manufacturing and services) recorded a dynamic growth, comparable to many developed countries. According to the recently published IMAD report (Institute of Macroeconomic Analysis and Development), the most important actors in ICT services are telecommunications and software consultancy and supply services. With 19% of all ICT sector employees in 2001, telecommunication companies created 40% of the ICT sector's value added and thus recorded the highest productivity in the ICT sector with EUR 69,400 value added per employee.

A specific problem in Slovenia is the very strong digital divide due to education and age. The business sector is well equipped with ICT, however, ICT capacities and applications are

poorly exploited. The state needs to further stimulate the development of the user-friendly e-government services.

Serbia and Montenegro
(National report presented by Mrs. Stankovic)

At the end of 2002, the number of Internet users was over 650,000 or approximately 9% of the population [some 20,000 users are on-line at any time during the day]. The largest group is within 25 years age bracket with a higher educational background. The Internet is mostly used in urban areas and men account for 60% of all users.

15,357 national domains (.yu) are registered and the availability of web-sites with Serbian content is rather limited. Internet access at home is still scarce and tele-centers, cyber-cafes and other businesses offering paid computer use and online services to the public attract an increasing number of people. The hourly use of a computer costs approximately US $ 1. The buying price of a PC is high - roughly 4 average monthly salaries. Internet access is expensive and the network speed and quality are poor.

A new regulation was introduced in 2002, which gave hardware/software products a free sales tax status making all hardware/software products 20% cheaper for private sector/home users.

The main problem with regard to network connectivity is the monopoly of Telecom Serbia A.D. and Telecom Montenegro. The telephone penetration is 32.92 mainlines per 100 persons but the fixed-line telephone system is seriously outdated. There are currently some 3,000,000 mobile telephony subscribers.

ICT education at the primary and secondary levels is greatly inadequate and the access to computers is very limited. Private schools exist but these offer primarily beginner courses. Due to poor connectivity and slow connections, the concept of distance learning is currently not possible to implement. University education in ICT is growing steadily and students are trained to use enhanced information and communication technology to improve their learning experience. The Belgrade Academic Network [http://servlet.rcub.bg.ac.yu/] is the heart of the Academic Network with 63 institutions connected through the Belgrade University Computing Center.

Only a few governmental web-sites exist and the information is limited and not regularly updated with hardly any interaction with the public.

ICT is not effectively incorporated within the internal business process of companies. Business is still mostly conducted via telephone, faxes and in person.

The number of employees within the field of telecommunications is approximately 20,000 and will increase. The conditions and salaries cannot compete with those abroad [the average monthly salary for a highly skilled worker is $ 350 US - $ 800 US]. At present, most workers with ICT experience try to leave the country in search of jobs abroad.

The new Government is committed to reform and industrial development. One of the important areas is the Telecoms sector. A new legal framework is in the pipeline. The recent trade liberalization related to ICTs gives some incentives to the private sector. International companies are interested to invest in the IT sector but the current legislation presents an obstacle for direct investment. The existing Copyright Law is also inadequate and needs to be reworked.

Lithuania
(National report presented by Mr. Telesius)

The Long-term Development Strategy of Lithuania was adopted in November 2002. It refers to the Knowledge Society as the first of the three long-term priorities of the country. The government program for 2002-2004 recognizes the output of information and the Knowledge Society as a strategic objective and a direction in which the economy should evolve. The Information Society in the country is proceeding on the basis of the 2001 Strategic Plan for the development of the Information Society, the provisions of which are harmonized with the Europe+ initiative.

In the second half of 2003, 39% of Lithuania's population within the 15 - 74 age bracket were using computers. The ratios of Internet use in households, however, are still low. In 2002, only 12% of the households had a computer, and only 4% had an Internet connection; in the 3rd quarter of 2003, the ratios were 20% and 8%, respectively. PC prices remain relatively high – the price of a computer totals nearly 4 times the monthly income of a household. The private business initiative "Window to the Future" aims to increase public Internet access and its objective is to achieve in Lithuania within 3 years the average Internet penetration of the EU.

Priority attention is given to the computerization of schools. 2003 saw an acquisition of over 370 computer classrooms, equipment for over 160 establishments with hardware allowing Internet access, procurement of 9 computer teaching tools, distribution of the open code software compilation for schools, creation of 6 web-sites designed for teaching various subjects.

Teachers' skills are also improving: In 2003, more than 5,000 teachers were trained under the "Technological", and over 3,000 under the "Educational" part of the computer literacy standard. Over 60 teachers were involved in international projects to upgrade their skills. Nearly 700 librarians took a computer literacy crash-course. The number of students accepted to study Informatics and Informatics Engineering in 2003 reached 1,895, nearly double the number of enrolled students in 2000. Important and until recently the only free-of-charge public Internet access points are public libraries where new workplaces with Internet access are being created on an ongoing basis.

In 2004, the new strategy for ICT implementation in Education for the years 2005-2007 was adopted.

Last year's exports of ITT and electronics were close to 1 billion Litas. The goal of INFOBALT, whose members are Lithuanian ITT companies, is to achieve 25% of the GDP generated by Lithuanian new technologies by 2015 (against 6.5% in 2001).

LIKS, the Lithuanian Computer Society, is a professional, non-governmental organization with a current membership of around 500 individuals. It is a member of CEPIS, IFIP, ECDL–Foundation and the IT STAR Association. Since 2000, LIKS is implementing the European Computer Driving License program in Lithuania.

Hungary
(National report presented by Messrs. Domolki, Eszes and Hanak)

For Hungary, many of the usual Information Society indicators have rather poor values. Internet penetration figures in particular are rather low, while in some areas (e.g. schools, hospitals, central government) the situation is somewhat better

An important step towards the development of the information society in Hungary was the adoption in 2003 by the government of the Hungarian Information Society Strategy (HISS). The general aim of the strategy is to satisfy objectives like improving competitiveness, enhancing quality of life, etc. The application of Information and Communication Technologies in achieving these goals make up the eHungary program, and HISS is the strategy for its realization, based on factors such as the analysis of the present status, (world) economy tendencies and technology trends.

The purpose of HISS is to review and systematize the tasks related to the formation of the Information Society in order to ensure that the responsibilities arising therefrom – to be fulfilled by the whole society – will proceed in a coordinated manner.

In the strategy, the 4+2 fields of intervention are *Content and services, Infrastructure, Knowledge and skills and Legal and social environment,* complemented by two horizontal fields: *Research & Development* and *Equal opportunities.*

The tasks are divided into 13 key areas, and the developments attracting the highest governmental interest are concentrated into 19 high-priority central programs.

The viewpoint of the Hungarian ICT industry on this strategy is based on the strong conviction that ICT is the key factor to improve national competitiveness, and innovation (which should be considered in a broader sense than just R&D) is a very important element of competitiveness. The contribution of the ICT industry to the GDP should be increased.

R&D is an important element of the Information Society. Recently, there are several important developments in this area, including the establishment of a new National Innovation System, consisting of a Science and Technology Policy Board (chaired by the Prime Minister) and its advisory body, the Science and Technology Advisory Committee. Further on, a new government office, the National Office for Research and Technology (NKTH) was established, assisted by the Research and Technology Innovation Council. For financing the creation and exploitation of R&D results, an independent Research and Technology Innovation Fund was established with equal contributions from the private and public sectors.

The major forms of government support for R&D activities in ICT include the Infocommunication Technologies and Applications Program (IKTA), established in 1996, and the National Research And Development Programs (NRDP), one of the five subprograms of which is Information and Communication Technologies. A summary of the Hungarian expertise in ICT, some new challenges in industrial R&D and initiatives for improving the conditions for innovation are also given.

An important next step is the elaboration of the National Development Plan-II for the 2007-2013 period, started in 2004. „Information Society and Innovation" is one of the key areas. Planning is based on the experience in the execution of HISS, an analysis of the current situation and international economic and technological trends.

The Czech Republic

(National report presented by Mrs. Stepankova)

The Czech Republic has a high number of top level ICT specialists and promotes itself as capable to deliver modern ICT products and services. The ICT production as a share of its GDP is significant, there is a good working culture and experience in ICT, a relatively high output of ICT specialists from its universities and a non-negligible involvement of women in ICT activities. Czech companies perceive opportunities to attract ICT orders. The country offers a friendly environment. Education is esteemed by the society and many people show interest in life-long learning and new technologies.

Unfortunately, the country's current economic growth of 3% per annum is not sufficient to catch up with the most developed countries. There is a slow legislation process and a lack of transparency in decision-making, unclear tax system and insufficient intellectual property protection.

Several negative facts and tendencies are observed: while 32% of the adults have Internet access from their homes, 38% of the population has no experience in using computers and the degree of experience of those that have it varies significantly. The prices for Internet access are excessive, there is a relatively low number of employees connected to the Internet and a low availability of governmental Internet services. The average productivity of the R&D sector is significantly lower than in the G-7 countries. The quality of the educational system slowly declines as good teachers are leaving schools for better paid jobs. The work force mobility is impeded and there is a lack of motivation and encouragement to people to increase their knowledge. Public institutions ignore or refuse to use simple international standards related to IT literacy and there is hardly any understanding that the administrative overheads of quality management in certification testing cannot be ensured for free.

The notion of computer literacy is still understood rather vaguely and this is misleading. There is a need for a transparent definition of IT literacy and a clear system how it can be tested in a reliable and uniform way. The European Computer Driving License (ECDL) is the only existing internationally recognized concept with such qualities and CSKI is promoting its utilization in the country, but serious governmental encouragement is lacking.

Most of the problems need to be resolved on a political level and it is up to the government to adopt appropriate solutions. The Czech government attempts to demonstrate a supportive attitude related to ICT and a number of laws and actions are in place. The *Electronic Signature Law* was passed in 2000 and the Ministry of Education since 1999 pursues the program on "Internet in Schools". In March 2004, a "*State Information and Communication Policy"* was adopted as a strategic document for the e-Society development until 2006. The Ministry of Informatics is working on a public portal to ensure a uniform approach to governmental services.

The Czech Republic is currently at a crossroads. The country could continue with the same pace and the same posture of its economy, which would be a safe strategy from a political point of view since no serious socioeconomic changes are required. However, that would be less attractive to the young, gifted, educated and enterprising part of the population. The other strategy would be to set more ambitious goals in achieving a Knowledge Society, which would need significant financial and moral investment of a long-termed character. This, however, does not seem to be in the focus of the current political forces. Fortunately, the world is interconnected in many sophisticated ways and the Czech Republic cannot ignore the current processes and the international atmosphere that call for a stricter application of internationally recognized standards, which could significantly support the enforcement of a necessary domestic change.

Croatia
(National report presented by Mr. Frkovic)

In late 2002, there were 1,581 ICT companies with a total of 20,492 employees. Another 7,830 IT specialists were employed by companies where ICT is not a core activity.

There was a 5.2% growth rate in 2002 - the highest so far in Croatia. The ICT sector also achieved the highest growth ever. The list of the 400 largest Croatian companies (by revenue) included 12 IT companies, i.e. 3 more than in 2001.

The Stabilization and Association Agreement between Croatia and the EU emphasizes the importance and need to further develop the Information Society. General objectives include preparing the society for the digital age, attracting investment and interlocking networks and services.

In January 2002, the Croatian Parliament adopted a strategy named "Information and Communication Technology – Croatia in the 21st Century" and endorsed the General Measures for the Development of the Information Society. The Croatian Government's program for the period 2003-2007 includes the "E-Croatia 2007" program among its priorities. This program sets out measures for the encouragement and development of science, technology and information technology. The Government plans to complete the computerization of the education system and the networking of a system that will help citizens maintain easier communication with the public administration and with health, legal and other services via the Internet.

In 2003, the sales of IT equipment and services in Croatia amounted to USD 530 m, 10.4% more than the previous year. Deregulation and liberalization of the telecommunications market are currently in progress. The Telecommunications Act is designed to regulate the field of telecommunications (the telecom network is nearly 100% digital).

A research conducted in October 2004 shows that there are approximately 1.200,000 active users of the INTERNET, or 34.4 % of the Croatian population aged more than 15 years. Among these, 47% are employees, 38% pupils and students, and 15% other.

During the last few years, several activities related to the transition towards the Information Society were carried out but an organized approach is still lacking.
The country needs an action plan identical to that of the European Union (e-Europe 2005) and similar to the plans of the candidate countries (e-Europe+),

A larger number of system measures have to be implemented (encouragement of entrepreneurs, legislative adjustments, protection of intellectual property, harmonization of national with global technical standards, reorganization of IT associations, promotion of the information society and introduction of mechanisms for progress measurement and monitoring in the sector).

5.4 Panels

Panel on National Strategies for the Information Society (IS)

It was clear that the objectives of the new member states and associated candidate countries in terms of the economy were to achieve a faster economic growth in order to catch-up with the more advanced countries. Their governments (at least judging by the output of policy documents and formal statements) consider the Information Society as a priority in this regard and in general are on the right track in stimulating the ICT Sector.

There were, however, problems in the practical implementation of concrete measures with respect to IS: the notion and definitions of the IS remain hazy and the ways to achieve concrete objectives were not always clear and practical. Many of the programs were of a

theoretical nature and the system and methodology of measuring results was not fully reliable.

A concrete problem in some of the countries was that the individual ministries were setting their own IS priorities and in practice central coordination was often lacking. A good central inter-ministerial coordination (also involving other stakeholders such as Industry and the NGO community) was essential.

Strategies were necessary in order to raise awareness. Countries needed ICT strategies in order to avoid the recurrence of previous mistakes of the Industrial Society. ICT relates to the infrastructure, education, the medical system and many other areas and the private sector alone could not comprehensively embrace the magnitude of the task. It was important that governments set the framework but when the system was properly geared and well functioning there should be as little interference as possible. Governments need to monitor developments and introduce corrective measures since the state is the biggest consumer of ICT services and products.

There were high expectations and occasionally frustrations regarding the pace of developments. The output was not always up to the level of actual expectations but when one draws the line, the final balance is positive.

Panel on R & D Policies

The panelists agreed that research funding is quite unsatisfactory. To improve the current situation there needs to be a more favorable redistribution of funds through the state budget, as well as more efficient PR activities to promote R & D and its value for societal development

In many of the countries, there was a substantial brain-drain towards the USA and Western Europe. While it is natural for young bright researchers to remain in academia and to pursue a scientific career, the current conditions are such that the incentives of the private sector or the possibilities of doing research in the West are far more attractive. To reverse the process, the governments and the scientific community need to create favorable conditions, which primarily relate to better funding.

Several felt that the legal base for research has to be developed. There was a need for simplified and transparent regulations to set the environment for proper research and better incentives for the private sector to be involved in R & D activities.

Some argued that research should be regarded as a qualitative (rather that a quantitative) process in which basic research needs special attention. There are often superficial divisions between basic and applied research, which are parts of the same process and need to be targeted towards the achievement of specific objectives and results related to the economy and the educational system of the country.

Project management was identified as an area, in which much more should be done and which has to be further promoted in order to make the research communities in Eastern Europe more competitive with respect to the organization of scientific projects.

6 PANEL DEBATES

6.1 Panel on National Strategies for the Information Society (IS)

Panelists:	Igor Privara	SK	(Facilitator)
	Eugenijus Telesius	LT	
	Gabor Eszes	HU	
	Niko Schlamberger	SI	

Mr. Privara introduced the panelists and invited them to address the following issues:

1. *What are the main goals and objectives of the national strategies and what is their influence on national policies and other national strategy documents?*
2. *What is the institutional background for coordinating IS related activities?*
3. *Which are the current priorities?*
4. *What action plans, benchmarking and monitoring processes are in existence?*
5. *What is their personal evaluation of the current state of the IS in their country?*

Mr. Telesius informed that the Information Society (IS) was a main priority of the three Baltic States and the governments were on the right track to stimulate the IT Sector. In Lithuania, there was no central coordinating body with a dedicated budget for this activity. Each ministry was setting its own IS priorities within the allocated budget. The Ministry of the Interior had the overall budget responsibility. Previously, there was a Ministry for Information and Telecommunications with a more central role but it was abolished. A reinstitution of a central coordination unit might better serve the purposes of the IS.

Mr. Eszes said there was nothing very specific with regard to the Hungarian objectives. The key words are cohesion and economic growth. The main problem was that the good ideas and proposals were not always followed by proper actions (or at least not in time).

Mr. Schlamberger advised that during the last 10 or so years some 40 strategies for the various Slovenian departments were proposed. This was quite unusual for a small country but it should be understood that a strategy for a particular field could hardly apply to any other. Attempts for having a common strategy continue but the part related to IT was vague and there were no specific provisions. A strategy was offered by the Ministry of the Information Society but was difficult to pursue. An overall strategy for the country was presently under general consideration where IT does not have such an important role as it should have. Some practical work has been done in the field of E-Government. A scenario for the development of IT in Slovenia – the Blue Book - was prepared 3 years ago by the Slovenian Computer Society. There was still no commonly accepted definition of what IS actually means. The proposed definition of it was a society of abundance, based on the intensive use of IT with the greater part of the GDP coming from information services and with the majority of the labor force employed in services.

Mr. Privara was also of the opinion that the notion of the IS remained hazy but the main idea was to improve the life of the country's citizens by an intensified use of IT**.**

Mr. Schlamberger agreed that improving the quality of life was the goal but it was important to concentrate on the ways to achieve that goal. His view on this was to ensure an intensive use of IT in all sectors of the national economy.

Mr. Eszes said that in Hungary there were many IS strategies which were very theoretical. In the last decade, 9 strategies were developed; the last one was adopted as a Governmental Decree this year. There was urgency for practical solutions. In practice, the IS responsibilities were institutionally segmented. The Ministry of Information and Communication dealt with IS aspects related to the infrastructure and the population while the Ministry of the Interior and the Prime Minister's office oversaw the activities related to E-Government. The Ministry of Education had responsibilities for ICT in the area of primary, secondary and tertiary education. This segmentation was not really effective as each ministry in effect was setting its own priorities and was developing its own yardsticks.

