



REPUBLIC OF CROATIA
MINISTRY OF SCIENCE AND TECHNOLOGY

NATIONAL REPORT ON STRATEGY IMPLEMENTATION
INFORMATION AND COMMUNICATION TECHNOLOGY
CROATIA IN THE 21ST CENTURY
2002-2003

Publisher

Ministry of Science and Technology
Strossmayerov trg 4, 10000 Zagreb
ured@mzt.hr
<http://www.mzt.hr>

In co-operation with

Ministry of Culture
Ministry of Economy
Ministry of Education and Sports
Ministry of European Integration
Ministry of Justice, Public Administration and Local Self-Government
Ministry of Labour and Social Welfare
Ministry of Maritime Affairs, Transport, and Communications
Ministry of Trades, Small, and Medium-Sized Enterprises
Government of the Republic of Croatia - Office for the Internet Infrastructure Development
Government of the Republic of Croatia – Strategic Planning Office
Central Bureau of Statistics
State Bureau of Standards and Metrology
State Intellectual Property Office

Editor in Chief

Diana Šimić, Ph. D.

Editors

Tomislav Vračić
Tajana Repulec

Reviewed by

Professor Vlatko Čerić, Ph. D.
Professor Ignac Lovrek, Ph. D.

Croatian version proofread by

Željko Jozić, Ph. D.

Translated into English by

Dado Čakalo

Layout

Listopad Web Studio
<http://www.listopadweb.hr>

Acknowledgement:

We wish to thank to all those who have contributed to this report with their comments and suggestions and especially to the following task force members:

Professor Damir Boras
Professor Leo Budinu
Dr Biserka Cvjetičanin
Tatjana Holjevac
Leda Lepri
Anto Mandić
Dr Mladen Mauher
Professor Nenad Prelog
Professor Velimir Srića
Ivan Vavra

as well as to

Branka Cimermanović
Irena Cvitanović
Vesna Černelč-Marjanović
Jasminka Draženović
Domagoj Jakobović
Sead Kotlo
Robert Mahović
Ivan Marić
Branka Rakić
and Snježana Zima

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1. Information and Communication Technology in the Development Strategy of the Republic of the Croatia

1.1. The Origin of the Concept of Development Strategy of the Information and Communication Technology

In April 2000, the Government of the Republic of Croatia started a project entitled *Strategy of Development of the Republic of Croatia - Croatia in the 21st Century*. One of the nineteen programme objectives focuses on the future role of information and communication technology (ICT) in Croatia's development. In June 2000, the Project Council and programme directors with task forces were appointed to work out specific programme objectives.

The Government of the Republic of Croatia by its Decision of 26 July 2000 (NN 77/00, 70/01) established the Strategic Planning Office as an expert and administrative Government service for strategic development. One of its responsibilities is to prepare the ground for project design and implementation of the Development Strategy of the Republic of Croatia "Croatia in the 21st Century". The Office acts on directions and under the surveillance of the Committee for Strategic Planning chaired by the vice-president and deputy prime minister. It includes the members of the Government Task Forces responsible for planning national development strategy, Minister of Science and Technology and all deputy-ministers. The Office has an expert body, the Central Council for the Strategic Planning, gathering experts in development strategies appointed by the Committee for Strategic Planning.

In end October 2000, the Task Force for Information and Communication Technology which operates under the Strategic Planning Office prepared the first draft of its strategic document for public discussion. The preparations included the study of a wide range of documents; the Government of Croatia called for, evaluated, and accepted the proposals by individuals who had been helpful to the Task Force in defining its policy toward a number of strategic determinants from the outset of the project. Expert community and general public were invited to discuss the first draft of the paper. Discussions and round tables throughout the country included over four hundred participants, and a number of suggestions for the improvement of the paper came via the Internet. All discussions were constructive and greatly helped to

complete this strategic document. They also showed that the Croatian expert community unanimously accepted the basic strategic guidelines and recommendations.

The Government received the paper in October 2001. After a preliminary discussion, the Government forwarded the paper to the Croatian Parliament for debate. On its 19th session of 25 January 2002, the Croatian Parliament adopted the paper and recommended its issuance to the Government. The Government reviewed the final draft on 25 May 2002, issued a strategy paper entitled *Information and Communication Technology – Croatia in the 21st Century*, and defined the responsibilities for the implementation of every strategic recommendation. Government decisions and the text of the paper were published in full in *Narodne novine*, issue 109/02 (corresponds to the EU Official Journal).

1.2. The Content of the Strategy Paper

The final version of the paper is divided in three sections: Executive Summary, Recommendations and Action Plan Related to Information and Communication Technology, and Proposals for Other Project Objectives of the Development Strategy

The Executive Summary sets the role of ICT within the framework of overall development and concludes that the Republic of Croatia is heading toward the development of the information society. It explains the roles and the tasks required for the achievement of objectives.

Information and Communication Technology Recommendations and Action Plan include seventeen recommendations and the plan of actions. By its decision of 25 May 2002, the Government of the Republic of Croatia appointed the personnel who would work out the implementation of recommendations on the basis of the proposed action plan.

The elaboration of ICT recommendations and action plan showed that some recommendations required further elaboration within other projects. Hence the proposal that these recommendations be addressed within these projects. This especially refers to the following strategic projects: Public Administration, Economy (Macroeconomics), Culture, International Integration, Housing, Healthcare and Environmental Protection.

1.3. The Content of the National Report on Strategy Implementation "Information and Communication Technology – Croatia in the 21st Century" 2002-2003

Certain activities related to the implementation of strategic goals had started when the strategy was still in design, particularly since the release of the first draft of the document in November 2000. This was especially true for the newly established Government Office for the Internet Infrastructure Development which acted in accordance with the proposed strategic guidelines. In addition, several Office activities largely influenced the final version of the strategy paper.

This Report describes the history of the Strategy (this chapter), the institutional and legislative framework of ICT in the Republic of Croatia (chapter two), the results of Strategy implementation and the current status of ICT development (chapter three), and the plan of future actions (chapter four).

The National Report is divided in seventeen sections describing actions taken with respect to each strategic recommendation. Special sections in chapter three describe ICT implementation in the areas of *culture* and *healthcare* (which have also been presented in other strategic documents). The report also reviews national projects introducing IT technology in government bodies and activities of the Republic of Croatia related to international co-operation in ICT.

2. Institutional and Legislative Framework

2.1. Institutional Framework

Pursuant to the Act on Organisation and Powers of Ministries and Government Bodies (NN 48/99, 15/00), the Ministry of Science and Technology is responsible for planning, coordinating and development of information technology and its integration into the information system of the Republic of Croatia and for the introduction of information technology in government administration.

The Ministry of Maritime Affairs, Transport, and Communications provides administrative and expert services in telecommunications as the basic information infrastructure.

The Ministry of the Economy is responsible for drafting bills and other regulations on the information society which are relevant for the economy, and proposes measures, implements policies, laws and other regulations in that area.

The Ministry of Justice, Public Administration and Local Self-Government in co-operation with the Croatian Information and Documentation Referral Agency (HIDRA) drafts new regulations to modernise office administration in the Republic of Croatia and adjust it to the requirements of e-administration and communication in accordance with legal provisions of the EU, on the basis of EUROVOC classification.

The Government of the Republic of Croatia by its Decision of 26 July 2001 (NN 70/01) has established the Office for the Internet Infrastructure Development which is responsible for developing Internet infrastructure, and especially for: providing technical, human, organisational, legal, security and financial resources for a comprehensive introduction of the Internet in everyday work and life; stimulating and coordinating the building of Internet infrastructure; preparing common standards for the introduction of the Internet into public administration and ensuring modern communication between government bodies and citizens; and the promotion of the Internet use as an integral part of culture and education.

The Office acts on directions and under the surveillance of the Internet Infrastructure Development Committee whose members are the vice-prime minister, deputy prime minister,

minister of science and technology, minister of European integration, minister of finance, minister of trades, small, and medium-sized enterprises, minister of justice, public administration and local self-government, minister of education and sports, minister of labour and social welfare, minister of the interior, minister of environmental protection and zoning, and minister of health.

The Office has an expert body, the Council for the Internet Infrastructure Development gathering Internet experts who are appointed by the Internet Infrastructure Development Committee.

Finance Agency Act (NN 117/01) has established the national Finance Agency (FINA) as the institution which integrates all information and communication infrastructure supporting the systems of state and public finances, registries and information services for public administration, and regional and local government. On 23 September 2003, the Government of the Republic of Croatia and FINA signed a contract whereby FINA assumed the responsibility for the support and development of application services and e-government solutions.

Zagreb University Computing Centre (SRCE) is the oldest academic institution whose activities include ICT infrastructure building and application. Its role is to build a stable, reliable, well-designed and advanced information infrastructure that should meet the requirements of the academic community in Croatia, and to provide efficient and readily available help in the use of this infrastructure and ICT. SRCE encourages co-operation with all participants in information infrastructure building and ICT application in Croatia, especially with the Ministry of Science and Technology and the Croatian Academic and Research Network (CARNet).

The Croatian Academic and Research Network (CARNet) is a public institution covering the entire territory of the Republic of Croatia, whose responsibilities have been defined by the Government decision (NN 16/95), as follows: the development, construction and maintenance of advanced information and communication infrastructure servicing the academic and scientific community, including a fast and secure network, a variety of programs and services, connection with international organisations and other academic/scientific networks, and the establishment and maintenance of centralised national Internet services such as: CIX (Croatian Internet eXchange) – national Internet exchange service and CARNet CERT (Computer

Emergency Response Team) – services related to computer network and system security in Croatia;

CARNet manages the Croatian top-level domain ("hr") and Internet domain registration within the top-level domain in accordance with the powers invested in it by the Internet Assigned Number Authority (IANA) in 1993 and in accordance with the current custom and world trends, and especially with the Top-level Domain Management Plan. Technical management of the Croatian domain is the responsibility of Zagreb University Computing Centre (SRCE) and its HR-DNS service.