Mr. Telesius pointed out that the situation in Lithuania was similar and there was a need for a central governmental institution with the power and funding to drive the IS forward.

Mr. Schlamberger informed that the new Slovenian government considered to shut down the Ministry of the IS, which was established 3 or 4 years ago. In his mind, that would be a setback. The Prime Minister had under his authority a committee to advise and monitor developments related to the IS. Mr. Schlamberger further opined that strategies need to set the framework without necessarily going into detail. The IS and all related activities were too serious a matter to be left only to the government, whose horizon of achievement is normally a two-year period.

Mr. Domolki wished to have the opinion of the panelists on why IS strategies were needed and why the government should intervene. If one considered the way cellular phones were successfully introduced, shouldn't one deduce that the private sector was a sufficient driver?

Mr. Telesius felt that it was important to have the government involved. There were many reasons and one good reason was that the state was the greatest consumer of ICT products and services.

Mr. Schlamberger believed that a country needed a strategy in order to avoid the recurrence of previous mistakes of the industrial society. It was important to set the general direction and when the environment was more or less established there should be as little interference as possible on the part of the government.

Mr. Eszes felt that there were 2 related issues to consider: In an ideal scenario, all governmental bodies would be aware of the importance of ICT and IS, so a central regulatory institution was not necessary though there was a need for some coordination between the stakeholders. However, an ideal scenario was always hard to achieve and strategies were necessary in order to create awareness. Most ministries do not really perceive the importance of ICT and there were too many rotations of and within governments.

Mr. Privara thought that there were many reasons for the government to be involved as ICT related to the infrastructure, education, the medical system and many other areas. The private sector could not comprehensively embrace the magnitude of the task. There was a need for a systematic approach and each ministry has to embed the IS issues in its strategies and performance oriented priorities. The other matter was that there needs to be a corresponding legislature and each ministry should have a clear mandate on IS. It was not necessarily important to have a separate ministry for the IS but a good horizontal coordination between all ministries was essential.

Mr. Telesius saw a problem when various ministries develop their own IS perceptions. This often led to incompatibility, especially on the operational and technical levels.

Mr. Schlamberger pointed out that strategies need to be broken down to concrete action plans. Slovenia, for example, had an action plan for the E-Government, which was positive but there was a problem with measurements to understand the facts and tendencies. Measuring IS had some serious handicaps. Some measure the level of political conformity based on EUROSTAT criteria, but no one measured the generic phenomena of the IS.

Mr. Eszes referred to the experience in Hungary and said there was no clear method what, how and why to measure. There were some specifications but these were quite theoretical. With respect to action plans, the problem was that the general strategy recommendations, when broken down to the level of ministries, were hard to implement as the ministries demonstrated a varying degree of conformity. In fact, each ministry had its own priorities, which were the main drivers for its activities.

Mr. Telesius agreed with the previous speaker and said that ECDL could be one of the indicators for measuring the competence of users.

Mr. Privara referred to the vagueness of the IS notion and said that there were problems in his country concerning deadlines, benchmarking and concrete action plans, which often led to a waste of money without concrete results.

Mr. Domolki informed that in Hungary it was not possible to kick-start a program without comprehensive estimates for costs and expected results.

Mr. Privara wished to hear the opinion of the other panelists on the state and progress of activities within their respective countries.

Mr. Schlamberger said that there were high expectations and occasionally frustrations regarding the pace of developments but he was convinced that Slovenia was in a better position than what was actually perceived. **Mr. Telesius** said that this statement would also refer to Lithuania. **Mr. Eszes** opined that there were many areas in which the output was not up to the level of actual expectations but when one draws the line, the final balance was not that bad.

Mr. Privara concluded that official proclamations on the IS in Slovakia sometimes appear groundless, however, as was the case of the other 3 countries, the situation was better than what appeared at first glance.

6.2 Panel on R & D Policies

Panelists:	Julius Stuller	CZ	(Facilitator)
	Cedomir Milenkovic	SCG	
	Peter Hanak	HU	
	Branislav Rovan	SK	

Mr. Stuller introduced the panelists and invited them to address the following questions:

1. *If you were the Prime Minister of your country, which important tasks related to research and development would you undertake within the existing budget allocations?*
2. *What would you advise and how would you influence bright students to stay in the national R & D environment rather than to migrate to other sectors of the national economy or abroad for higher pay?*

Mr. Rovan was of the opinion that some PR activities to promote R & D would be essential. For many years, the official propaganda was such that the workers were portrayed as the real creators of societal progress while the intelligentsia was characterized as a necessary evil. The researchers and scientists themselves are probably also to blame, as they could have done much more within the educational and research environment to countercheck this speculation and to popularize research. Even today, this heritage persists and it would be very important to convince people of the necessity to invest more in research and development.

Obviously, it is important to allocate more funds for research. In the case of Slovakia, the research funding is so low that redistribution would be quite difficult. With Slovakia's entry in the EU the country inherits a complicated decision making process, which does not take into account the specifics of the new member states. Mr. Rovan opined that the Lisbon goals are not really achievable in the part related to R & D strategies.

Mr. Rovan hoped to see more importance attached to basic research in the ICT field and would support activities in that direction. Currently, there are few specialists involved in basic research and it would be necessary to develop a stronger core of specialists by allocating further funding and carrying out better PR.

With respect to the second question, he felt it is not really necessary to persuade bright students to stay in research. The problem is that the funding for research is scarce and at present, the best students go to the USA and Germany but some remain in the country.

Mr. Hanak mentioned that there was a change of government in Hungary. The previous government considered R & D as a priority and according to the new Prime Minister, who is from the same party, priority will remain. There is an incentive for the private sector to be involved in R & D activities and therefore it could be envisaged that the overall funding would not deteriorate.

His response to Question 1 is to establish a fund for research and development, which would not be dependent on the yearly budget. This would allow an accumulation of funds to support long-term project activities.

The legal base for research needs to be developed. There is a need for new R & D and innovation regulations to set the environment for proper research.

There is also an obvious necessity for more PR activities in order to explain the importance of research.

With respect to R & D financing, the issue is more complex since R & D should not be considered as a stand-alone activity but has to be closely related to the economy and the educational system of the country. These interrelations have to be developed in Hungary.

For Hungary, it is important to identify key areas, which are important for the country's socioeconomic development. There is no special emphasis at present and this has to alter as it leads to a waste of money with no practical effect.

While there is a system of universities and the Hungarian Academy of Sciences, the previously existing Hungarian companies with their own R & D ICT units are no longer in existence. Currently, there are no R & D units in this sector of the economy. The institutional structure of R & D activities has to be rebuilt since the country cannot rely solely on the transnational companies that have opened branches in Hungary.

With respect to question 2, Mr. Hanak agreed with the previous speaker that the best students naturally wish to stay with their universities so as to be engaged in research. The bad news in the case of Hungary is that only 20% of the Ph.D. students can count on state scholarships. The rest is dependent on some form of employment or on their parents. The salaries of researchers are low and the ratio between researchers and support staff is also disproportionately low.

Mr. Milenkovic stressed that in Serbia and Montenegro there are much more serious matters than the issues related to R & D.

The Ministry for Scientific and Technological Development organizes public tenders for R & D projects, which are selected for funding by a commission on the basis of a set of priorities. Additionally, there are some contributions from industry. Some funding comes from the European Agency for Development.

There is a huge emigration of R & D specialists and students. Given the current situation, it is very difficult to advise young people to stay. The country's priorities are such that the government must first sort out the problems of the national economy and only then it would be able to see what could be done for R & D.

Mr. Stuller stressed that research needs to be regarded as a qualitative rather than quantitative activity. It is important to have talented people, to simplify the laws, to make the existing regulations more transparent and to ensure better financing.

If he were Prime Minister, he would aim to reduce the military expenditure by 10% and dedicate this to research.

As to young researchers, the situation in the Czech republic is such that the most talented students try to emigrate. There is nothing unusual about this and the conditions for research in the Czech Republic need to improve so that in future some of the Czech scientists who have left the country would become interested to return.

Mrs. Stepankova agreed with the panelists and opined that public awareness is very important. The interest in the technical studies and disciplines was declining. She felt that a good idea to raise awareness is to develop interactive Science museums.

Mr. Eszes reminded that there is such a museum in Budapest known as the Palace of Miracles but that is not enough. He felt that basic research and applied research need to be considered differently and opined that it is important to target research towards well-defined objectives and final products.

Mr. Stuller said that it would be hard to draw the line between basic and applied research and he was of the opinion that the quality of research should be the primary consideration.

Mr. Rovan felt that a balance is needed and that irrespective of whether it is upstream or downstream research it should relate to societal development.

Mr. Stepanek observed that from a purely legal point of view one could conclude that the results of basic research could not be patented while these from applied research can. **Several of the participants** advised that patenting is not necessarily indicative for the type of research.

Mr. Privara wished to draw attention to the management of scientific projects – an activity that has to be promoted in order to achieve better research results. He felt that professional

project management staff is needed in Eastern Europe. **Mrs. Stankovic** agreed that it would be important to train professionals for project management, including monitoring and overseeing review processes. **Mrs. Kotsis** observed that persons from the university environment teach project management without having the experience of running projects.

Mr. Stuller emphasized that for small countries it is always difficult to organize a genuine review process.

Mr. Marinkovic stressed that there should be some control factors to guarantee the quality of research but currently there was no comprehensive system in existence. He compared the system of research to existing political systems and felt that there should be inherent self-activating control factors as in the case of good political systems.
Mr. Eszes was of a different opinion with regard to the link between the political systems and research. In his mind the most talented scientists are also excellent project managers and it is really a matter of organizing good projects. Scientists should learn how to manage projects since they apply for funds and they have to convince the funding authorities of their plans and ideas.

7. COUNTRY REPORTS

COUNTRY REPORT- SLOVENIA

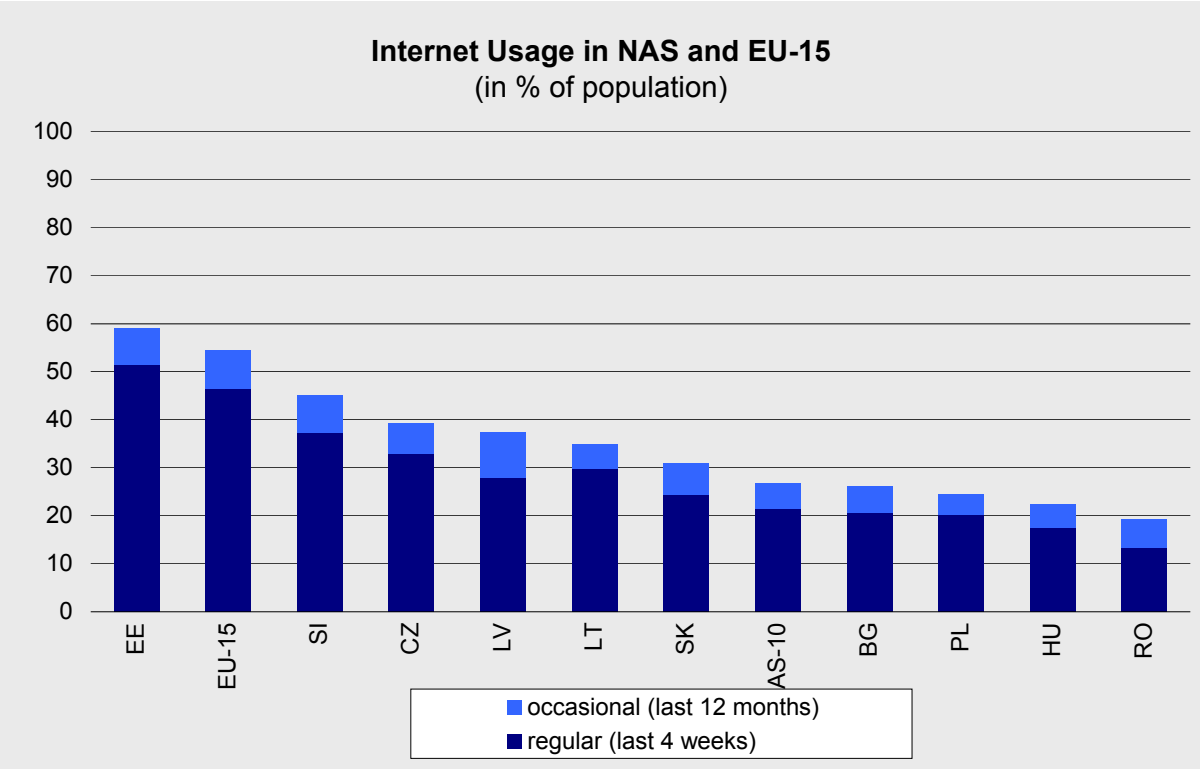
1. Background information

In the 70-ies and 80-ies Slovenia was among the first countries in South Eastern Europe to take important steps in the development of information technologies and expansion of educational programs. Educational institutions began providing computing programs and equipping the first computer classrooms. These foundations were further developed following the Slovenian independence in 1991. In the 90-ies, the use of computers continued to expanded.

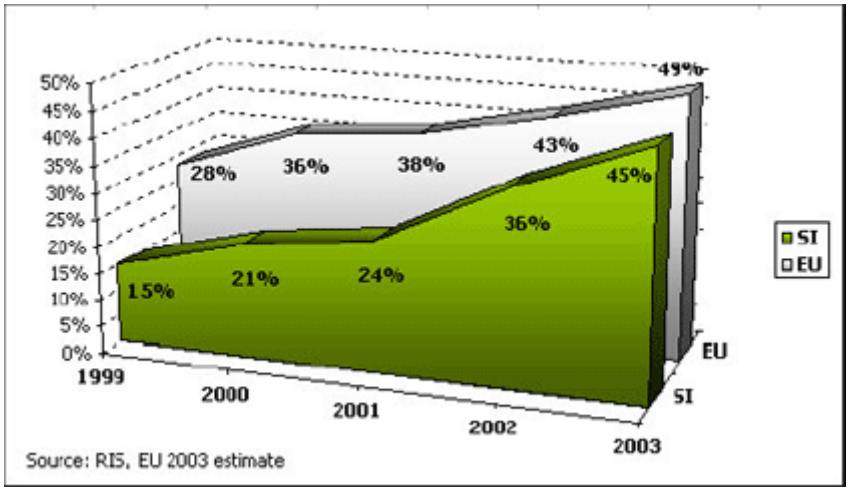
The findings from the 2003 Final eEurope+ Progress Report, SIBIS Slovenian Country report (2003), Research on Internet 2003 (RIS) and the Statistical Office indicate a relatively high level of Internet and online technology use in Slovenia. Slovenia has an Internet penetration rate close to the EU-15.

In different surveys different methodologies and definitions are used. The number of the Internet users is a very complex indicator depending on several circumstances. It differs depending on target groups, the methods of surveying, etc:

a) According to SIBIS+ data, around 60% of all Slovenian respondents have a PC at home and 45% of the respondents are connected to the Internet, mainly with an analogue modem (63%), followed by ISDN (21%), cable access (11%) and ADSL (4%).



b) The next graph shows the growth of net users in Slovenia, in comparison with the EU, during the period 1999-2003. For the EU survey (1999-2002) we used Flash Eurobarometer data. On the other hand, the 2003 extrapolation was made on the basis of estimates.



c) Recent figures from the survey of the Statistical Office of the Republic of Slovenia on ICT usage among households show that there are serious problems with benchmarks. The research, which is in line with the Eurostat recommendations, was conducted in spring 2004. In the first quarter of 2004 there were 47% households with access to the Internet and 673,453 Internet users who represent 43% of the Slovenian population aged 16 to 74. On the other hand, in the RIS surveys, the age group 10-75 is used. The definition of the RIS project indicates for March/April 2004 around 710,000 monthly Internet users (35,5% of the total population), 600,000 weekly users and 400,000 daily Internet users.

2. Current state of affairs with regard to ICT

2.1. ICT in research and educational institutions

The faculties of the University of Ljubljana, the University of Maribor and the University of Primorska provide programs promoting scientific progress in the area of information science. These programs operate with emphasis on both practical knowledge and modern theoretical starting points.

The Internet is used in 97% of primary, 100% of secondary and 100% of higher education institutions. ARNES, the Academic and Research Network of Slovenia, provides free Internet access to all educational and research institutions. Besides that, nearly all school local area networks (LAN) are connected to the Academic and Research Network of Slovenia. All pupils, students, teachers and researchers in Slovenia have possibilities of free access to the Internet through school or university LANs and ARNES.

On the other hand, the number of PCs in Slovenian schools is lower than in other EU and some candidate countries. The number of PCs per 100 pupils in primary school is 4.8, the number of PCs in secondary education is 5.0 and the number of PCs per 100 students is 4.0. Slovenia is approaching the European target of 5-15 PCs per 100 pupils (eEurope 2003+). As for research, it is worth pointing out that Slovenia is actively engaged in the Information Society Technologies Program (IST).

2.1.1. RIS

Research of Internet in Slovenia (RIS) is a project within the Centre for Methodology and Informatics at the Faculty of Social Sciences, University of Ljubljana. RIS is systematically studying all aspects of the information society in Slovenia from early 1996. Since now over 60 substantial reports on information and communication technologies (ICT) and information society related topics have been written.

The results of RIS work are continuously disseminated through the RIS web-site (www.ris.org), while the microdata are archived in the central Social Science Data Archives in Slovenia (http://www.adp.fdv.uni-lj.si/). Another direction of research deals with the role of ICT as a research tool (i.e. WebSM).