2.2. Legislative Framework

The Ministry of Science and Technology has completed the Plan for the Harmonisation of Croatian Legislation with the Legislation of the European Union which is based on a review of ICT-related legislation in developed countries (European Union) and of relevant Croatian legislation.

The legislative framework for the development of the information society has been defined by the Electronic Signature Act (NN 10/02), Electronic Commerce Act (NN 173/03), Telecommunications Act (NN 122/03), Electronic Media Act (NN 122/03), technical laws, intellectual property rights, the right to the privacy of information, the right to information access.

The Electronic Signature and Electronic Commerce Acts regulate information services, the responsibilities of service providers and the provisions for issuing electronic contracts. The Electronic Signature Act has been accompanied by the Ordinance on Electronic Signature Certificate Providers Registry (NN 54/02); Ordinance on Qualified Electronic Signature Certificate Providers Registry (NN 54/02); Ordinance on Use and Protection of Electronic Signature and Advanced Electronic Signature, Means for Creating an Electronic Signature, Advanced Electronic Signature and Certification System and Mandatory Insurance of the Qualified Certificate Provider (NN 54/02); and Ordinance on Technical Specifications for Connecting Electronic Signature Certification Systems (NN 89/02), which provide for the registration of unique digital public keys within the national and local governments. The

Electronic Commerce Act has been completely harmonised with the Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services in the internal market and with the existing contract law of the Republic of Croatia. However, a law regulating electronic documents, electronic payment and electronic money is still pending enactment.

The Telecommunications Act has defined a new legislative framework for the telecommunications market in Croatia, particularly regulating market relations and customer protection. A complete regulation of the telecommunications market requires a series of subordinate laws based on the Telecommunications Act. By now two such ordinances have been enacted, the Ordinance on Addressing, Numerating and Charging in Public Telecommunications (NN 177/03) and the Interconnection and Network Access Plan (NN 185/03). The Radiofrequency Spectrum Plan is pending publication in the official journal *Narodne novine*, and the following regulations are near completion: Ordinance on Telecommunications Services Franchising and Licensing; Ordinance on Telecommunications Services; and the Ordinance on Telecommunications Service Fees, other Fees and Payment.

A group of technical laws (Standardisation Act, Technical Requirements for Products and Conformity Assessment Act [NN 158/03], Accreditation Act [NN 158/03] and Product Safety Act [NN 158/03]) has been completely harmonised with the EU directives, International Organization of Legal Metrology (OIML), international and European standard series EN 45000 and EN ISO/IEC 17000 and international homologation system UN-ECE.

Laws related to the protection of intellectual property rights (Copyright and Related Rights Act [NN 167/03], Patent Act [NN 173/03], Trademark Act [NN 173/03], Industrial Design Act [NN 173/03], Geographical Indications and Designations of Origin of Products and Services Act [NN 173/03], Protection of Topographies of Semiconductor Products Act [NN 173/03]) have been harmonised with the EU directives and international contracts ratified by the Republic of Croatia: The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement), International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations, Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite, World Intellectual Property Organization (WIPO) Copyright Treaty and the WIPO Performances and Phonograms Treaty, European

Patent Convention, Cooperation Agreement between the Government of Croatia and the European Patent Organization, Madrid Agreement Concerning the International Registration of Marks and the related Protocol, the Hague Agreement Concerning the International Registration of Industrial Designs and the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration.

The Data Protection Act (NN 103/03) defines the protection of personal information and the control over the collection, processing and use of personal information in the Republic of Croatia. The purpose of this law is to protect privacy and other human rights and freedoms from possible infringement through the collection, processing and use of personal data. In the Republic of Croatia, all persons are entitled to the protection of privacy, regardless of their citizenship, residency, race, sex, language, religion, political and other inclinations, nationality, social background, wealth, birth, social position or other personal traits.

The Right to Information Access Act (NN 172/03) regulates the right to access information in the possession and control of public services, defines the principles upon which such access is granted, exceptions to this right, and the means to exercise it and defend it. The purpose of this law is to grant all natural and legal persons access to information controlled by public administration. The work of public administration must be open and transparent in accordance with this and other legal provisions.

International relationships in respect to ICT are related to the implementation of the Convention on Cybercrime of the Council of Europe, signed by the Republic of Croatia on 23 November 2001 (NN International Agreement 9/2002). This Convention is necessary to deter actions directed against the confidentiality, integrity and availability of computer systems, networks and computer data, as well as the misuse of such systems, networks and data, by providing for the criminalisation of such conduct, the adoption of powers sufficient for effectively combating such criminal offences, by facilitating the detection, investigation and prosecution of such criminal offences at both the domestic and international level, and by providing arrangements for fast and reliable international co-operation.

Croatia has also signed the eSEE Agenda on collaboration in development of information society in South-eastern Europe within the Stabilisation and Association Agreement.

3. Report on Strategy Implementation Information and Communication Technology–Croatia in the 21ST Century

3.1. National Council and Parliamentary Committee for Information Society Technology

The Committee for Information and Media is the working body of the Croatian Parliament whose task is to monitor and steer the development of information and communication technology at the national level. However, this Committee alone has not met the recommendation in its entirety, since ICT is not the only responsibility of the Committee.

3.2. Inexpensive, Fast and Safe Information and Communication Infrastructure

The basic task of the Ministry of Maritime Affairs, Transport, and Communications is to create conditions for the implementation of the following recommendation: to create the legislative framework that will provide guidelines and stimulation for the private sector to build the information society. This objective can be achieved by providing guidance and encouraging investment in ITC infrastructure development, such as multi-service networks with a set of services that would meet the requirements of the citizens and of the economy, including broadband and mobile Internet access. In co-operation with a Croatian team consisting of private sector and science experts and with foreign consultants bringing experience from other countries, the Ministry of Maritime Affairs, Transport, and Communications has authored the new Telecommunications Act (NN 122/03). New ISPs have contributed to greater market competition, which has been further stimulated by the Ministry of Maritime Affairs, Transport, and Communications which lifted the 2% charge to ISPs in spring 2003.

These efforts are reflected in the increased number of Internet users. The market has accepted ISDN, citizens and companies alike (Table 1).

Table 1 The number of Internet users in Croatia in 2002-2003 by technology and user type.

Individual users	2002	2003
Dial-up	233,601	295,119
Increase		26.33%
Broadband	105	642
Increase		511.69%
Total	233,706	295,761
Increase		26.55%
Business users	2002	2003
Dial-up	62,488	77,964
Increase		24.77%
Leased lines	994	1,249
Increase		25.62%
Broadband	1,435	3,741
Increase		160.64%
Total	64,917	82,954
Increase		27.78%
Individual and Business	2002	2003
Dial-up	296,089	373,083
Increase		26.00%
Leased lines	994	1,249
Increase		25.62%
Broadband	1,540	4,383
Increase		184.57%
Total	298,624	378,715
Increase		26.82%

Source: IDC, 2003

The Croatian Academic and Research Network (CARNet) advocates the spreading of the Internet, especially of the next generation Internet to be powered by its gigabit network (GigaCARNet). In this context, CARNet works on the development of Internet Protocol Version 6 (IPv6), wider distribution of basic services and on new contents on the web.

Croatia has made considerable progress within the frame of actions taken to build e-business infrastructure which will ensure the basic functions such as registration and certification, public e-mail and electronic exchange of documents. After the passing of the Electronic Signature Act in January 2002, the Financial Agency (FINA) has been issuing digital certificates since June 2003. FINA's Registry of Digital Certificates (RDC) has been issuing relevant certificates in

accordance with the Electronic Signature Act and is the only qualified certificate provider registered with the Ministry of Economy as the highest certifying authority in the Republic of Croatia. RDC certificates allow secure electronic access to information and services using the public-key infrastructure (PKI) and electronic signature technology. It is worth mentioning that since 2003, about 30,000 companies have been using PKI in money transfers through their banks, whereas Internet banking in the leading Croatian banks accounts for over 50% of all money transfers.

By joining the European efforts toward safe infrastructure and by adopting priority measures set out in the eEurope 2002 action plan, Croatia has accepted the Convention on Cybercrime (NN – International Agreement 9/2002).

Protection of privacy has been regulated by the Data Protection Act (NN 103/03) and by the Consumer Protection Act (NN 96/03). The EU directives related to the protection of privacy have also been included in the new Telecommunications Act. Users have been granted protection of privacy in records and directories, advertising services, traffic and locations records, invoice items, protection from unsolicited communication and displaying and hiding of caller ID.

Since early 2003, the Ministry of the Interior of the Republic of Croatia has been issuing the next generation identity cards which provide optimum protection against fraud and abuse, introduce an additional protective layer, and allow automated data exchange between government and/or electronic business systems.

3.3. Liberalisation of the Telecommunications Market

The new Telecommunications Act has introduced modern regulations to an open telecommunications market. It has provided for the establishment of the Croatian Telecommunications Agency - an independent national regulatory agency for telecommunications management. It has also provided for a licensing system, interconnection and network access, cable lease, universal services and user protection, tariff policy and cost assessment, addressing and numeration, and the right of passage. In addition, the Act has defined effective protection of data as well as the means of frequency spectrum planning and

management. Despite the provisions stipulating the establishment of the Council of the Croatian Telecommunications Agency, this management body has not yet been formed.

New laws related to the information society have been completely harmonised with the EU legislation and protect the interests of the Republic of Croatia using the same mechanisms as those used by the EU to protect its own interests in the international community. All information and communication traffic with the origin and destination in Croatia, as well as the transit traffic is subject to Croatian legislation and the monitoring of information and communication operations is based on the EU principles.