RIS is positioned as a key national information point for research issues on the information society and also as a Slovenian partner in various international research activities.

2.1.2. Statistical Office of the Republic of Slovenia
The Statistical Office of the Republic of Slovenia (SORS) is the main producer of national statistics and the cohesive force in this field. In addition to linking and harmonizing the statistical system, its most important tasks are international co-operation, determination of methodological and classification standards, anticipation of users' needs, collection, processing and dissemination of data and taking care of their confidentiality.

2.1.3. The Ministry of Education, Science and Sport
The Ministry is responsible for the implementation of the education policy. Since 1994, the Ministry has been supporting program RO (Computer Literacy program: Computer and Information Literacy in Slovenian schools) that provided Internet access to all primary and secondary schools and also educates teachers and pupils on ICT.

2.2. ICT and Industry
Slovenia inherited a relatively well-developed electronic and electrical engineering industry from the past, providing a good basis for the further development of ICT industry in the 1990s. In the 1995-2001 period, ICT industry (manufacturing and services) recorded dynamic growth, like many developed countries. In 2001, the ICT sector accounted for 5% of employment, 7.5% of value added, 5.8% of turnover and 5.4% of exports of the total Slovenian non-financial corporate sector. Compared to 1995, the importance of ICT sector increased significantly: in 1995 the respective shares in total employment and total value added amounted to 3.4% and 5.3%. Growth was substantial in absolute terms as well: in the 1995-2001 period the number of companies increased from 993 to 1654 and the total number of employees grew from 16 591 to 23 532. (IMAD, 2004:46).

2.2.1. Actors in ICT services
According to the IMAD report (2004:54) the most important actors in ICT services are telecommunications and software consultancy and supply services. With 19% of all ICT sector employees in 2001, telecommunication companies created 40% of the ICT sector's value added and thus recorded the highest productivity in the ICT sector with EUR 69,400 value added per employee.

The biggest player in the telecommunications services market is the fixed telephony operator Telekom of Slovenia, a majority state-owned company (62.5%). Apart from commanding the fixed telephony market, Telekom Slovenije is the owner of the largest mobile telephony operator Mobitel and of the dominant Internet services provider Siol.

Software consultancy and supply is the second most important sector within ICT services and one of the most dynamic sectors of the Slovenian economy. The number of software development companies tripled in the 1995-2001 period while the number of employees increased fivefold. In 2001, the software development industry employees were 12.9% of all ICT sector employees and accounted for 13.5% of the ICT sector's value added. The sector is dominated by a large number of small companies operating mostly on the Slovenian market and developing specific software applications. The main suppliers of software in Slovenia are faced with the lack of ICT experts with managerial experience and knowledge.

According to the IMAD report (2004:55) this requires additional training and investment in human resources by the companies themselves in order to compensate for the deficiencies of the education system.

A closer examination of the Slovenian software production reveals that many innovative applications and solutions (e.g. e-banking, interactive content management, network solutions) are being developed.

2.3. ICT and e-government

The Slovenian public administration is quite well equipped with ICT (PCs, Internet access). At the beginning of 2003, 94% of the workplaces in public administration had Internet access. However, the ICT infrastructure for the supply of e-services by the public administration is only a precondition that should be supplemented by solutions and services for citizens and for the public administration itself.

2.3.1. The Ministry of Information Society

The Ministry of Information Society holds the political responsibility for the development of information technologies and the promotion of the information society. The Ministry of Information Society, which was established in 2001, actively participates and monitors all the main activities at the EU level and assures consistency of national initiatives and projects with the broader directions of the EU. However, at an operational level, the Government Centre for IT (GCI) is the body in charge of developing the country's e-government infrastructure and supports, controls and coordinates the ICT projects of the government's departments.

The government activities within the information society framework in Slovenia are described in some main strategic documents:

- Strategy of the Republic of Slovenia in Information Society (2003)
- Strategy of Electronic Commerce in the Local Communities (2003)
- E-government action plan (2003)
- Strategy for E-Commerce in Public Administration for the Period 2001 – 2004 (2001)

The legal framework for the development of e-government in Slovenia comprises:

- Act on the Access to the Information of the Public Character (2003)
- Electronic Commerce and Electronic Signature Act (2000)
- Electronic Communications Act (2003)
- Act on Conditional Access to Protected Electronic Services (2004)
- Act on Postal Services (2002)
- Telecommunication Act (2001).

The key document Strategy: Republic of Slovenia in the Information Society (13. 02. 2003) was prepared by the Ministry of Information Society in cooperation with other ministries and state agencies. The following major target areas have been determined in order to execute the above strategy:

- Usage of ICT in schools and educational institutions for both teachers and students. Introduction of uniform and up-to-date educational content connected with the development of the information society at all levels of education.
- Innovative recognition and formation of new market potential, incorporating research and development initiatives. Improving cooperation on ICT between educational research institutions and the economy.
- Creating an environment for knowledge intense economic activities (ICT industry).
- Creating digital cultural content and preservation of cultural heritage and language.
- Widespread deployment of electronic services in the public sector and enabling electronic transactions between public sector, citizens and businesses.

- Improving access to the services of IS for all citizens and the development of new work environments, and
- Reducing the digital divide by including all citizens, especially minorities, the socially disadvantaged and groups with special needs (blind, deaf).

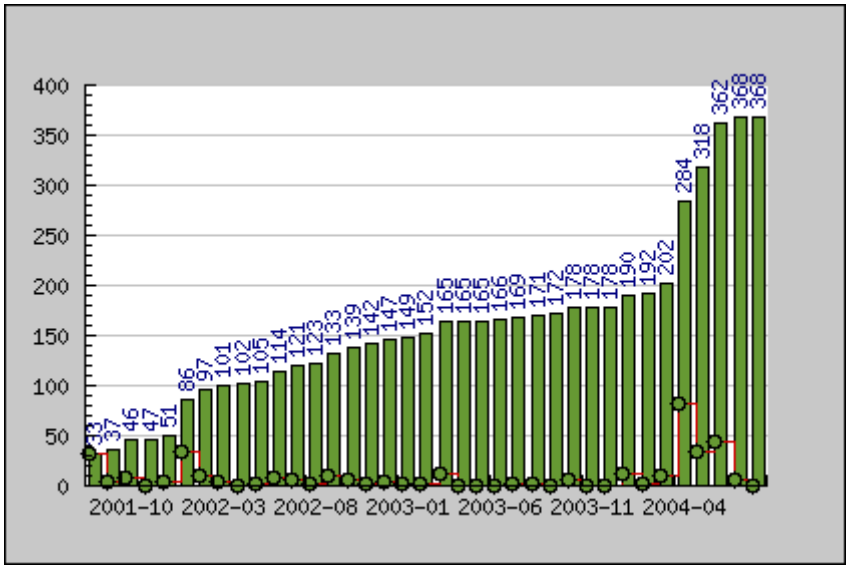
2.3.2. Governmental projects aiming at bridging of the digital divide

A considerable digital gap is evident in Slovenia, however, it is similar to that of other developed countries. The strongest influence on it has education, followed by age and income (from National Report on Digital Divide 2002). The gap has been stagnating during the last three years.

The Ministry of Information Society in cooperation with other ministries (Ministry of Labor, Family and Social Affairs, Ministry of Education, Science and Sport and Ministry of Culture) and state bodies launched several projects dealing with the bridging of the digital divide. The basic objectives of the following projects are to ensure equal opportunities to the public and free Internet access:

- **E-library projects:** the Ministry of Information Society in co-operation with the Ministry of Culture, launched a network of multimedia centers and e-library projects.
- **Cyber Cafe network:** the Ministry of Information Society has established projects enabling citizens to use the Internet in public spaces, e.g., a Cyber Café network.
- **E-schools**: The basic goal of the project is to ensure equal opportunities to the public and free Internet access. The Ministry of Information Society has encouraged the development and supply of free content in the area of computer literacy for various age groups. Workshops are organized to inform the public in the area of information - communication technologies, to educate people to use computers independently and to inform them on how to use new technologies efficiently. In this way, older people, particularly, overcome their fear of computers and gain new skills and knowledge.
- **Info-terminals:** An info-terminal is a Public Internet Access Point with payable or free 24/7 access set up in the form of a freestanding terminal. The formal basis for setting up these points is laid down in the Strategy of the electronic commerce in public administration (SEP 2001 - 2004). The intention to support internet, telecommunication and electronic service providers in setting up Public Internet Access Points is clearly stated and so is the provision of easier access to citizens interacting with the government via such points.
- **Multimedia Centers (MMCs)** are non-governmental organizations (associations, institutions and other NGOs), exceptionally public institutions, established as youth cultural centers, registered to perform cultural and art activities.
- **Public Internet Access Points:** The number of Public Internet Access Points in Slovenia grew from around 40 in 2001 to over 335 in mid-2004 (http://e-tocke.gov.si). An annual increase of at least 20% of new PIAPs per year is planned over the next few years.
- In October 2003 the Government passed a special act to formalize its positive attitude towards open source software. The Policy of the Government of RS for the development, introduction and use of open-source software and solutions recognizes the importance of open source: especially with regards to data exchangeability, economic independence, code adaptability and re-use, as well as permanence of ownership.
- A new **e-government portal**, launched in March 2004, provides access to a range of e-services and government information for citizens, businesses and civil servants.

Number of all registered e-points by months (Source:MID)



3. Recommendations on future development in Slovenia

Advantages: According to the results from 2003 Final eEurope+ Progress Report, SIBIS Slovenian Country report and Research on Internet 2003 (RIS) Slovenia is still one of the most developed acceding countries (together with Malta and Cyprus). However, it is also true that the Slovenian advantage in comparison with the other acceding countries, especially Estonia, Czech, Hungary and Poland, is slowly disappearing. The percentage of experienced Internet users (using the Internet more than 2 years) is still above EU average. Slovenia is also among the leading European countries with respect to mobile phone penetration, as 76% of the population use mobile phones (EU-15: 69%). The SIBIS+ data confirm that in Slovenia there are surprisingly no explicit barriers for the Internet usage. The costs of the Internet usage are among the lowest of all EU countries.

Additionally, a very high interest for ICT usage is evident in Slovenia. Whenever there was a question concerning the interest for ICT usage, Slovenia stood among the first of the 25 EU countries and this is particularly true for the interest in governmental on-line services.

Future opportunities, threats: The low share of the population with a tertiary education and the low availability of e-content in Slovenian language are main obstacles for the higher Internet usage.

A specific problem in Slovenia is the very strong digital divide due to education and age. The non-educated segments of the population also show a particularly low interest in PC and Internet usage. In this respect, it has to be noted that the Slovenian Society INFORMATIKA[1] has introduced the European Computer Driving License (ECDL) in Slovenia as early as 2001, but the government so far has not seen it[2] as a European computer user skills standard. The ministries of education, labor and the interior have practically ignored their role in this respect. Much less has been done so far for ECDL in Slovenia, as compared to neighboring countries (Italy, Austria, Hungary and even Croatia, where ECDL enjoys strong support from the part of the respective governments). Nevertheless, over 3,000 participants

[1] National computer society, established in 1976, publishes a professional quarterly “Uporabna informatika” (in Slovenian) and a scientific quarterly “Informatica” (in English).
[2] With a notable exception of the Ministry of Information Society.

have been included in the ECDL certification program in Slovenia so far, mostly on the basis that individuals see it as a means of personal development and as an improved possibility for keeping their existing employment, or for finding a better paid job.

The business sector is well equipped with ICT, however ICT capacities and applications are poorly exploited. The lack of interdisciplinary knowledge and skills is evident.

It is also true that the problems with ICT developments arise from past absence of a more proactive governmental policy, so the unique opportunity to keep the country among the top ICT adopters was perhaps missed. Namely, at the end of the 90-ies, the ICT applications were rarely among the top governmental priorities. This could be observed through the disintegrated governmental Web presence, limited offer of G2C services, insufficient support for ICT in schools and the absence of stimulating measures (less restricted domain registration, tax support for household PC purchase). The delays in de-monopolization and telecommunication regulations may also contribute to this gap.

However, actions of the *Ministry of Information Society* brought an important impetus for ICT developments. The state should further stimulate the development of the user-friendly e-government services. The idea to encourage the availability of online services that meet the needs and preferences of end-users should be promoted in future.

The education gap needs to be narrowed by a systematic policy approach towards increasing the share of population with tertiary education, dismantling the problem of functional illiteracy and low level of engagement in lifelong learning.

This all offers the possibilities to improve the Slovenian position once again. Of course, the future developments basically depend on the priority level given to ICT by the Slovenian government and particularly the Parliament.

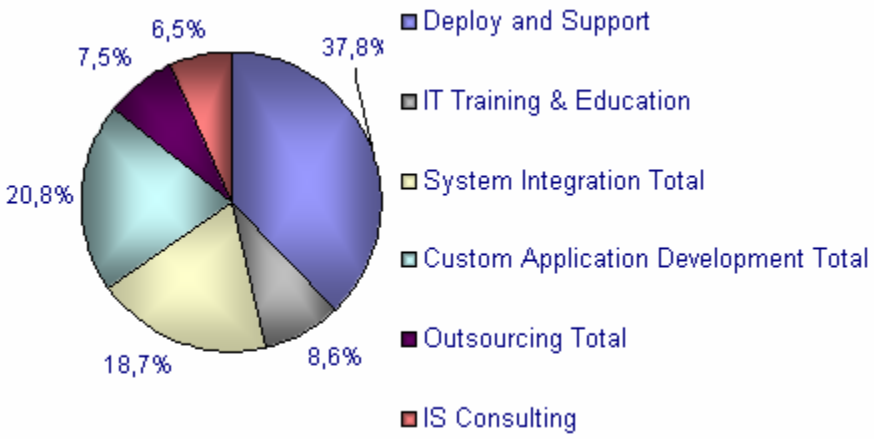
4. IT Services Executive Summary for Slovenia

IDC research on the Slovenia IT services market for year 2002 and the forecast for 2002 - 2007 shows that the value of the total IT services Market in Slovenia for 2002 was 91.06 Million US $ with a growth of 10.5 % (year on year). The population of Slovenia in 2003 was 1.94 Mio, IT spending was 413,07 Mio US $ which means 213.40 US $ per Capita.

4.1. Total IT Services Market Split by Engagement Type, 2002

Technology	Value ($ M)	Value Share
Deploy and Support	34,44	37,8%
IT Training & Education	7,87	8,6%
System Integration Total	17,04	18,7%
Custom Application Development Total	18,93	20,8%
Outsourcing Total	6,83	7,5%
IS Consulting	5,96	6,5%
Total:	91,06	100,0%

Source: IDC, 2003



Source: IDC, 2003

Top 3 Sectors According to IT Services Spending in Slovenia, 2002

Vendor	Value Share
Combined Finance	27,5%
Combined Manufacturing	23,5%
Combined Government	15,5%
Top 3	66,5%
Rest of the Market	33,5%
Total Market	100,0%

Source: IDC, 2003

4.2. IDC findings

Despite being relatively mature by Central and Eastern European standards, the Slovenian IT services market remains quite hardware and software-centric. IDS expect the IT services market in Slovenia to exhibit a compound annual growth rate (CAGR) of 10.0% over the five-year forecast period. Total market value should reach US $146.81 million by 2007.

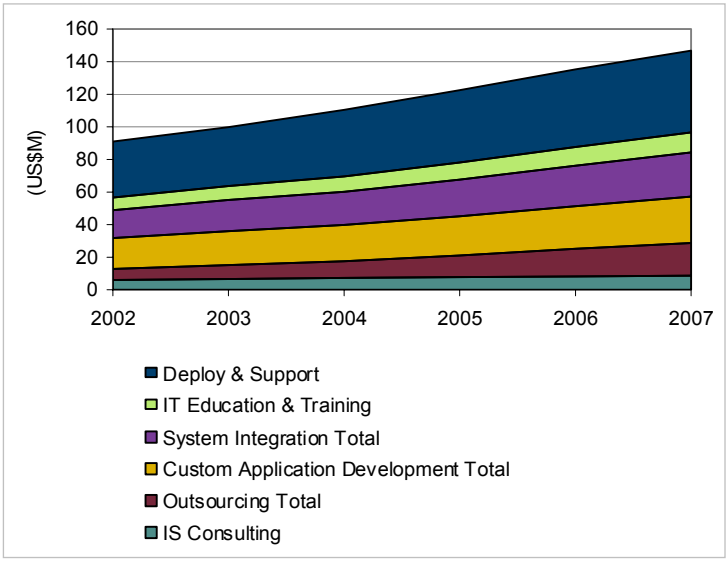
The following drivers will boost IT services spending in the coming years:

1) Growth in the increasingly technology-dependent economy.
2) Foreign direct investment.
3) The impact of EU accession on public and private sectors.
4) Privatization efforts in key industries

The hardware support and installation services foundation market was the largest in Slovenia in 2002. These services recorded higher than projected year-on-year growth of 15.9% to total US $18.34 million. Software support and installation services were the second largest foundation market, accounting for 17.7% of IT services expenditure in the country last year. Representing the third-largest category with 14.4% share of the IT services market was system integration. Demand for customization services was strong in 2002: the custom application development category totaled $10.5 million for an 11.0% share, while application consulting and customization captured 9.8% (US $ 8.88 million) of the IT services market.

With a share of 27.5% the combined finance sector (banking, insurance and financial services) was the largest vertical market in terms of IT services spending in Slovenia. The finance sector firms spent US $25.03 million on services during 2002. Of the three, banking was the largest segment with services expenditure of US $14.79 million (although this represented a 4.8% decline in spending year-on-year). The combined manufacturing sector (process and discrete manufacturing) was the second-largest sector with US $21.38 million in services expenditure, or a 23.5% share. The third-largest sector was the government, with a 15.5% share based on IT services spending of US $14.09 million in 2002.