In 2003, the Croatian telecommunications market has consisted of one fixed-line operator (Hrvatski Telekom - HT), two mobile operators (HT mobile and VIPnet), and seven ISPs (HTnet, Iskon Internet, Globalnet, VIP Online, Vodatel Net4U, VM mreže, europroNET).

Research and development in the Republic of Croatia are stimulated through co-operation between the Ministry of Science and Technology and the scientific community. The Ministry of Science and Technology has taken measures and financed projects that support the contribution of national science and expertise to the development of information and communication infrastructure and to the partnership between the public and private sector. Cases in point are the development of local programmes, support to complex projects, multi-service networks which will include computer and voice communication and allow videoconferencing and GRID.

3.4. Access and Participation of Citizens in the Information Society

By enacting the Data Protection Act and Right to Information Access Act, the Croatian Ministry of Justice, Public Administration and Local Self-Government prepared the ground for citizen's free participation in the information society without the infringement of privacy.

The Ministry of Education and Sports has taken actions to make electronic access to educational programs available to citizens. To this end, the Ministry of Education and Sports designed a new web-site in 2002. The web-site posts important news about the activities of the Ministry and documents relevant for the education system (regulations, projects, etc.). Implementing this recommendation, the Ministry of Education and Sports has become aware

that schools lack information and communication equipment and an appropriate model for its maintenance and modernisation.

The Ministry of Culture has been implementing universal access and participation in the information society by making available on its web-site all information about ongoing cultural projects, about digitizing cultural heritage under the Ministry's authority (monuments, archives, libraries, museums, immaterial heritage) and especially about digitizing church heritage according to the contractual obligations signed between the Government of Croatia and the Vatican, within the framework of a number of international projects (Alps-Danube-Adriatic, Danubian Cultural Itinerary). Web-pages CulturenetCroatia dedicated to cultural events which have been posted on the Ministry's web-site are a project realised in co-operation with the Open Society Institute.

Less developed parts of Croatia are included in the implementation according to the principle of universal services, using financial support for the development of information and communication infrastructure and allowing free Internet access in public. Special solutions are needed for underpopulated islands with high seasonal variance of information traffic.

The Ministry of Education and Sports seeks to secure preferential treatment for schools in underdeveloped areas and islands in respect of the distribution of computer equipment. This is why schools in the areas of special state concern, particularly new and renovated schools and schools on the islands have been adequately equipped with computers.

In the framework of national projects for the revitalisation of islands and areas of special state concern, the Ministry of Culture has particularly focused on introducing information technology to public libraries and on stimulating projects for public Internet access to users of all ages. The Ministry of Culture provides public libraries on the islands and in the areas of special state concern with financial support for book acquisition, computerisation and investments through public competitions announced every year in the press and on the web-pages of the Ministry. There is no doubt that these activities have contributed to the increase in the number of home and academic Internet users (Table 2).

Table 2 Internet users in Croatia in 2002-2003

Quarterly report by user type	2002.	2003.
Home	585,509	707,617
Increase		20.86%
Home only	240,059	318,428
Increase		32.65%
Business	234,590	313,855
Increase		33.79%
Academic	314,692	381,982
Increase		21.38%
Internet users Total	789,341	1,014,264
Increase		28.50%
Quarterly report by user type (%)	2002	2003
Home	74.2%	69.8%
Business	29.7%	30.9%
Academic	39.9%	37.7%

Source: IDC, 2003

3.5. Electronic Business

The Ministry of the Economy has prepared the Electronic Commerce Act which sets the legal foundation for removing the distinction between safe e-business administration and classical paper administration. This Act will provide a competitive edge to the Croatian economy and public administration and open the way toward a new technological era in which e-commerce will be a pre-requisite for competition in the world market.

The Republic of Croatia has been participating in a number of international forums addressing key issues, solutions, laws and regulations related to e-business. This is where Croatian delegates co-operate in representing the national policy and in reporting on its implementation.

Table 3 E-business in Croatia in 2002-2003 (in mil. US\$)

Market segment	2002	2003
B2C	4.92	9.82
Increase		99.6%
B2B End user	2.22	4.49
Increase		102.3%
B2B Process	42.10	85.41
Increase		102.9%
B2B Total	44.32	89.90
Increase		102.8%
Total	49.24	99.72
Increase		102.5%
Market ratio (%)	2002	2003
B2C	10.0%	9.8%
B2B End user	4.5%	4.49
B2B Process	85.5%	85.6%
E-commerce per capita (in mil. US\$)	2002	2003
B2C	1.12	2.23
B2B End user	4.49	0.50
B2B Process	9.57	19.41
Total	11.19	22.66

Source: IDC, 2003

The Ministry of Trades, Small, and Medium-Sized Enterprises has set up information points with entrepreneur centres providing free practical information on e-business for small and medium-sized companies, including information on best practice, different markets, investments and microeconomic analyses and advice on company management. This information can help entrepreneurs to acquire new knowledge and skills and solve business problems.

These activities have increased the rate at which the Croatian economy has been adopting ICT and e-business (Table 3).

3.6. Electronic Government

In co-operation with the Ministry of Justice, Public Administration and Local Self-Government, Ministry of Science and Technology and Ministry of Finance, the Government Office for the

Internet Infrastructure Development coordinates and defines actions and priorities related to e-government, regularly analyses the progress of activities and creates partnerships between the Government, business subjects and the academic community. Through its reform of administrative procedures in order to make public services more efficient and transparent, the Government of the Republic of Croatia has decided to adopt the International Standard ISO 9001:2000 for Quality Management System. So far, the Certificate for Quality Management has been issued to the Ministry of Maritime Affairs, Transport, and Communications, Ministry of Science and Technology, Ministry of the Interior and Ministry of Trades, Small, and Medium-Sized Enterprises.

By streamlining their organisation and by training their staff, the Croatian Ministry of Justice, Public Administration and Local Self-Government and other central government bodies seek with their limited human and technological resources to improve their performance, especially in respect to electronic document exchange, setting up useful web-pages and providing access to digitised databases. The Ministry of Justice, Public Administration and Local Self-Government has intensively been working on its computerisation. Courts are being equipped with information technology, preparations for a VPN with Internet access have been completed, and the functional and technological parameters of e-Court will be fulfilled shortly. In addition, a project *Supreme Court Decision Information System* is being implemented. Commercial courts are getting a digital company registry, and the land registry system is being networked.

By devising a conceptual model of a national information system and providing the foundations for the development of e-government (legislation, networking of central and local government bodies, e-mail system, electronic data exchange system, national registries and records, database system with open access, creation and exchange of digital documents, analysis of the existing solutions, databases in particular, and possibilities of their integration) all unclassified information should become available to every citizen and company. In co-operation with the Ministry of Justice, Public Administration and Local Self-Government and the Ministry of Finance, the Government Office for the Internet Infrastructure Development has intensified its efforts in establishing digital communication between central government bodies and administration in a limited number of counties. Government bodies have been creating

new web-sites allowing citizens to access certain databases. The Ministry of Justice, Public Administration and Local Self-Government has taken a series of steps to equip county offices and local (regional) government units. Further equipping and networking of county offices and local government, including necessary adjustments in hardware and software which is mainly obsolete, depends on the national budget allocation.

The procurement of computer equipment for public administration is coordinated by the Government Office for the Internet Infrastructure Development and is carried out through joint public tenders. This overarching procurement procedure provides for a steady increase in the processing capacity in accordance with international standards and ISO 9001 certified production processes, and reduces the cost of equipment to about 70% of the retail prices.

The Government and its institutions have successfully negotiated legalisation, standardisation and re-licensing of software at substantially reduced rates. Government bodies thus receive favourable treatment when purchasing and using world's top technology and software.

In 2001, the Ministry of Science and Technology ordered and financed the design of an operational project for Public Administration Computer and Communication Network (PACCN), a multi-service network which will include computer and voice communication and allow videoconferencing. The Government of the Republic of Croatia has built its own VPN Data network for the Government ePortal. Other networks include Revenue Service VPN, Customs Service VPN and a trial primary healthcare service VPN. ICT use in public administration has been modernised and improved. Government sessions have completely been computerised (eVRH Portal), and the Government Secretariat has adopted a new system of office management called e-Pisarnica (eSecretariat). The integration of applications using new technologies has also led to e-Sabor Portal, an information and communications system of the Croatian Parliament.

The introduction of the European Computer Driving License as the basic criterion for determining the competence of public servants is directly associated with the CARDS programme for administrative capacity building in the Republic of Croatia. To this end, a special licensing unit within the Ministry of Justice, Public Administration and Local Self-Government is being established. The Croatian Information Technology Society (HIZ) has

signed a contract with the ECDL Foundation in order to start implementing ECDL in Croatia. The signing of this contract has been followed by the signing of ten contracts between HIZ and computer organisations authorising them to establish ECDL training and test centres for the seven basic computer skills. Zagreb University Computing Centre has applied for an ECDL test centre certificate in order to accommodate the requirements of our academic and scientific community.

3.7. Teleworking

Amendments to the Labour Act (NN 114/03) introduced by the Ministry of Labour and Social Welfare which define and regulate telework, open the possibility to work at home or away from an employer's place of business. The Labour Act also regulates teleworking contracts.

Although the Government of Croatia encourages telework as a means to rationalise public administration in those services which do not require physical presence, and although the legislative framework has been set, this form of work has not yet taken root in the Republic of Croatia.

3.8. Development of Information and Communication Technology as a Production Sector

The Ministry of Trades, Small, and Medium-Sized Enterprises is responsible for setting development priorities which include 21st century technologies. Its first priority is to develop ICT as a production sector along with a few traditional technologies.