4.3. Forecast and analysis of IT services spending (US$M) by IDC engagement type in Slovenia, 2002 - 2007



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COUNTRY REPORT - SERBIA AND MONTENEGRO

Following the introduction of the Internet in Yugoslavia in the mid-1996-ies, the number of connected users grew at an average annual rate of 150%, reaching over 650,000 (approximately 9% of the population) at the end of 2002.

The existing obstacle to the growth of ISPs and the upgrade of the network bandwidth is related principally to the monopoly of Telecom Serbia as well as of the Montenegro Telecom. These are the only two Telecom operators.

The infrastructure developed by the Internet Service Providers is presenting an additional problem. Currently, only the major ISPs have established the mutual ISP-to-ISP connections (peering) -- traffic exchange points at the domestic level. Therefore, the traffic between almost any two domestic ISPs usually travels through the international nodes.

Network Access (Connectivity)

The main issue is the monopoly and the non-existence of a free market.

On the average, landline phone users need to try 3-10 times to establish a connection, while mobile phone users need less than 3 trials to connect, except in the rush hour. This is fluctuating depending on the region and the capacity of the local telephone switchboard.

Landline operators are connected regionally with optical backbone between most urban zones with fiber optic infrastructure: the central node is in capital Belgrade and other nodes are in Novi Sad (in the north), Nis (in the south-east), Kragujevac (in central Serbia) and Podgorica-Montenegro (in the south).

The only attempt to produce a systematized and documented approach and strategy papers for the development of the sector was made by a group of local enthusiasts-experts (the private sector is interested but does not have the expertise) and the newly formed Information Technology and Internet Development Agency (ITIDA).

Information Infrastructure
The larger part of the population has good access to telephone services. Telephone penetration is 32.92 mainlines per 100 people. Landline user numbers steadily grow from 1.9 million in 1998 to 2.4 million in 2001. An increase in the number of mobile telephone subscribers is noticeable. Presently, the number of mobile telephony subscribers is over 3,000,000 (prepaid and postpaid) and is growing at an annual rate of 50%. (Source: Federal Statistic Bureau, 2002)

Access to the telecommunications infrastructure is done through:

1) Landline operators -Telecom Serbia A.D. and Telecom Montenegro.
Telecom Serbia
The Serbian company, "Telekom Srbija" a.d., is a joint stock telecommunications company. Since June 1997, 49% of this company is owned by Telecom Italia (29%) and the Greek OTE (20%). Public Enterprise PTT Traffic"Srbija", i.e. the Republic of Serbia, as its founder, retains 51% ownership of the company being also the owner of all cable networks in Yugoslavia.

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

2) Mobile wireless operators - two in Serbia and two in Montenegro

The mobile telephony was introduced in 1996, at first through the NMT systems. The GSM system was introduced in 1996 in Montenegro and in 1997 in Serbia. Mobile telephony is expanding rapidly and the number of users is constantly growing. The market penetration of the mobile telephony in Montenegro (per 100 inhabitants) equaled to 58.6% in 2002. Mobile operators are utilizing the GSM standard at 900 and 1800 MHz.

Internet Availability
There are 8 major ISPs and more than 40 local ISP sub-providers in Serbia and Montenegro. Many ISPs offer to the end users the option to choose between the “full” access to all content on the Internet worldwide or the “light access” to domestic content only. As such, the "light access” costs only 50% of the "full” due to the fact that the international traffic costs ISPs significantly more.

All major ISPs provide leased lines to businesses. Higher bandwidth solutions such as DSL or cable modem access are just starting to be developed and are offered by a handful of ISPs. There are no free ISP services. Some ISPs offer free hosting for private and public web sites and presentations.

The number of new dial-up connections is increasing literally on a daily basis and the rising demand for connectivity cannot be satisfied. Subscribers have some options between various Internet service packages. Also, there are more and more Internet Café establishments for people without access at home, school or work.

An average business in Serbia and Montenegro numbers 10-20 employees; in average, such companies utilize 256 K -512 K bandwidth through leased line connections. There are some 40,000 such companies in Serbia and Montenegro with approximately 100,000 business users. Unfortunately, there is no option available for businesses to have 1 MB or higher connections.

The complete international Internet connectivity for Serbia and Montenegro is as follows:
- 5 x 34 Mb (total 170 Mb) through Telecom Serbia
- 4 Mb through Telecom Montenegro with connectivity through Slovenia
-14 Mb satellite connection.

Internet Affordability
Adding up the numbers of dial-up connection users at home, and those in cafes, at work and schools, we come to 20,000 people on-line at any time during the day, which accounts for 0.3% of the population. Considering that only urban areas have access to the Internet, nearly 0.8% of the urban population in Serbia and Montenegro is on-line at any given time during the day. This number drastically diminishes at night.

Our opinion: Internet access is priced within the rich part of the population. It is calculated by the hour for dial-up connections, and is doubled for ISDN access and leased lines. Two major ISPs offer flat rate pricing.

Network Speed and Quality
Users have access to dial-up modem transfer speeds of up to 32.2 kbps. Leased lines are available for business users and their transfer speed is up to 64.4 kbps. It is normally possible for users to establish a dial-up connection out of 5-10 tries. Several major ISPs have a standard of establishing the connection with less than 3 tries, except during peak hours.

Dropped connections are frequent especially in non-urban communities. The quality of voice connection is acceptable but in the peak hours there are many echoing, double connections, and intermingling lines.

The problem is also associated with the network speed and quality, due to fusion of digital data and prevailing analog telecommunication switchboards - collisions arise when interconnecting. 60-70% of the domestic calls are successful.

Hardware and Software

Most of the hardware products are imported, however, there is a strong potential for the development of the local ICT industry, especially for software development.

Standard hardware and software is affordable within the rich majority of citizens in urban areas. A small minority of citizens, small and mid-sized businesses, can afford the latest technology. The cost of a home PC is roughly 4 average monthly salaries (approx. US $ 600). Despite this fact, the growth of the PC market shows to be significant within the past 3 years. In 2000, the Hardware market value in Yugoslavia was US $ 80 million. It reached $ 120 million in 2001. There are many hardware/software companies and sales points in urban areas.

Most of the communications equipment and 6% of computer equipment are brand names with legal software. Some software in the local language is available (but usually it is in English) and a variety of hardware and software solutions is available and affordable to most small and medium-sized businesses, as well as to many individuals.

The most significant boost to the hardware market growth was the introduction of a new regulation in 2002, which gave hardware/software products free sales tax status (in turn making all hardware/software products 20% cheaper for private sector/home users). The recent introduction of small and medium size business loans, as well as consumer loans, has further boosted hardware/software sales.

Service and Support

Due to the lack of free capacities, it takes at least six months for the installation of landlines. Communication problems are usually resolved within 48 hours. There is no competition and, therefore, the landline operator (Telecom Serbia), does not dedicate serious attention to technical support or customer services.

On the other hand, ISP's and mobile operators provide better 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 center but are freely set in regard to what goes on the market.

Software developers, web designers and network administrators are predominantly located in urban communities and their number is growing. There is a growing number of customer services among the service and support providers, although it is not a priority for most of the businesses. Some ICT maintenance and technical support services are usually available.

There are currently around 5,000 certified software programmers in Serbia and Montenegro. One of the most significant issues is the brain drain, mainly due to economic reasons. There is no program at the moment to reduce this phenomenon and there are no programs to support the return of such immigrants.

Networked Learning

Schools' Access to ICTs

Primary schools and high schools:
Serbia and Montenegro have 1,620 primary schools. Belgrade has 16 municipalities with 163 primary and 73 high schools.

In primary and high schools, there are either no computers, or less than five. Access is limited to some teachers/administrators. Computers tend to be older generation models, such as stand alone 486 PCs or the equivalent. Wherever several computers are installed they are not networked. Their use is limited to electronic documents that are available on hard drives or diskettes. There may be connectivity that is usually used for email communication only. Network learning programs (e-learning, distance learning) are not developed at all.

University level:
The University of Belgrade consists of 30 faculties with the number of undergraduate students ranging from 65,000 to 70,000 and with 20,000 postgraduate students.

The Belgrade Academic Network [http://servlet.rcub.bg.ac.yu/] is the heart of the Yugoslav Academic Network. The entire university network is connected through the Belgrade University Computing Center with 2 MBPS - connected to the Internet via local commercial providers at a speed of only 512 K. There is a 100 MB optical backbone in the city between the two central nodes of the Belgrade Academic Network with 63 Academic institutions connected to this network. Telecom Serbia allocated 60 landlines to the University for accessing the Network through dial-up.

Enhancing Education with ICTs
Primary schools and high schools:

Only a small number of teachers use computers in a very limited fashion. Most of those are theoretical applications using non-graphic operating system (such as DOS and UNIX), and theoretical education using programming languages (such as Basic, Pascal, Fortran and Cobol).

Our opinion: Teachers do not have appropriate access to information available on-line. Students do not use Internet or advanced software, and teachers are not trained appropriately to incorporate computers into the teaching methodologies.

University level:
University education in ICT grows steadily and students are trained to use enhanced information and communication technology to improve their learning experiences. Universities have been producing highly trained professionals in this area. During the last 10 years, approximately 250,000 graduated students emigrated to developed countries, which means that educational improvements and wider use of the computer networks would enable professionals to work worldwide. Major development opportunities can be found in the software development domain.

Distance learning:
Although the number of Internet users in Serbia and Montenegro has increased within the last several years, we have to notice that there is a major lack of domestic web-sites, especially with Serbian content.

The insufficient education of the academic and the general population on the benefits of the Internet is widening the digital divide, also due to the language barrier and an insufficient amount of local content.

The use of ICT in university education is gradually increasing. Science, engineering, IT and other courses are supported by information gathered from the Internet.

Due to a poor connectivity within the country and slow connections, the world concept of distance learning is still not possible to implement. Distance-learning programs are not stimulated by the authorities (some research on the subject is performed by Ph.D. students at the University of Belgrade, especially at the Faculty of Organizational Sciences).

Developing the ICT Workforce

Universities provide first-class opportunities for developing the ICT workforce but at the primary and secondary school levels ICT training is very limited. Classes and programs in ICT-related subjects are available at private computer schools. However, these are usually beginner courses covering the utilization of Windows, MS Office and/or basic web-design. Online training is not available in Serbia and Montenegro.

Some employers are investing in the ICT education of their employees. Such education is being acquired through private schools, including some of the universities (such as the Faculty of Organizational Sciences). It is important to mention that only large companies or government institutions provide such investment in human resources.

The only examples of development of the ICT workforce are private businesses and the Information Technology and Internet Development Agency of the Government of Serbia. 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 home. They are usually young /students, although they sometimes have another profession. The number of companies hiring full-time network administrators is increasing.

Networked Society

People and Organizations Online

At least 51.8% of the urban population is aware of the existence of the Internet. More than 600,000 people use the Internet regularly. We can determine that the largest group of users is within 25 years of age with higher educational background. Men are more predominant Internet users and account for 60%, whereas women account for 40% of users in Serbia and Montenegro.

Internet is mostly used in cities, which is a consequence of the poor connectivity in rural areas. The largest number of Internet users is in the capital city of Belgrade.

At present, there are 15,357 national domains (.yu) registered.

Locally Relevant Content

There are more than 10,000 web-sites that are covering the local topics and most of them are hosted and created within the community, usually by young people. Many web-sites provide content in Serbian and about one third of them also provide English content.

ICTs in Everyday Life

Faxes and telephones are commonly used to facilitate orders or for remote client support, although some paper-based transaction (e.g. signature and official seals) are required. In non-urban communities the income level and/or network infrastructure cannot support the high level of individual access, and there is a small number of cyber-cafes and community info-centers. Telephones, mobile telephones, digital pagers and PCs are used regularly for social and commercial interaction, and professional or educational activities.

Computers are widely used especially in urban areas. Considering the fact that over two million Serbs are living worldwide, many people buy computers in order to communicate with their relatives abroad.

Since 1997, mobile telephones have become a communication, social and business standard and they are very widely used.

Some members of the community have Internet access at home. A growing numbers of community members use tele-centers, cyber-cafes and other businesses that offer computer use and online services to the public for a fee. The use of a computer in these locations for one hour costs approximately US $ 1.

Only recently, with the support of local NGOs and international donors several rural locations obtained computer classrooms where the use of computers and Internet is free of charge. However, no free education is provided. This number is very small at the moment and much more needs to be invested for free Internet access points and education, especially within the rural areas.

ICT in the Workplace

ICT is not effectively incorporated within the internal process of companies. Business is still mostly conducted via telephone, faxes and in person. Some business activities are completed via e-mail (specification, ordering etc). Many computers are internally networked for data processing, reporting, and or/and enterprise applications. Some of the employees use email for communication but this is not a standard.

The mostly used software applications are Microsoft Office, especially World and Excel. The issue with these applications is that they are not localized in Serbian, thus end users are utilizing only a handful of options.

According to a recent poll by the Serbian Informatics Society, over 90% of the companies utilize e-mail. Approximately 70% of the companies have their own web-sites (basic content with the general company information and contact). Only 57% of the companies have posted their products and services online. Only a handful are posting the prices of their products and services online. These are only modest activities and cannot be categorized under e-commerce.

Most of the domestic companies handle their on-line financial transactions through international service providers.

During the past 2 years, computer literacy has been a basic requirement for acquiring employment. This is characteristic for all domestic SME's, however, advanced software functions are very rarely used.

Within larger companies, 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 and some employees use e-mail for internal communication.

Most employees have limited access to telephones. Telephones are available -- however dialing of mobile or international numbers is restricted. Most employees do not have e-mail accounts or Internet access from personal workstations. Some companies do provide the Internet on all workstations, but most of them limit the access.
Efficiency gains resulting from the use of ICT systems are widely recognized. A major obstacle for more intensive implementation is the cost of additional equipment and services.

Networked Economy

ICT Employment Opportunities

The number of employees within the field of telecommunications is now approximately 20,000 (estimation) and 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 etc.) jobs will be created for thousands of employees. 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.

Opportunities for highly-educated workers do exist within the country, although the conditions and salaries cannot compete with those abroad. The average salary range for highly skilled workers is $ 350 US - $ 800 US per month. At present, most workers with ICT experience leave the community and search for jobs abroad.

Only a small number of companies have specialized in developing software/hardware solutions. Establishing international cooperation is managing to keep their employees.
Unofficial statistics show that there are about 3,000 ICT professionals working for foreign companies in Serbia mainly in software development for foreign markets (outsourcing business concept). However, these companies are still in the "gray" area as this sector is not being entirely covered by the legislative mainly due to the unregulated tax and investment laws.

In order to stimulate the development of the ICT sector and stimulate employment, the Government of Serbia needs to provide a clear strategy on deregulation of the Telecom monopoly and a strategy on business development of the ICT sector.

E-Government

Only a few governmental web-sites exist, providing basic information, often directed at parties outside of the community. This information is static and infrequently updated. Some limited interaction is possible by telephone or fax. The interaction with citizens is very rare. There are only few electronic services available, such as checking the election polling lists.

Several E-Government projects are being considered by the appropriate structures within the government. The debate focuses on the logic and the choice of a platform.

Networked Policy

Telecommunications Regulation

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 other countries of 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 a powerful leverage to catch up with the developed world and leapfrog into the Information Age.

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.

The adoption of the new Law is a prerequisite for 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 behavior;
- 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 and to provide continued development of existing and prospective telecom operators.

The key innovation in the new legal framework is the introduction of an independent regulatory authority for telecommunications. The adoption of the new law will mark the beginning of the reform and the development of Telecommunications in Serbia.

ICT Trade Policy

There is a significant reduction in the taxes related to the commerce of ICT-related equipment leading to an increase in sales. Credits are gradually increasing for small and medium companies whose purchasing power has thus increased.

The current situation on the Serbian and Montenegrian market in general, and the information technology area in particular, is not very favorable. The low buying power of the population and a large number of businesses in the computer equipment trade are significant and well-known restraining factors. However, considering that complete computer configurations are still being sold, there is a basis for future sales of computer components. There are no restrictions on ICT trade. There is some foreign investment in the IT sector, but there are still no specific incentives for this.

ICT Trade Regulation

ICT is recognized as a specific trade category. New trade regulations (2003) specify the amount of import duties at 5% for PC's (but not for all ICT equipment). Trade and servicing taxes were 20%, today taxes for PCs and Software are off.

This trade liberalization gave a little boost to the private sector. Banks do not have provisions to adapt electronic commerce and to encourage the use of ICT. Licensing requirements increase considerably the price of ICTs.

There is a great interest on the part of international companies to invest in the IT sector, particularly in the infrastructure, ICT equipment commerce 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.

Legal Aspects

The Copyright Law hardly applies in SCG and it is not functional on a national scale. The court and judges are not prepared for the Internet Age and the Copyright Law itself is not designed for this national transition period. In short, "there are more important cases to solve at the moment" ad this is the grave reality.

At this moment Microsoft (and BSA) claim successful legalization campaigns but this is the only example (Microsoft is recognized as and important partner by the government). The Yugoslav law or legislature does not recognize Internet crime or e-commerce transactions. Several law packages are in the pipeline, but they are on hold for the time being until other "hot-spots" in the country settle down. These laws are mainly related to crime on the Internet and are not supposed to regulate the e-commerce aspect when adopted.

As this report was assembled, the Federal Government announced a set of laws that will regulate e-commerce and electronic signatures according to the corresponding European laws.

COUNTRY REPORT – LITHUANIA

by Alfredas Otas, President of the Lithuanian Computer Society,
Eugenijus Telešius, Managing Director, ECDL-Lithuania

Background

In Soviet times, the level of computerization in Lithuania was quite high according to Soviet standards. This technological heritage provided the country with a good infrastructure for current activities. Since the late 1990-ies the Information Society development processes had and have a major influence on everyday life. The European Union's target, set in the Lisbon Strategy of 2000, is to create a competitive knowledge economy in Europe by the year 2010. The document that defines the long-term development targets of Lithuania – the Long-term Development Strategy of the State - was approved by a resolution of the Seimas of the Republic of Lithuania dated November 12, 2002. This document refers to the Knowledge Society as the first of the three long-term priorities of the country, followed by the Safe Society and the Competitive Economy.

The Government of the Republic of Lithuania emphasizes on the importance of this as well – the Government Program for 2002-2004 recognizes the output of information and the Knowledge Society, based on science and innovative technologies, as a strategic objective of Lithuania and a direction in which the economy should evolve.

Lithuania is proceeding with the Information Society development on the basis of the Lithuanian information society development strategic plan dated September 10, 2001 and approved by Governmental Resolution No. 984, the provisions of which are harmonized with the Europe+ initiative. For the purpose of implementing the strategic plan, detailed plans for the development of the Information Society in Lithuania are drawn on an annual basis, establishing key measures, necessary resources, and responsible institutions.

Using computers and the Internet

The extent of using computers and the Internet in Lithuania has been growing at a rather good pace, although the issue of Internet access here is still an urgent one, just as it is in many of the countries that are new members of the European Union.

According to the Department of Statistics of Lithuania, in the second half of 2003, 39% of Lithuania's population within the 15 - 74 age bracket were using computers (37% during the 1st quarter).

It must be noted that in 2003, the rate of Internet development in Lithuania was the highest among the three Baltic States: the number of Internet users in Lithuania increased by approximately 25%, compared to a 20% overall increase in all the Baltic countries. In Estonia and Latvia the growth rate was around 10% (In Estonia, the number of Internet users increased from 43% to 47%, and in Latvia, from 21% to 23%).

Important (and until recently the only) free-of-charge public Internet access points in Lithuania are public libraries. The Year 2003 saw a continuation of the work of creating workplaces complete with Internet access for readers at all public libraries, acquisition of hardware for 184 workplaces with Internet access for readers at the country's public libraries and an expansion of the Lithuanian Academic Library Network, LABN. In 2003, the number of LABN libraries increased to 57.

There are other arrangements being implemented to encourage people to use information technologies. Such arrangements include the work in the area of popularization of open-code software, which includes the tasks of software localization; new Lithuanian products allow people who lack sufficient knowledge of English to use computers easily.

The non-profit organization "Open Source for Lithuania" was established with the main objectives:

- To promote the ideas of free and open source software in Lithuania;
- To assure availability of professional and high quality OS products, services and training;
- To strengthen and support local open source community.

The vision of "Open Source for Lithuania" is:
Confidence in OS software: let users migrate from (illegal) proprietary software to free and open source software;
A lot of OS services and products will be available on the market;
Free software in a few years will gain a significant market share.

The Association INFOBALT unites Lithuanian ITT companies, which in 2002 accounted for approximately 4.5-billion-litas-worth of share of the local market (and employed around 13,000 highly qualified specialists). Last year's exports of ITT and electronics were close to 1 billion Litas. The Objectives of the Association INFOBALT for the immediate future are:

- Professional information and business mediation services to its members;
- Enhancement of influence to decisions adopted by the public administration;
- International reputation and assistance to Lithuanian ITT companies in getting a stronger position on new markets;
- Involvement of the Lithuanian ITT potential in international consortia and programs;
- Assistance of EU structural funds; promotion of R&D projects;
- ITT market monitoring of Lithuania and Baltic countries;
- Coordination of educational public information programs targeted to individual groups of Lithuanian population.

The goal of the Association INFOBALT, uniting all Lithuania-based information technology companies, is to achieve 25% of GDP generated by Lithuanian new technologies by the year 2015 (against 6.5 % in 2001).

"Window to the Future" Initiative

The private business initiative "Window to the Future", which was started in 2002 and was targeted at creating public Internet access points in Lithuania, was a significant step in the field of developing public Internet access. To support this initiative, the Government granted budget funds for its development.

The project "Window to the Future" was launched at the beginning of 2002 by the two biggest telecommunication companies: Lietuvos Telekomas and the mobile operator Omnitel, the two biggest banks: Hansabankas and Vilniaus bankas and the two IT companies: Sonex and Alna. The goal of the project was set to achieve an average Internet penetration of the EU in Lithuania within three years.

Pursuing this goal there were three phases planned in this project:
1) Establishment of public Internet Access points (PIAPs),
2) Training of new Internet users,

3) Developing new relevant e-content.

The PIAP project was very enthusiastically welcomed by local communities and became very popular in all regions. As a result - local governments and communities are ensuring very rapid establishment of PIAPs and supporting their operations. The first usage results have exceeded all expectations: up to 800 unique visitors attend each PIAP every month. People are registering early in the morning; usually, the time is booked several days in advance. Most local governments and communities expressed high interest in the further development of new PIAP's. Today, 175 PIAPs are established all over the country, normally in small settlements. The central government encouraged the project from the very beginning. After 6 months of operations, the Ministry of the Interior joined the project. By 2005 it is planned to open up to 1000 PIAPs using private, state and EU funds.

Therefore, the first and most implicit lesson, which Lithuania has learned, is that in undertaking certain actions, it is possible to make a major breakthrough in advancing the Information Society despite the initial conditions. This gives some optimistic ideas about the wider scale growth.

The second lesson, no less important, is about the conditions, when such a breakthrough becomes possible. There are several of them that are crucial for the success:

- A positive private initiative within a field of interest for society;
- Partners who share the initiative;
- Focused and measurable goals to start the idea working;
- Well-done organizational set-up with respect to the partners' interest;
- Mature environment in terms of expert-government-public awareness, support of different actors in society, NGOs;
- Co-operation with local authorities;
- Co-operation with central Government;
- Informative, but solid, coverage in mass-media;
- Openness to new partners;
- Perspective planning and continuity of the project.

If these conditions are present, the "Snowball effect" will occur where initial private projects act as a catalyst for further initiatives and later turn into a self-developing process.

The third lesson is about Efficiency, namely, when an initiative is raised by the private sector, its execution employs unique skills and competencies developed by private business practices. This helps to increase the efficiency of actions and to achieve broader social change. Motivation of the participants, both the donors and the recipients, has crucial impact on the project success.

The Lithuanian Computer Society initiatives
The Lithuanian Computer Society (LIKS) was established in the early autumn of 1989 and was registered officially on January 29, 1990 with its Headquarters in Vilnius.

Its goals are:

- To stimulate the progress of informatization in Lithuania,
- To promote the ideas of Information Society,
- To take care of the professional skills improvement,
- To stimulate and support professional contacts,
- To raise the professional ethical level,

- To represent interests of the Lithuanian IT specialists both in Lithuania and abroad,
- To promote computer literacy.

LIKS is a professional, non-governmental organization having only individual members, currently about 500. Members are individuals who have graduated from an IT or related faculty, or their occupation is closely related to IT, as well as IT students. LIKS has many teachers of Informatics as members.

LIKS members are often solicited to provide their expert opinion on matters of national importance. LIKS provides expert advice to governmental institutions on legislative and other matters related to IT. LIKS members have participated in various WGs (in the elaboration of documents such as the Long-term Economic Development Strategy of Lithuania until 2015, Strategy for ICT Implementation in the Lithuania Education, the General Computer Literacy Standard, the Computer Literacy Standard for Secondary School Teachers, and other).

LIKS is a member of CEPIS, IFIP, ECDL–Foundation and the IT STAR Association. Thanks to this, LIKS was a co-organizer of the World Information Technologies Forum, WITFOR, which took place on 27-29 August 2003 in Vilnius. WITFOR is an initiative, which is unique and exceptional in terms of its importance. The Forum was organized by the Government of Lithuania and the International Federation for Information Processing (IFIP).

In 2000, the Lithuanian Computer Society started with the ECDL (European Computer Driving License) program implementation in Lithuania. The Lithuanian Computer Society (LIKS) is responsible for all the ECDL activities in Lithuania. ECDL is a key priority for LIKS because IT services can be provided only to people who are computer literate. More than 11,000 Lithuanians are involved in the ECDL Program and there are 72 ECDL Authorized Test Centers. The Computer Literacy Standard for Secondary School Teachers was endorsed by the Lithuanian Government. We hope that the General Computer Literacy Standard will be introduced in Lithuania shortly. The Lithuanian Computer Society has a technological cooperation agreement with ECDL-Russia using the original Internet-based Test Engine. The Russian and Lithuanian language versions of this Test Engine are authorized by the ECDL Foundation. All the ECDL Test Centers in Russia (30 TCs) are also using this Test Engine. Starting this year the Lithuanian Computer Society has authorized one pilot Test Center in Belarus. The Internet-based Test Engine functioning is mission critical when speaking about Russia and Belarus. Today, the Lithuanian Test Engine is working with three different languages: Lithuanian, English and Russian. Until October 2004, the Lithuanian Computer Society has issued 3,736 ECDL certificates and 4,132 ECDL Start certificates supervising 72 ECDL TCs only in Lithuania.

The main goal is to fully implement the ECDL concept in Lithuania, achieving 2-3% penetration level. This level equal to 0.30% is of the country's population as of October 2004.

Knowledge Economy Forum

The mission of the Forum is to encourage the Knowledge Economy in the country, based on the creation and introduction of science-intensive technologies and innovations. Therefore, members of the Knowledge Economy Forum take an active part in formulating the policy of a "cluster economy" of the country, preparing draft laws, as well as organizing various conferences, seminars, and club-type discussions.

The Knowledge Economy Forum seeks to achieve that bio-technologies and pharmacy, information technologies and telecommunications, laser technologies and electronics should be declared as trends for an economic breakthrough in Lithuania. Members of the Forum also seek to achieve that the system of education, research and higher education should be

improved, taking into consideration challenges posed by the Knowledge Economy. Co-operation between Business and Science, which creates a transparent and open business environment and stimulates free competition, would contribute to achieve these aims.

The Knowledge Economy Forum unites active, progressively thinking members of the Society who work in the fields of bio-technologies, pharmacy, information technologies and lasers. The members of the Association are legal entities and persons – heads of successfully operating undertakings of the country, scientists and politicians.

The Knowledge Economy Forum organized recognition awards for companies and organizations, which are working hard in making new products and creating innovations for the society and science. 400 such companies recently participated in the contest and the winners were Fermentas and Window to the Future.

Information Technologies in Education

Lithuania is paying an increasing amount of attention to the computerization of schools. The year 2003 saw an acquisition of over 370 computer classrooms, equipment of over 160 establishments with hardware that allows access to the Internet, procurement of 9 computer teaching tools, distribution of the open code software compilation for schools, creation of 6 web-sites designed for teaching of various subjects, etc.

The teachers' skills have also improved. For instance, given the chance to obtain the necessary computer literacy, more than 5,000 teachers were trained in 2003 under the technological, and over 3,000 under the educational part of the computer literacy standard. To upgrade their skills, over 60 teachers were involved in international projects. Nearly 700 librarians took a computer literacy crash course.

To ensure training of information technology specialists with university education and to satisfy the ever increasing demand for such specialists, the number of students enrolled to study Informatics and Informatics engineering in 2003 reached 1,895, nearly double the figure of 2000, when 981 students were accepted to study the said subjects.

Finally, it is very important that the new strategy for ICT implementation in education for the years 2005-2007 was approved this year.

Household Computerization

The high Internet penetration ratio in a country typically relates to the use of the Internet at homes – that is, for personal rather than for business needs. In Lithuania, the ratios of using the Internet at households are still rather low, although some rapid developments can be observed in this area. In 2002, only 12 % of the households had a computer, and only 4 % had an Internet connection; in the 3rd quarter of 2003, the ratios were 20 % and 8 %, respectively.

The study shows that computer prices in Lithuania remain relatively high – the price of a computer totals nearly 4 times the monthly income of one household. In view of the low domestic household computerization ratios and the high hardware prices, Lithuania is in great need of effective instruments to promote provision of information technologies to the people who live there. A significant step in this direction was the Amendment to the Law on Income Tax, as drafted by the Seimas Information Society Development Committee. Registered at the close of 2003 and currently being adopted, the Amendment incorporates a

new item stipulating that costs related to the acquisition of a hardware unit with software and (or) an Internet access as incurred during a reporting period may be deducted from income on annual basis. The basic idea is that if a household buys a PC it would reduce taxes on the basis of the associated expenses. It is possible that the adoption of such an amendment would be an effective factor in promoting household computerization.

The SWOT of IS in Lithuania	
Strengths • Many IT specialists • Rapidly increasing Internet usage • Legacy of well developed IT sector?	**Weaknesses** • Very low fixed line penetration ratio • Weak IS governing policy • Low level of e-commerce • Low digital literacy
Opportunities • Proximity and good relations with Nordic and Baltic countries • EU integration • Use of wireless solutions for Internet access	**Threats** • High Internet access costs and high fixed telephony charges

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COUNTRY REPORT - HUNGARY

Information Society and R&D management in Hungary

by Balint Domolki, Gabor Eszes and Peter Hanak

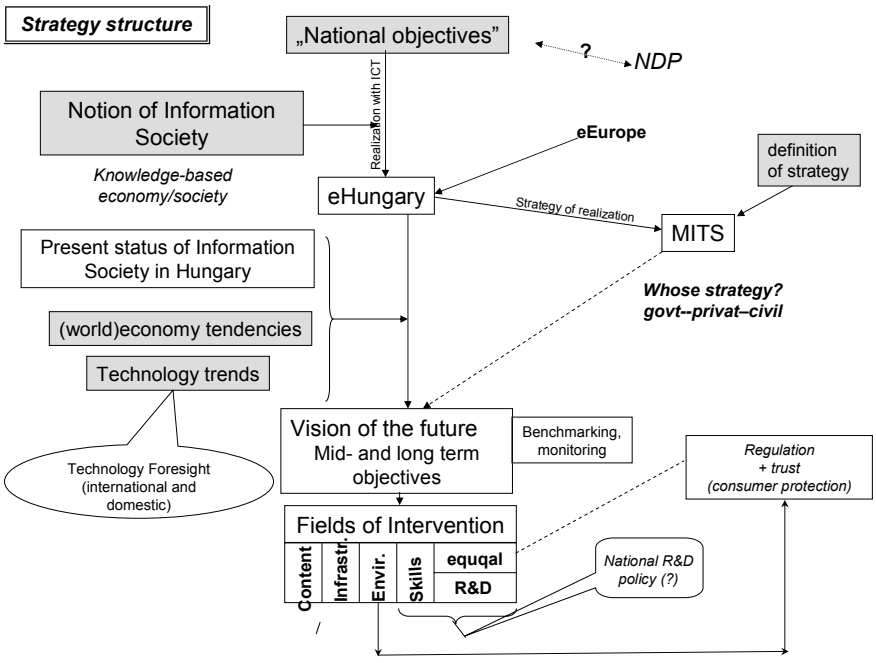
The value of the different indicators on the status of the Information Society will not be given in this report, since they can be found in detail in the ICEG report presented at this conference and also in the report titled ‘‘Hungarian Information Society on the Eve of the Accession to the European Union”[3]

Many of these indicators have rather poor values as compared to the EU-15 and even to some CEE countries. Internet penetration figures in particular are rather low, while in some areas in the usage of information society technologies the situation is somewhat better. The few areas, where Hungary has good indicator values include the penetration of (Internet connected) computers in secondary schools and some health institutions. A fairly large percentage of central government organizations is also equipped with PCs in a satisfactory manner.

I. Information Society Strategy

An important step towards the development of the information society in Hungary was the adoption in 2003 by the government of the Hungarian Information Society Strategy (HISS). This is a strategy for helping the economy and the society to catch up with the European rate of development. In its objectives and solutions, it follows the European values and courses of action, while considering specific Hungarian characteristics and possibilities. HISS reckons that broadening the application of information and communications technologies is the key to Hungary’s success. The wide-ranging application of these technologies and their eventual transformation into a production force would guarantee the modernization of the economy, the enhancement of efficiency and competitiveness, and through these a new level of development that is the objective of the information society.

The basic approach in the formulation of this strategy is illustrated in Fig.1.



This shows that the general aim of the strategy is to satisfy the “National objectives” as defined in official documents such as the Government Program and the National

[3] See http://english.itktb.hu/engine.aspx?page=sta_eng

Development Plan (NDP), including requirements like improving competitiveness, enhancing quality of life etc. The application of Information and Communication Technologies in achieving these goals make up the eHungary program, defined in close connection with the eEurope action plans, and HISS is the strategy for its realization based on three important factors:

- present status
- (world) economy tendencies
- technology trends (as shown by technology foresight programs like FISTERA)

The **purpose** of HISS is to review and to systematize the tasks related to the formation of the information society in order to ensure that the responsibilities arising therefrom – to be fulfilled by the whole society – will take place in a **coordinated** manner.

It aims to effect this in the following ways:

- with the help of a **model** representing social and economic processes and based on the "socialization" of information, it systematizes the tasks pertaining to the creation of the information society by determining the **fields where action needs to be taken (fields of intervention)**; by breaking these fields further down it designates the **key areas** within them, while also determining the tasks to be jointly performed by the various participants (government, private field, civil organizations);
- based on this model, it determines the **objectives** to be attained within these fields and, by further refinement, within the key areas. On the level of the key areas it provides a uniform technical management and **coordination**;
- It integrates and generalizes the **sector strategies** drawn up by the ministries into a uniform structure, and incorporates the tasks to be performed in the strategies above into the model's key areas;
- based on the priorities of the model and the special strategies, it assigns the **High-Priority Central Programs** – the most highlighted programs regarding the implementation of HISS; on these programs certain program brochures will be published, determining in detail the objectives, the tasks to be performed, the operating models of their implementation and the methods for measuring the results; the **program brochures** will form an integral part of the strategy;
- it determines the statutory conditions which are necessary to create the organizational and financial system in which the strategy can be implemented, thereby guaranteeing that the tasks in the individual key areas will be carried out in a coordinated way; furthermore, it designates the tasks regarding the **updating** and fine-tuning of HISS.