Priorities are defined according to the expected success of a technology, the size of the market, infrastructure, and grounds for development. The ongoing loan programme "New Technologies" realised in co-operation with banks has secured enough money, but the number of requests and sound projects has been surprisingly small. For the two years of the programme, only eighteen loans have been approved to software and hardware support services.

Government institutions and state-owned enterprises are encouraged to purchase new and competitive Croatian products, including those with enhanced functionality, in order to

strengthen the position of Croatian companies in the market. To this end, the Ministry of Trades, Small, and Medium-Sized Enterprises has been conducting a programme called "Domestic Product" which ends in November 2003. This programme has shown that the quality of Croatian products and services varies substantially.

The Ministry of Trades, Small, and Medium-Sized Enterprises is responsible for bringing to Croatia leading international ICT companies who are engaged in development programmes, and not solely in distribution. So far however, this type of co-operation has been established only in software development.

The implementation rate of advanced Internet access services among small companies (10-49 employees) is still relatively low. The main reason for this is that only a few small businesses have determined that they have a real need for advanced (or any other) access to the Internet. Most medium-sized companies (50-249 employees) have Internet access, but only a few over a leased line. In 2001, the Internet was present in over 90% of large companies (250 employees and over). In 2002, this percentage increased, and the access was dominantly over a leased line. (Source: IDC, 2003)

3.9. Focusing on Software and Innovation

Financed from the budget of the Ministry of Science and Technology, the national Programme of Innovation and Technology Development (HITRA) partly includes the networking of infrastructure institutions and the support for small know-how businesses. HITRA has been adopted by the Government, and presented in the Croatian official journal *Narodne novine* (NN 33/01). The procedure of application, evaluation, and selection of projects and development programmes is similar to that for scientific projects, except that it includes provisions regulating intellectual property and return on investment. A major role in this procedure is played by the Regional Council for Technology and the Business and Innovation Centre of Croatia (BICRO). Beside BICRO from Zagreb, other business and innovation centres are Split Technology Centre, Technology and Innovation Centre Rijeka, and Zagreb Technology Park.

Drawing from successful foreign models, the Ministry of Trades, Small, and Medium-Sized Enterprises has also been running programmes supporting the development of entrepreneur

centres and of entrepreneur incubators. However, due to a lack of uniform operational standards among the centres and incubators, entrepreneurs tend to get more help and better advice at the local level. The 2003 Innovations Programme and the Programme for the Development of New Products and Technological Processes are intended to encourage, recognise, aid, and promote innovations and their authors.

The Ministry of Trades, Small, and Medium-Sized Enterprises has devised the means to measure efficiency and innovation (ideas, patents, products) of R&D institutions in information and communications sector and has adopted the practice of recognising, evaluating, and rewarding best ideas, patents and products, and of aiding the promotion of new Croatian products. On the occasion of the 7th National Symposium on Small Business, the most innovative entrepreneur received the Dr Milan Arco Award and the New Dimension Award, which is given to entrepreneurs in the information and telecommunications sector.

The Innovations Programme resulted in the development of 17 new products, employment of 62 people, international innovation exhibition awards, and the dissemination of innovative products and procedures.

In all its activities related to promoting and developing innovation projects, however, the Ministry of Trades, Small, and Medium-Sized Enterprises has experienced financial difficulties. In order to develop, these projects require long-term engagement, and quick results are out of the question. Another issue is the relative media silence about the success of new ideas, patents and products, and the lack of a database to connect the innovator and the entrepreneur.

The Start-up Forum Project started in 2001 at the initiative of the Faculty of Electrical Engineering and Computing, University of Zagreb, and the Zagreb Fair, with the aim to encourage personal initiative and small and medium-sized ICT businesses. It has been imagined as an entrepreneur centre for the new economy, as a training centre for small and medium-sized enterprises, and a point of contact with potential investors and scientific, financial and government institutions and associations offering support. INFO Start Up Forum is an annual meeting gathering businesses not older than 4 years, which present their ideas and ICT products. INFO Fair of the Zagreb Fair sets up an "entrepreneur centre" presenting

award-winning start-up projects, successful entrepreneurs, institutional programmes of support to small and medium-sized businesses, investors and international projects and programmes.

The Ministry of Science and Technology has allocated funds to finance iProjekti - projects applying information technology. These projects have been financed for four years in a row. The proposals are usually evaluated, selected, financed and monitored on a one-year basis, much like scientific projects. Unlike scientific projects whose aim is to obtain and publish relevant scientific findings, iProjekti are intended to produce operational software products (digital textbooks, web portals, knowledge bases, computer systems, and software packages). So far over 120 projects have been financed and about 80 have been completed. Their authors usually come from scientific and higher education institutions. The Ministry of Science and Technology has obtained ISO 9001:2000 Quality Management System Certification for the management of iProjekti.

CARNet and SRCE provide support to system engineers working in scientific and higher education institutions. This support includes open software packages whose use is recommended as standard within CARNet network. All open software packages have been tested by CARNet and SRCE and then customised for distribution and installation in our environment. Help and relevant courses have also been provided. All CARNet servers are powered by Linux operation system.