In analyzing the changes of transition to an information society, the HISS model identifies the two fundamental pillars of modernization as **the modernization of processes** and the **modernization of services**. The former represents the modernization of the internal working of processes in the broadest sense ("back office"), while the latter means the perfection of those functions of the same processes that are available to a wide range of users ("front office"). The use of information and communication technologies is of primary importance in the case of both pillars.

For the improvement of processes the strategy divides the **fields of intervention** in the following way in respect of both pillars:

Content and services, Infrastructure, Knowledge and skills,
Legal and social environment,

complemented with two horizontal fields:

Research & Development and Equal opportunities.

The largest field of intervention is that of **Content and services**, which is further divided into the following key areas:

Economy, Public administration, Culture, Education, Health, Environment,

which are concerned with the development of the content aspects of the services provided in the corresponding areas of application.

The three different levels of **infrastructure** constitute its key areas:

- construction of broadband networks,
- improvement of access and availability,
- availability of public-domain data, standards and software tools.

Within each of the other four fields of intervention there is a single key area.

The structure of HISS is illustrated in Fig. 2

Fields of Intervention	Key area	SzáNo.m	High-priority central program
Content and services	Economy	KKP-01	eWork
		KKP-02	eBusiness
		KKP-03	eTransport
		KKP-04	eAgrarium
	Public administraton	KKP-05	eGovernment
		KKP-06	eMunicipalities
	Culture	KKP-07	National Digital ARchive
	Education	KKP-08	eEducation
	Health	KKP-09	eHealth
	Environment	KKP-10	eEnvironmentprotection
Infrastrukture	Broadband	KKP-11	Public Net
		KKP-12	NIIF (research network)
	Access	KKP-13	eHungary points
	Public data and programs	KKP-14	Public Data
Knowledge, skills	Knowledge, skills	KKP-15	Digital literacy
Legal and societal environment	Legal and societal environment	KKP-16	eSafety
		KKP-17	eDemokracy
R&D	R&D	KKP-18	IT RcD
Equal opportunities	Legal and societal environment	KKP-19	eUmbrella

The objectives of HISS are realized via **programs** of various levels under the key areas. The level of each program is determined by the significance of the tasks involved, as well as the responsibility and the coordination that their implementation requires:

- high-priority central program (HPCP),
- high-priority sector program (HPSP) or
- sector program.

When working out the programs, the following four essential principles must be adhered to:

- The programs should cover the strategy jointly, and the attainment of the strategic objectives should be ensured by their combined implementation.
- Each program must have its own well-defined goal which can be adequately monitored, and the attainment of which depends primarily on the given program itself.

- Each program must have an “operation model”, which should have a project approach and should preferably rely on market and business solutions.
- The operation models of the programs should favor ongoing operations over one-time solutions.

The regulation created with the **implementation** of HISS can guarantee the organizational and financial conditions of the coordinated implementation of the tasks defined in HISS. This includes the creation of the various levels of “HISS program”:

certification and definition of rights, responsibilities, procedures, decision-making processes and forms of financing associated with these.

The above regulation determines the tasks and competencies related to the **coordination** of the key areas, with special regard to the preceding evaluation of the program proposals from market players and from other sectors, and the monitoring and assessment of the HISS programs. The coordination will be supervised by the Interministerial Committee on Information Society.

HISS defines its strategic objectives for a period of 10 to 15 years, which is a long time measured by the standards of information technology; at the same time, the individual programs are typically short-term, concerning the period between 2004 and 2006. Accordingly, during the **maintenance** of HISS, on the one hand the long-term objectives should be regularly adjusted to the changing circumstances and the development of society and technology with the help of economic, technological and statistical analyses, while on the other hand the short-term programs should be updated with the method of rolling planning.

Considering the execution of HISS from the point of view of the Hungarian ICT industry, players of which are mostly interested in economic growth as the highest rank priority, the approach can be determined by three factors:

1. Strong conviction that ICT is the key factor to improve our national competitiveness in the global world-market. Here we don’t mean the ICT industry itself – we think about wide use of ICT tools, applications and services, which will result at sustainable economic growth.

   This statement is obvious for those who are involved with ICT, but neither so obvious for the public, nor for the public administration. This latter is the real problem – mainly not for our industry but concerning the status of the whole national economy.

   Concerning this issue, the main goal is to make the Government understand the premium importance of ICT. We hope (we work on it!), that in the next coming years the success of the Government will be measured by the extension of the “information highway” instead of counting kilometers of new concrete highways built by them.

2. Considering “innovation” in a broader sense, than just R&D. The major elements are:

   - the innovative use of ICT tools, applications, services in all sectors, e.g. industry, services, public sector, health care, private life.
   - this includes, of course, also the classic R&D. Concerning the ICT industry, the era of selling manpower (software specialists) is over – only innovative ICT companies will survive.

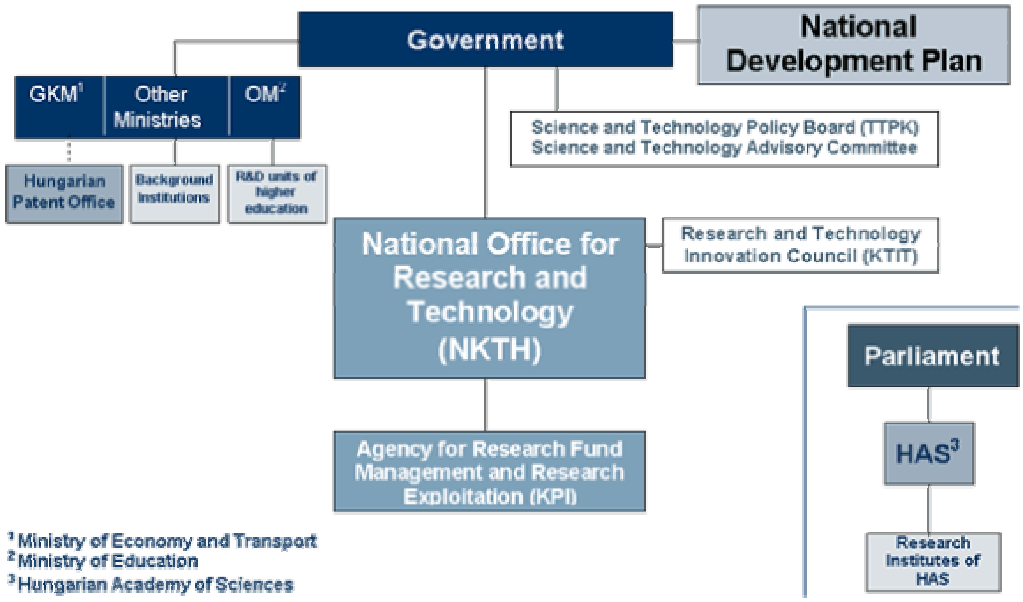
3. Increasing the contribution of ICT industry to the GDP – i.e. to increase the market and profitability of the ICT industry.

II. Research and Development in Hungary

Research and Development (R&D) is an important element of building the Information Society. Recently, there are several important developments in this area, which will be summarized in the following:

1. *The New National Innovation System of the Hungarian Government*

In order to speed up economic growth in Hungary, the government is committed to the development and operation of a new, efficient innovation system. This goal can be realized if research and development is driven by the present and future needs of the economy. To reach this goal, the institutional and legal frameworks have been revised as can be seen on Fig.3.



Consequently, a **Science and Technology Policy Board (TTPK)** has been established and it is chaired by the Prime Minister. As the advisory body of TTPK, the **Science and Technology Advisory Committee (TTTT)** has been set up and it is composed of distinguished scientists and R&D experts.

Further on, a new government office, the **National Office for Research and Technology (NKTH)** has been established and it is supervised by the **Minister of Education**. NKTH is responsible for implementing the government's science and technology policy. Its duties are to provide a new framework for the national innovation system and to promote research and development that will boost Hungary's economy.

To create a predictable environment for the exploitation of R&D results, the **Research and Technology Innovation Fund** has been established. The Fund is managed by NKTH. Apart from the micro- and small enterprises, **every enterprise** is obliged to pay at least 0.25% of its turnover into the Fund. Each year, the **Hungarian government** contributes to the Fund with an equivalent amount that has been paid by the companies two years earlier. The goal of NKTH is to provide sufficient funding for innovation programs that aim to create innovative services and products. These programs will be simple, transparent and evaluated by independent experts. **Representatives of the academic and industrial spheres will submit proposals together.**

Under the supervision of NKTH, **the Agency for Research Fund Management and Research Exploitation** (KPI) is responsible for managing innovation programs. The **Research and Technology Innovation Council (KTIT)** helps NKTH in developing its innovation strategy (incl. the strategy of using the Fund). Members of the KTIT delegated by

ministries responsible for innovation form the minority, while the majority is representatives of the scientific community and industry.

The **Hungarian Academy of Sciences (HAS)** is an autonomous public body. Its task is to promote science. In order to achieve this goal, it maintains a special academic research network. The HAS and its institutes are financed by the state budget.

Further information:
http://nkth.gov.hu/main.php?folderID=808&articleID=3684&ctag=articlelist&iid=1

2. *Major forms of government support for research and development activities in ICT*

2.1. Infocommunication Technologies and Applications Program (IKTA)

Established in 1996, calls for proposals in 1997, 1999, 2000, 2001, 2002
Objective:
promote R&D, innovation and technology transfer in ICT
Aims:
elaboration/trial of **new, marketable** tools, services, processes
development of **new** ICT-applications **for public use**
Fields:
information services
information & knowledge management
information & communications technologies
Preferences:
eLearning, eHealth, iSecurity,
academic/industrial coop., international/EU cooperation.
Eligibility:
private companies, incl. SMEs, universities and other research institutes, other organizations (with little restriction); foreign participation in the project consortium is given preference under the condition that the foreign partner covers all its expenses, i.e. no Hungarian financial support can be given to foreign organizations
Minimum support: 10 M HUF (40 K EUR), max. 75 M HUF (300 K EUR)
Source of financing: government budget (since 2004: innovation fund) + participant's contribution
The number of project proposals submitted: between 120 and 250 annually
Acceptance rate: 20% on average
Duration of projects: min. 12, max. 36 months

2.2. National Research And Development Programs (NRDP*)*

The Government decided in 2000 on launching the National Research and Development Programs (hereinafter referred to as NRDP). According to the implementation rules, applications, aiming at comprehensive research, development and innovation projects, have been expected in the fields of

P1. Improving the quality of life,
P2. Information and communication technologies,
P3. Research on environmental and materials science,
P4. Research on agribusiness and biotechnology,
P5. Research on the national heritage and contemporary social challenges.

Further information: http://nkth.gov.hu/letolt/k+f/kf_angol/index.htm

Objective
promote R&D in ICT in national priority areas

Aims
support comprehensive research, development and innovation activities leading to practical applications,
synchronize basic and applied research with technological development,
improve competitiveness of Hungarian science and economy
Preferences
Integrated intelligent sensors, bionics
Speech technology
Mobile and integrated telecommunication networks
Analogous detection-processing methods and telemetrics
Telematic methods of intelligent transport
Grant M HUF 100++ for up to 36 months

3. *New challenges in 2004 and beyond*

3.1.Hungarian expertise in ICT

- The R&D projects have been helping Hungarian experts & expert groups to manifest themselves.
- Sound expertise, mainly in the following fields:
  - Mobile communication technologies
  - Embedded & dependable systems
  - Software technologies
  - Electrical measurement & instrumentation
  - Medical instrumentation
  - Analogic computing, cellular networks
  - Distributed and parallel computing, GRIDs
  - Medical image processing & computer graphics
  - Natural language processing & speech technologies
  - Knowledge engineering, decision support systems

3.2. Industrial R&D in HU – new challenges

- Increasing R&D investments and innovative capabilities of domestic companies
- Access to seed and venture capital for domestic companies
- Fostering a favorable environment for new and existing R&D-intensive SMEs
- Favorable conditions for Hungarian SMEs to become research and technology suppliers for multinational companies
- Strengthening linkages between the companies and the knowledge base; create regional innovation centers

3.3. Improving the conditions for innovation

- Focusing financial resources on high priority areas
- Compulsory IPR regimes for public research institutions, utilization in contract (Patents)
- Encouraging the establishment of technological innovation clusters based on knowledge centers
- Researcher mobility to industry, „sabbatical" semester
- Regional institutional system promoting innovation
- Measures to promote researcher immigration

3.4. What to do?

- Focusing on key technologies.
- Concentration to reach the critical mass and internationally competitive knowledge centers.

- Partnership between universities, research institutes and industry.
- Improving transparency and independence (foreign peers).
- Long-term partnership between investors and government.
- Enhancement of regional innovation activity.
- Innovation conducive legislation (Law on R&D and technology innovation, etc.).

III. The future: National Development Plan-II for 2007-2013

The elaboration of the plan started in 2004 as part of the Europe Plan of the Hungarian government.

„Information Society and Innovation" is one of the key areas. Planning is based on

- experience in the execution of HISS
- analysis of current situation
- international economic and technological trends

The "Information Society and Innovation" priority of the next (second) National Development Plan of Hungary will be worked out in real public-private partnership: a working team set up by the representative Hungarian ICT organizations will participate throughout the planning process.

COUNTRY REPORT - THE CZECH REPUBLIC

by Olga Štěpánková, Czech Technical University in Prague
Petr Štěpánek, Charles University

1 Some basic facts about ICT in the Czech Republic

Historically, the Czech republic (formerly Czechoslovakia) belonged between the two world wars to the group of well-developed countries with a strong economy. The present growth of the GDP is about 3% per year, which is slightly above the average of the EU-15. Recent sociological studies [DEMA] report that 48% of the citizens older than 18 years live in a household equipped with a computer and two thirds are connected to the Internet, i.e. 32% of the adults can access the Internet from home. This is a dramatic change when compared to the year 1997 when the corresponding number was 2%. However, 38% of the population has no experience in using computers and 14% play computer games only. The degree of sophistication varies among the computer users significantly, e.g. one third is confined to text editors and spreadsheets. On the other hand, the country has a high number of top level SW specialists and the Czech Republic presents itself as a country capable to deliver modern ICT products and services on the technological trade fair TECHXNY in New York (October 2004). Two governmental agencies, CzechInvest and CzechTrade, were presenting six successful companies seeking partners for the US market. CzechTrade also represents a group of 24 Czech companies prepared to deliver to the USA software and highly specialized services.

The Czech Republic has high ambitions. All political bodies are aware of the fact that the 21st century brings novel indicators of wealth of nations, which are more important than traditional supplies of raw materials, an industrial basis and a qualified industrial production - the automotive industry, production of airplanes, precise engineering industry, chemical industry (especially the production of plastics), electronics. These are the peak technologies of the last century, which are so well mastered and transformed into routine work that it is almost impossible to gain new comparative advantage or higher added-value in their domain. Everyone understands that the main source of wealth of any advanced nation today is information management and the efficient transformation of information into knowledge resulting in the production of new goods in a creative and individualized way. There appear completely new decisive factors for the economics of the near future based on circulation and exchange of information, namely sophisticated technology, qualified workers, flexibility of the production. It is clear that modern industry cannot be built without ICT. Moreover, an efficient utilization of computers could significantly speed-up public administration, simplify services, etc.

The Czech government demonstrates its high interest in ICT – the *Electronic Signature Law* was passed in the year 2000 and the program "*Internet to Schools*" of the Ministry of Education has proceeded since 1999. On 24th March 2004, the government adopted Decree No. 265 "*State Information and Communication Policy"* as its strategic document in the field of e-Society development until the year 2006. The document is on the web-site of the Ministry of Informatics (http://www.micr.cz/dokumenty/default_en.htm) and sets clear targets related to IT literacy – it spells the goal "*to achieve basic computer literacy certification for selected managing and expert staff of the public administration"* by the year 2006. The Ministry of Informatics is developing a *public portal* ensuring uniform approach to governmental services. In October 2004, its pilot version was made public.

2 Is the Czech Republic heading towards an affluent knowledge society of the future?

This question is so complex and important that it has to be analyzed from a broader perspective. SPIS, an influential association of ICT industries in the Czech Republic, has published recently a carefully prepared document *The Manifest of Knowledge Society* [MKS] analyzing the present situation. It points to the fact that the Czech Republic is currently at a crossroads and has a choice of 2 roads:

- The first one, which seems safer since no serious socioeconomic changes are required, brings no surprises. If we take it, our country will hopefully sustain its present position. Our economy will remain at the lower end of the list of countries of the European Union, but still above the economic standards of most countries. The country will decline so slowly that almost nobody will take notice. It will be less and less attractive for the young, gifted, educated and enterprising. It will persist on the basis of its traditional resources with the government believing that all is in order and that everything can proceed like this forever. The creative potential, however, will continue decreasing since the competent people are leaving the country and are not coming back.
- The other road sets ambitious goals and leads hopefully towards a more prosperous future of the Knowledge Society. This road is far less attractive, because it cannot be entered unless some hindrances are removed. This is impossible without significant financial and above all moral investments into the future. Such investments have long-termed character since their results cannot be manifested before the end of several election periods. Clear vision, integrity and strength are needed to accept this choice, since a lot of decisions requiring courage have to be taken along the way.

Let us review the current state. What are the strengths, weaknesses, opportunities and threats the Czech society has to take into account when considering its position with respect to the Knowledge Economy, which needs for its smooth functioning qualified personnel, technical infrastructure as well as a sound economic and legal environment.

Strengths

s1. With its ICT market related to GDP, CZ is in a leading position (4th place) among 25 countries considered by a study produced by INSEAD this year [eE].
s2. Well-qualified open-minded work force with high ability to improvise.
s3. Good working culture with experience in complex production, requiring sophisticated quality management.
s4. Existence of a number of R&D teams active in ICT, achieving results above international standards. A.T. Kearne Consulting identifies CZ as one of the countries with best conditions for the design and development of ICT solutions (immediately after India, China, Malaysia), setting it as the first in Europe.
s5. Number of people working in R&D is twice as high compared to G7 [WB, 2004].
s6. Interest of young generation in ICT. Each year, the number of ICT experts is increased by at least 5000 new ICT graduates who finish their studies at the University level.
s7. Several decades of presence of females in ICT and in the technical environment in general.
s8. Long tradition of dedicated hardworking.

Weaknesses

w1. Insufficient economic growth. The increase of 3 % a year is slightly higher than that achieved by stabilized economies. Under these conditions, CZ could reach for the

average GDP of the EU-15 in the period 2030 – 2040. This time span is discouraging and it is likely that the educated and productive elite will not want to wait until this remote and unsure goal will be reached; some will choose a shorter way by seeking employment elsewhere.

w2. Slow legislation and lack of transparency in decision-making, low transparency and intelligibility of the tax system. Insufficient property protection [WB, 2004].
w3. Transparency International continues to observe a high degree of corruption – its report form 2004 indicates 4 countries as the worst in Europe: Czech Republic, Latvia, Slovakia and Poland.
w4. Insufficient number of university graduates in the population (about 50% of the number characterizing G7 countries [WB, 2004]), low computer literacy throughout the population (less than 50% [DEMA, 2004]).
w5. Significantly lower number of technical publications than the average of the G7 countries [WB, 2004].
w6. Excessive price of access to Internet (approx. 3 times more than in EU-15 [eE]), low number of employees connected to the Internet (about 2/3 of the average of EU-15 [eE]).
w7. Low availability of governmental services offered through the Internet.
w8. Low usage of e-Shopping (approx. 3 times less compared to EU-15 [eE]). Government does not promote IT or it is not successful in this respect (CZ is on the 22nd place from 25 countries considered in the study [eE]).
w9. Public institutions ignore or refuse to use simple international standards connected e.g. to IT literacy and they refuse to understand that the administrative overheads of quality management in certification testing cannot be ensured for free.

Opportunities

o1. At present, the most important supplier of ICT services is India due to its cheap qualified English-speaking work force. However, Czech programmers can offer high competitiveness and thanks to a general legal consciousness and European cultural tradition, Czech companies perceive an opportunity to attract and accommodate some part of ICT orders from foreign markets.
o2. The country offers a friendly environment, which is likely to attract qualified and potentially wealthy companies and workers from abroad.
o3. Education is esteemed by the society and many people have high interest in life-long learning and new technologies. 51% of the Czech citizens consider the Internet as a useful tool for that purpose and 39% use e-learning as a means for gaining new knowledge in a subject related to their profession or their interest.
o4. Education has still the resources to increase quality and accessibility of middle and higher education – this may be no more the case in several years.

Threats

t1. Slow but continuous decline of quality of the educational system due to the fact that good teachers are leaving schools to accept better paid jobs elsewhere.
t2. Work force mobility is seriously hindered by artificially introduced barriers. This can be well demonstrated in the case of IT literacy. Some important public sectors (having currently serious budget problems) are designing and using their own IT certification systems which are sector specific and which are not mutually recognized between sectors (often, these systems are lacking objective criteria and safe quality management). The main hidden reason for the introduction of these specialized IT certification systems is the intention to prevent mobility between sectors and, before all, the migration of qualified personnel to the better-paid private sector. The state as an employer is afraid that people with internationally or nationally recognized IT knowledge

certificates would leave their low-salary jobs (teachers, nurses,...) and seek better opportunities.

t3. The state does not motivate and encourage people to increase their knowledge. Intentions to undergo life-long learning may fade out quickly unless it pays-off somehow. One of the tools is to include ICT certification based on reliable and fair testing procedures among the criteria for career promotion.

t4. Usage of fuzzy notions (like computer literacy) lacking well-defined meaning in various cultures can cause serious misunderstandings or disappointment.

3 Time for conclusive domestic political decisions

Most of the problems that are mentioned in the former paragraph have to be resolved on a political level and it us up to the government to adopt appropriate solutions. There is no doubt that special attention should be given to ICT since the Knowledge Society cannot exist without it. Should a state support the specific section of enterprises dealing with information and communication technologies? The Manifest of the Knowledge Society [MKS] explains that the correct answer is neither “YES”, nor “NO”, as it considers both answers wrong. It claims that the right answer is “define the concepts first and specify what it means to support peak technologies”! Support ICT? Does it mean ICT supplier, user or only domestic producers? And how? By polite words? Or by a law stating that everybody must buy a computer and must have an e-mail address? This brings us back to political business. The main conclusions presented in the MKS are summarized as follows:

With all respect to political neutrality, the state should not support suppliers of any type of peak technologies. On the other hand, there are certain domains of public interest, which are responsible for the creation of conditions necessary for the Knowledge Society. This is the case of

- public administration,
- education,
- legislation,
- support of direct foreign investment,
- creation of friendly conditions for small enterprises.

In these domains, the state should not adopt a neutral position but has to stand frankly on the side of modern technologies. Such an approach is definitely in the public interest.

Fortunately, we do not live in a vacuum and the world is interconnected in many sophisticated ways. The state has to take into account the current processes and the international atmosphere could positively influence the speed of the domestic changes.

4 Impact of the International Community and IT societies

Each society that wishes to function efficiently has to measure its productivity and use some reliable means how to evaluate the results of its decisions. With ICT, it is not easy to find the best criteria for that purpose. But often a simple comparison of prices paid to achieve similar goal does this job quite well.

One of the important targets of the eEurope Action Plan is to promote *computer literacy* as one of the building blocks of the Knowledge Society. The notion of computer literacy is still understood rather vaguely. For example, the Czech Ministry of Informatics promotes a course in IT literacy, which has been delivered to 32,000 students already. This course takes 120 minutes and is aimed at the absolute layman who does not know the difference between

a mouse and a keyboard. After 2 hours of training s/he is supposed to be able to switch the computer on and off, use the keyboard and understand some notions on the "Start" menu. On the other hand, the British Health Service UK defines IT literacy as an ability to use efficiently the hospital computer system. This cannot be achieved in 2 hours and comparing the price and the results of projects in Britain and in the Czech Republic would be highly misleading. The only way to escape this trap is to use a transparent definition of IT literacy and provide a clear system how it can be tested in a reliable and uniform way. ECDL is the only existing internationally recognized concept with these qualities. That is why CSKI is promoting it and we have been rather successful (12,000 participants up to now) although we have no serious government support.

The introduction of an objective methodology to compare the results achieved on the local scale with those of the international community is an important step towards clear identification of the reasons why certain contradictions appear in our SWOT analysis, see for example

- s1 versus {w6, w7, w8}: low impact of high investments in ICT
- s5 versus w5: low average productivity of R&D sector.

The international community should help to define and standardize notions as well as set criteria to be applied in the context of the Knowledge Society. It is important that only these demystified notions are used when describing the obtained results, because this approach prevents a good deal of manipulation and helps to fight corruption. The introduction of reliable, internationally recognized certification programs seems a good step forward. There are a number of reasons why they often meet strong local opposition. Publicity and reasonable persuasive arguments are needed to put them into life. The international community can ensure this and the EU, CEPIS, IFIP and IT-Star can play an important role in this respect.

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COUNTRY REPORT - CROATIA

Introduction

In Croatia, the application of modern information and telecommunication technologies started in the mid 1960-ties, simultaneously with the developed countries as there were no political barriers to the import of modern equipment from the West. In late 2002, there were 1,581 ICT companies with a total of 20,492 employees. According to figures from the Croatian Information Technology Society (HIZ – www.hiz.hr), companies where ICT is not a core activity employed 7,830 IT staff in their computer centers.

Business figures for Croatian companies in 2002

The Croatian entrepreneurs' business performance showed a 5.2% growth rate in 2002 - the highest so far in Croatia and also among the transition countries. The ICT sector also achieved the highest growth ever. According to *Privredni vjesnik* from Zagreb, the list of the 400 largest Croatian companies by revenue included 12 IT companies, i.e. three more than in 2001.

Republic of Croatia – basic business indicators, 1999 - 2003

	1999.	2000.	2001.	2002.	2003.
GDP (bn USD)	19,91	18,42	19,54	22,44	28,81
GDP per capita	4.423	4.095	4.439	5.569	6.493
Foreign investment	1.041	828	1.500	1.124	1.356
Inflation (retail prices, %)	4,2	6,2	4,2	2,2	1.5
Unemployment	19,1	21,1	22,0	22,3	19,1
Commodity exports (m USD)	4.302	4.432	4.666	4.899	6.164
Commodity imports (m USD)	7.799	7.887	9.147	10.713	14.199
Foreign debt (bn USD)	9,9	10,1	10,7	15,41	21,57
Foreign exchange reserves (m USD)	3,025	3,525	3,735	5.885,8	
Average rate USD/HRK	7,1	8,3	8,4	7,8637	

* Ministry of Finance estimate
Source: Croatian Chamber of Economy (CCE) 2003

DEVELOPMENT OF THE INFORMATION SOCIETY IN CROATIA

The Stabilization and Association Agreement between Croatia and the EU emphasizes the importance and need to further develop the Information Society. General objectives include preparing the society for the digital age, attracting investment and interlocking networks with services.

In January 2002, the Croatian Parliament adopted a strategy entitled Information and Communication Technology – Croatia in the 21st Century and endorsed the General Measures for the Development of the Information Society.

The Croatian Government's program for the period 2003-2007 also includes the "E-Croatia 2007" Program among the priorities. This program sets out measures for the encouragement

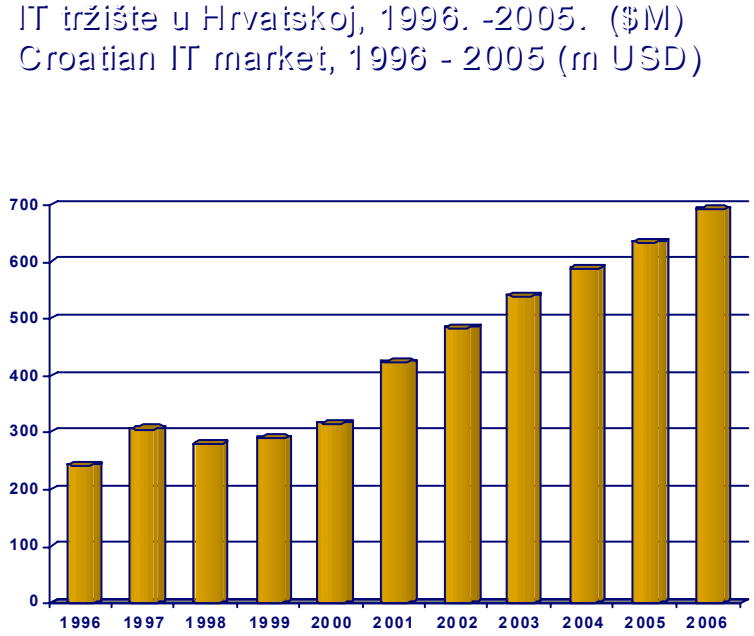
and development of science, technology and information technology. The Government plans to complete the computerization of the education system, the networking of a system that will allow citizens easier communication with the public administration and also the use of health, legal and other services via the Internet.

Information and communication technology market

Information technology market

According to IDC's research, the sales of IT equipment and services in Croatia amounted to USD 485 m in 2002, that is, 14.7% more than the previous year. A breakdown by type of IT equipment and services shows that single user systems make up 40.3%, multi-user systems 12.7%, communication equipment 5%, software 18.9% and IT services 23.1% of the market. IDC's estimates forecast total sales of goods and services to the amount of USD 540 million.

Diagram 2.1. presents the growth of the Croatian IT market from 1996, including forecasts till 2005



Source: IDC Croatia, 2003

Communication technology market

Deregulation and liberalization of the telecommunications market are currently under way. The Croatian telecommunications market should have been liberalized early in 2003, however, due to incomplete legislation this is still in progress.
The Telecommunications Act (NN [Official Gazette] 122/03 and 158/3), together with the related rules (some of which are still to be finalized), is designed to govern the field of telecommunications in Croatia.

The Croatian telecommunications network is almost 100% digital, which is not to be found in any other Central European country.

HT's (www.ht.hr - still a sole service provider) installed fixed network capacity sufficient for 2.33 million subscribers, with the actual subscribers numbering 1.7 million.
The sector of services in mobile telecommunications has also grown very rapidly. Mobile telephony recorded 2.6 million users in early 2004. Estimates indicate potential market growth of an additional million subscribers. The service providers in mobile telephony are HT and Vipnet (www.vipnet.hr).

ICT BUSINESS IN CROATIA

1,581 companies with a total of 21,409 employees were active in the Croatian ICT sector in 2002, generating total revenue of HRK 9.6 billion.

IT Companies

The IT segment started to grow after the war. In 2002, there were 1,538 companies with 8,180 employees. They generated total revenue of HRK 7.8 billion, or 1.98% of the national total.

Small enterprises (up to 10 employees) were dominant in number (86%). Their share of the total employment was 49%, and their share of the IT segment revenue was 35%. At the same time, the 93 largest companies (>51 employees) accounted for 15.4% of all employees in the segment and for 10% of the total revenue.

The largest companies have strongly contributed to the growth of the IT segment. Some of them belong to the group of top performers on the national level.

IT companies have specialized in particular fields such as distribution of ICT equipment, production of software, system integration and manufacture (assembly) of PCs.
Wholesalers distribute equipment to the points of sale, and only exceptionally to end-users.

TELECOMMUNICATIONS BUSINESS IN CROATIA

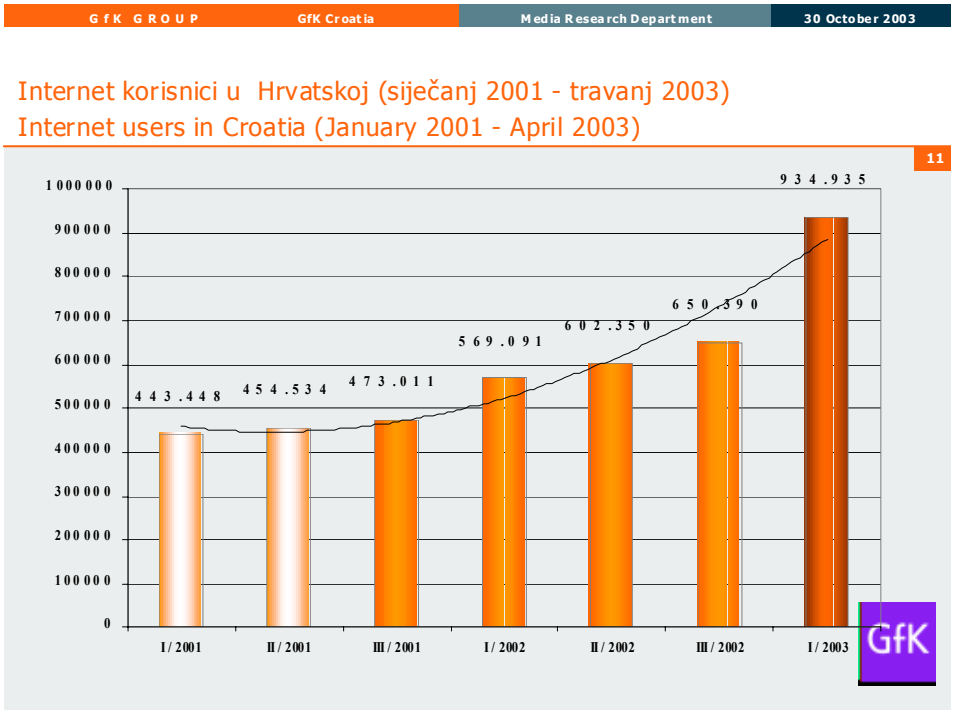
There were 43 active telecommunications companies in Croatia in 2002. They had 12,312 employees and generated a total revenue of HRK 10.475 billion.

Three companies dominate the domestic market: HT – still a monopolist in fixed telephony; VipNet – second largest mobile telephony service provider; and Odašiljači i veze (*Transmitters and Communications*), formerly part of the Croatian Radio-Television. Their revenues make up 99% of the total revenue in this industry.

INTERNET USERS IN CROATIA

The research of the Gfk Online Monitor Market Research Center, conducted in April 2003, showed a total of approximately 1.4 million persons with Internet access, which is 350,000 more than in late 2002. As many as 34% do not use it. Thus, there are around 935,000 active users, or 21.5% of the Croatian population. Among these, 47% are employees, 38% pupils and students, and 15% other.

Diagram 2.2. shows the increase in the number of Internet users in Croatia.



CROATIA'S ACTIVITIES ON THE ROAD TO THE INFORMATION SOCIETY

A number of activities related to the transition towards the Information Society was carried out in the last several years but the approach was not in an organized fashion similar to that of other transitional countries that became EU members in 2004.

The Republic of Croatia needs to make an action plan identical to that of the European Union (e-Europe 2005), i.e. similar to the plans of the candidate countries (e-Europe+),

A larger number of system measures should be implemented such as the encouragement of entrepreneurship, legislative adjustments, protection of intellectual property, harmonization of national and international technical standards, reorganization of IT associations, promotion of the Information Society and introduction of mechanisms for progress measurement and monitoring in the sector.

Encouragement of entrepreneurship

A full economic effect through the application of ICT can only be achieved by measures that encourage entrepreneurship and by ensuring a stable business environment. This implies the availability of favorable conditions for company start-up, lower tax burden and lower contributions from the income of employed persons, especially in the initial phase of business, lower tariffs on ICT imports, etc. Careful formulation of measures to encourage experts to stay in the country is a special concern.

Legislative adjustments

Approximation of domestic to European legislation is currently under way. So far, the following laws have been either formulated or harmonized:

Electronic Signature Act (NN 10/2002) and accompanying rules, Consumer Protection Act (NN 96/2003), Telecommunications Act (NN 122/2003), Electronic Commerce Act (NN 173/2003), Personal Information Protection Act (NN 103/2003), Copyright and Related Rights Act (NN 167/2003)

The following laws or groups of laws need to be formulated or adjusted:

Intellectual Property Protection Act, Electronic Documents Act, Freedom of Information Act, Public Information Act (NN 83/96), Tariff, customs and tax laws.

Intellectual property

Croatia needs to achieve a high level of innovation, copyright/patent protection, quality of patent applications and patent grants in the field of ICT.

These objectives are reflected in the activity of the State Intellectual Property Office (SIPO Croatia - in Croatian: DZIV; www.dziv.hr), which has developed and now applies the national intellectual property system, together with the State Inspector's Office, Ministry of the Interior – Customs Administration, commercial courts, Croatian Copyright Agency and users. The system has been harmonized with EU directives and the World Intellectual Property Organization's guidelines (WIPO - www.wipo.org).

The Copyright and Related Rights Act regulates the use of databases and the Internet, and it has been brought in line with WIPO's and ICANN's (Internet Corporation for Assigned Names and Numbers - www.icann.org) activities.

Standardization

The procedure of transposing international and European standards into the system of the Republic of Croatia is under way.

The State Office for Standardization and Metrology (DZNM) is a national standards organization responsible for the establishment of an infrastructure that will facilitate the achievement of national consensus in the drafting of standards. The Technical Committee for Information Technology (DZNM TO-4001) has been established within the DZNM at the proposal of the Croatian Information Technology Society (HIZ). An inventory of the existing ICT standards has been conducted, followed by a list of priorities. Under the Standardization Act, it is not necessary to translate international standards. What needs to be done is to approve just the introductory document, which contains a short description and title translation.

Adaptation by professional associations

There are several professional associations in Croatia. The Croatian Information Technology Society (HIZ) was set up in 1975, and it comprises several associations, forums, members from the business community, banking system, state administration, schools, universities and also individuals.

HIZ is currently being reorganized to conform to European standards. It is a member of the Council of European Professional Informatics Societies (CEPIS - www.cepis.org), the International Federation for Information Processing (IFIP, www.ifip.org) and the IT Association of Central and East Europe (IT STAR, www.starbus.org).

Since 2003, HIZ is authorized to introduce the international system for the assessment of computer literacy (European Computer Driving License – ECDL), which it implements together with 18 authorized test centers.

Promotion of the Information Society

Public awareness of the Information Society needs to be raised through promotional activities and citizens should be mobilized to participate in its creation. The public should be informed about the technical, economic and social aspects of the transition to the information society. Influential public media, state administration, business and other institutions, universities, schools, IT associations and other entities play a special role in this. The Croatian Chamber of Economy is continually contributing to the promotion of the Information Society through numerous promotional and other activities.

Measures for Information Society progress monitoring

Croatia has to introduce indicators that allow the transition to the Information Society to be monitored by benchmarking the country vis-à-vis developed and transitional countries. Next to basic indicators such as GDP, competitiveness, deregulation, investment, prices, employment and other, comparisons should also be made with regard to the level of development of the ICT infrastructure, value of exports/imports of ICT goods and services, general development of the sector, the business community's readiness to apply ICTs and the readiness to use these technologies in households, schools and universities.

E-BUSINESS IN CROATIA

Due to the non-existence of an implementation document for the National Strategy: ICT - Croatia in the 21st Century, activities for the introduction of e-business are carried out in a slow and poorly coordinated manner.

Educational reform at schools and universities is necessary and it is also important to make leading staff in companies and the state administration aware of the need to introduce e-business. Otherwise, because of the slow reaction, the Croatian companies could find themselves circumvented by international trade and faced with a further decrease of exports.

Substantial progress is possible only through a joint program of the business community, business associations, state administration, science, banks and others that would be correspondingly coordinated by the Government of the Republic of Croatia, which, on its part, should form a professional body for program introduction and implementation.

E-business Security

The Financial Agency (FINA, www.fina.hr) provides certificates. The conditions and requirements for the establishment and operation of certifying institutions are defined by the Electronic Signature Act (NN 10/02) and accompanying rules.

Providers of Internet services in Croatia

Currently, there are eight commercial and one academic provider of internet services (CARNET): EuroproNET - www.europronet.hr , GlobalNet – www.globalnet.hr , Croatian Academic and Research Network (CARNet) - www.carnet.hr, Croatian Telecom Htnet– www.htnet.hr , Iskon – www.iskon.hr, Net4u – www.net4u.hr, VIPNet – www.vipnet.hr, Vodatel - www.vodatel.hr

8. THE PRAGUE "TAKE-AWAY": CONCLUSIONS AND RECOMMENDATIONS

The readers of this WS report will naturally draw their own conclusions on the basis of the summaries, the country reports and the other supporting material. For a broader and more informed view on the status of the Information Society in Central and Eastern Europe they are also advised to tap into other FISTERA documents to which references are provided and the series of country reports developed under the leadership of IPTS is accessible at http://fiste.jrc.es/pages/enlargement.htm.

The proceedings of the Prague workshop offer interesting perspectives of a representative mix of experts of leading ICT professional societies in the region who are also associated with research and education, governance and the public sector. On the basis of their contributions some important conclusions can be drawn.

The region has a series of comparative advantages such as a traditionally well-rounded educational system, relatively well-qualified workforce and ICT specialists, a developed research infrastructure, a growing economy, acute interest on the part of the younger generation in ICT, much lower labor costs and other. The region is attractive at various levels:

- Politically, most of the region is keenly set on the EU-integration course and a greater compatibility on all fronts is likely to be achieved in the shorter term;
- Economically, the region is certainly interesting for commerce, investment and joint ventures;
- Culturally, it is a newly rediscovered part of Europe, at least from a western perspective, which provides a medley of exciting opportunities.

In most of the represented countries it is well realized that their future successful socioeconomic development largely depends on the ability of the population -- led by government, academia and industry -- to usher the Information Society in all walks of life. Most of the countries have the principal strategy documents in place, such as:

Croatia: "Information and Comm. Technology – Croatia in the 21st Century" (2002)
Czech Rep.: Strategy document "State Information and Communication Policy" (2004)
Hungary: Hungarian Information Society Strategy – HISS (2003)
Lithuania: Strategic Plan for the Development of the Information Society (2001)
Slovenia: "The Republic of Slovenia in the Information Society" (2003)

These strategies are more or less supported by an elaborately subordinated network of laws and regulations covering various aspects related to education, e-governance, industry, commerce and other. The problem, as some see it, is not the unavailability of a legal basis for the Information Society, but rather its quality and ability to adapt to the changing circumstances. Some felt that many of the existing strategies and documents are of a theoretical nature and remain unclear and unfocused for a large part of the population. Therefore, it would be essential for the governments to actively, honestly and comprehensively promote PR activities related to the Information Society and the Knowledge Economy.

Most participants (Czech Rep., Hungary, Lithuania, Slovakia, Slovenia) felt there is a need for a greater "political" sacrifice on the part of the ruling parties in thinking "long-term" on Information Society issues rather than focusing on the political cycle. There is a need for better horizontal coordination (between ministries and governmental agencies) and vertical coordination (within the sectors) on matters related to the Information Society. The matter is

crucial, and stronger bonds and partnerships between Government, NGOs and Industry are paramount.

The notion of the Information Society remains unclear for a good part of the population of the respective countries. This is compounded by the fact that measuring the processes and the generic phenomena of the Information Society has some serious handicaps. This is also true for measuring IT Skills and several of the speakers [Croatia, Czech Rep., Lithuania and Slovenia] referred to the European Computer Driving License (ECDL) as a reliable international certification program for measuring the competence of users.

Strong academic networks with well grounded educational and research establishments are vital for the Knowledge Society. The CEE countries have a legacy of well-trained ICT specialists, researchers and educators, however, in order to maintain and improve the quality of Education and Research, sufficient financing is of absolute importance. During the debates, there was a clear unanimity that Research is seriously under-funded and the best scientists and ICT experts are looking westward or considering a change from academia to the private sector. In Hungary, the previously existing IT research units in the national industrial enterprises are nearly extinct and this is most probably true for other CEE countries. Another tendency, reported by the Czech representatives (probably also the case in other countries), is a slow but progressive decline of the educational system due to a migration of educators to other sectors for better paid jobs. Since these worrisome phenomena are inter-linked, it is important for the governments to consider urgent measures to reverse the negative tendencies. Hungary has launched a series of ICT research and development programs and there are some other significant sources for governmental support. Slovenia and Lithuania are successful in organizing computer and information literacy programs in schools, and the Internet is available at all levels of education. On the other side of the line are Serbia and Montenegro, where the government faces more urgent issues than those related to Research and the PC availability and Internet connectivity at schools are simply inadequate.

The Economy of the region is perky [according to the Vienna Institute for International Economic Studies, the Economy of the eight new CEE EU-members will increase by roughly 5% in average during 2004 and a similar increase is forecasted for 2005]. However, some of the participants advised for the need of a stronger economic performance in order to catch up with the West. The ICT Sector in most CEE countries has a steadily growing share of the generated GDP and the trade balance, and presents a lucrative market for foreign investment and for outsourcing activities (Czech Republic, Hungary, Lithuania, Slovenia). The ICT integration in business processes varies greatly from country to country. Slovenia's business sector is probably best equipped, but even there ICT is not sufficiently exploited in making companies more competitive.

The countries of the region carefully monitor the level of computer availability and Internet penetration at home (and also within the public space) as an indicator for the development of the Information Society. However, there is a disparity: Slovenia is a leader on both counts followed by the Czech Republic. In the case of Hungary, the Internet penetration appears to be rather on the lower end with respect to households. The two main factors influencing the availability of PCs and Internet penetration are hardware/software prices and connectivity costs. In most countries, Internet costs are excessively high (the exception is Slovenia, where connection costs are among the lowest in the EU) and a PC could cost as much as 4 average monthly salaries (Serbia and Montenegro) and up to four monthly household incomes (Lithuania). Several countries offer special incentives with the aim to increase the availability of computer equipment among the population.

Obviously, some of the existing problems related to the Information Society in the region will disappear as the economies expand and the living standards improve. However, that statement should not necessarily bring comfort to the political elites as the new "info-culture" is rapidly changing the basic philosophy and practice of societal organization. Governments need to be well equipped to monitor and manage the processes. Their most valuable resource is a well-educated and well-motivated workforce, sustained by a robust system of education and research. If these conditions are not available the risk for a country is to remain in a position of continuously catching up.

During the Workshop, Dr. G. Occhini, Director General of AICA, an IT STAR member, expressed an interesting view concerning the status of the Information Society in CEE. He felt that the situation was not much different from that in Italy 3-4 years ago. He stressed that the awareness of the public is critical. In Italy, the introduction of ICT certification programs made it possible just in a few years to successfully raise qualifications and implement new processes and ICT tools. It is important to have a "bottom up" approach as people are the most important factor and when they are interested, the Government, as was the case in Italy, would be obliged to follow.

In order to tap into a wider view with respect to the conclusions of the workshop, the Rapporteur invited several participants to respond to the following:

What major conclusion have you drawn for yourself from the Prague WS and on that basis
a. What is your message to the Information Society decision-makers in your country?
b. What recommendation do you have for the Commission of the European Communities with regard to ICT and Central and Eastern Europe?

1. Dr. Balint DOMOLKI, Past President of the John von Neumann Computer Society (HU)

A. What is your message to the Information Society decision-makers in your country?

In each country some kind of Information Society policy documents (*strategies*) are being created, describing the role of information and communication technologies and their applications in the development of the economy and society. It is not enough, however, to prepare such documents and put them on the book-shelves, but they should be *implemented*.

Implementation means activities on three levels:

- From the strategy an *action plan* should be derived containing well-defined programs. The execution of these programs should be *monitored*, by continuously checking the values of *indicators* prescribed to the programs.
- The strategy should serve as a *filter* for proposals about adding new programs or changing existing ones. All these proposals are to be evaluated against a set of *criteria* defined in the strategy.
- The strategy itself should be continuously *updated*, i.e. the filter should be revised according to the changing economic, societal and technological conditions. This involves taking into consideration *foresight* activities, like FISTERA.

Governments should provide sufficient resources (intellectual, financial, human, organizational etc.) to perform these tasks for the implementation of the strategy.

B. What recommendation do you have for the Commission of the European Communities with regard to ICT and Central and Eastern Europe?

Countries of the CEE region have in many senses similar situations and problems as in the rest of Europe. They might be somewhat less developed and may have problems which are already solved in more advanced countries, but in some cases may show specific, interesting approaches and solutions. Therefore, an exchange of experiences in the development of information societies might be useful not only between the CEE countries (as it was in Prague) but between this region and the EU - 15 as well. Such an event could bring together national policy makers of the different countries in order to discuss best practices (and also pitfalls) in building the information society.

An important feature of the Prague Workshop was that issues of the Information Society were discussed with the participation of representatives of civil organizations (professional societies, chambers of commerce, etc.) These organizations may bring a specific insight into the picture, sometimes different from the official opinions of government representatives. It might be recommended to the European Commission to rely to a greater extent on such organizations, by involving national computer/informatics societies (and their regional association: IT STAR) into European activities about the Information Society.

2. Prof. Olga STEPANKOVA, President of the Czech Society for Cybernetics and Informatics

A. What is your message to the Information Society decision-makers in your country?

Each country, which has the intention to build the Information and Knowledge Society really seriously, has to

- Reconsider and improve the structure of its education, its industry and services;
- Support processes of life-long education, and
- Create necessary conditions in many domains including first of all legislation and public administration.

These are complex processes and the Czech Republic has to act very quickly if we do not want to miss our train (and be left far behind by other more active countries). The Czech Republic should take into account that we are not pioneering this track and many other countries had to face the same problems a few years ago. The Czech Republic should build on foreign experience and be inspired by the solutions and approaches, which proved most successful in other more advanced countries (e.g. Ireland or Finland). Our country has to set clear goals on its road to the Information Society, keep comparing its achieved results with the international community to identify promptly where we lack behind and draw conclusions from this comparison. In this way, one can see that one of the most serious current problems, which has to be resolved, is the excessive price of Internet connection and low computer literacy among public administration.

B. What recommendation do you have for the Commission of the European Communities with regard to ICT and Central and Eastern Europe?

An objective comparison of the ICT state between different countries is impossible without a mutual agreement on well defined and meaningful criteria. The Commission of the European Communities should help to define and standardize notions as well as set criteria to be applied in the context of the Knowledge Society. It is important that only these demystified notions are used when describing the obtained results, because this approach prevents a

good deal of manipulation and helps to fight corruption. The introduction of reliable, internationally recognized, certification programs seems a good step forward and the Commission of the European Communities should support it.

3. Mr. Niko SCHLAMBERGER, President of the Slovenian Society "INFORMATIKA"

A. What is your message to the Information Society decision-makers in your country?

Let me start the answer based on my mountaineering experience. The way to the summit depends on one's starting point meaning that for all that attempt the same goal the route necessarily depends on where they start. The same is true of the way to the Information Society (IS). While developed countries mostly believe that this is the way to go, there is no generally applicable formula available. First of all, the decision-makers should agree upon what is to be understood under IS. Here is my offer: IS is a society of abundance, characterized by high enough gross domestic product, structure of value added, structure of labor, and self-perception of the society as a whole. Next, usage of computers should be recognized and related to industrial development where production increased in turn by orders of magnitude by use of power tools, automata, and robots instead of manual work. Similarly, computers increase output of administrative and knowledge workers by orders of magnitude. A third factor to be considered is the reality of a country where it should be understood that Slovenia will not be a significant producer of information technologies related commodities even in the European context, let alone wider. IS decision-makers should, therefore, concentrate on the self-perception of the population. My recommendation would be to encourage, promote and support all manner of use of computers, starting, of course, with the basics - digital literacy. The situation is very much like the one with automobiles: to reach the destination we do not need to know thermodynamics, mechanics, materials and related science; we only need to be expert drivers. In this respect, the government has similar responsibility as in the case of classical literacy some hundred years ago, only much greater. When most of the population will be comfortable with computers they will find new ways of usage, employment and activities to the benefit of themselves and the country.

B. What recommendation do you have for the Commission of the European Communities with regard to ICT and Central and Eastern Europe?

This question also has to be regarded in its historical and economical context. Traditionally, people from Central and East European (CEE) countries have a good educational basis to build upon. In terms of economical development CEE countries are below the average of EU countries. Propulsive industries are not the same for all but rather depend on the stage of development. Information technologies are propulsive for developed countries but related services are available to all. In this respect it is good that the internal EU borders are fading away as, even not so long ago, in terms of ICT they were functioning as a semi-permeable membrane, letting commodities into CEE countries but allowing a next to negligible reverse flow. If the intentions of the Commission of the European Communities are sincere, and there is no ground to think otherwise, it should establish conditions, under which an intensive reverse flow of ICT related knowledge and services from CEE into traditional EU countries could take place, thus creating a possibility for their relatively faster development. Also to be recommended to CEE countries is to have a high ranking civil servant to be able to communicate directly with the EU IS Commissioner. This alone is not enough but combined with the proposed development it may facilitate many processes that would otherwise take place much harder or slower.