3.10. Open Opportunities for Accelerated Growth

The new Science and Higher Education Act (NN 123/03) has prepared the ground for university education reform which should be able to produce a sufficient number of qualified experts and managers to meet the requirements of ICT as a production sector. This university reform is a step toward the EU standards. An important element of the reform is the legislative reintegration of the university and the introduction of direct financing.

The Ministry of Science and Technology has financed an integrated project, CRO-GRID, whose objective is to create a Croatian computational grid. The grid would consist of several interconnected computer clusters distributed among universities and scientific institutes. Their

connection and smooth operation should be controlled by a middleware developed through co-operation between the academic community and the private sector. This co-operation should boost the production of programming support software. The development of CRO-GRID would pool the knowledge about the latest grid technologies and would also rationalise the available computational resources used by the public and private sector. This integrated project consists of three sub-projects: Infrastructure, Middleware and Applications. It is being implemented through co-operation between: Zagreb University Computing Centre (SRCE), several faculties within the Universities of Zagreb, Split and Osijek, Institute Ruđer Bošković, and Ericsson Nikola Tesla Company.

3.11.Improvement of Production and Business Processes

At the local level, entrepreneur centres have been conducting training programmes for start-ups and growing enterprises which are co-financed by the Ministry of Trades, Small, and Medium-Sized Enterprises. So far, 1,500 entrepreneurs have completed their training programmes. The Ministry of Trades, Small, and Medium-Sized Enterprises has been implementing a programme encouraging businesses (through public invitations such as that of 2003) to adopt ISO standards. The programme has been running for three years and has doubled the number of small businesses certified to ISO 9001. However, few enterprises have shown interest for other standards such as ISO 14001, ISO 17025, and ISO TS 16949. By adopting ISO standards, companies, businesses, cooperatives and institutions can boost the competitive edge on the international market and gain managements skills.

The Ministry of Science and Technology encourages the application of modern methods in reengineering business processes and decision-support systems in complex business environments. University students and teachers can use these modern software packages as an aid in making decisions. Through courses, students become familiar with their possibilities, and when they graduate, they will be able to implement this knowledge in new working environment.

Working on a scientific information exchange network, the Ministry of Science and Technology has been financing the Scientific Information System (SZI) and the Croatian Scientific

Bibliography (CROSBI). These allow for the scientific and academic community to access technological databanks and knowledge bases nationwide. However, the information system used by scientists has not yet been connected with the one used by business people.

3.12.School for the Information Age

In designing models for ICT curricula for elementary and secondary schools, the Ministry of Education and Sports has been paying special attention to teaching programmes that develop and encourage invention from the earliest age and has introduced a number of attractive promotional activities of the information society into primary and secondary school curricula. The expert team of the Ministry of Education and Sports has set the foundations for teaching programmes and defined basic skills and knowledge to be imparted to students during their primary and secondary education. The project was concluded in October 2003 with new teaching programmes. Information science has become a compulsory subject in all secondary schools and an optional subject in all primary schools. It has been taught by about 1,200 teachers.

Within the framework of ICT application projects, the Ministry of Science and Technology has been financing a project called "ICT Curriculum". Its objective is to catalogue ICT teaching programmes for primary and secondary schools. The project starts from the modern perception that ICT teaching should be similar to that of natural sciences and mathematics. In other words, teaching should not be limited to practical skills in using current technology, but should also focus on basic theory and independent problem solving.

"Net in School" is a project in which Hrvatski Telekom has been donating equipment and services for Internet workshops in 50 schools in Croatia. In these workshops, students will learn to use global computer networks. Their training has started in November 2003 and will intensify in the second half-year. Workshop programmes were designed and teachers appointed in co-operation with the Ministry of Education and Sports in September and October 2003.

Croatian Informatics Clubs Association has successfully been organising the participation of Croatian secondary school and university students in international informatics olympiads. National teams have been increasingly successful from year to year, bringing home medals.

In 2002, the Ministry of Education and Sports appointed an expert committee – Council for Computerisation of Schools – which has adopted a training programme in ICT for school staff. It includes all teachers, assistants, school directors and administrative staff and is focused on the application of ICT in teaching and school management. The programme teaches skills required for the integration of ICT in the class and is divided in three courses; basic, advanced, and specialist. There are several regional centres for training teachers in ICT (Zagreb, Slavonski Brod, Varaždin, Šibenik, Split and Rijeka), and additional funds have been allocated in 2003 for their training which started in the school year 2003/2004. The total programme budget for 2003 is HRK 14 million, which have been allocated for the development of a project for automated follow-up, testing and evaluation of course participants and for 680 basic courses (8,160 participants) and 8 specialist courses (for 160 basic course teachers).

In 2002, the Ministry of Education and Sports defined minimum standards for the equipment of primary and secondary schools, aware of the shortage of funds for their implementation. These minimum standards are: every primary school must have a computer classroom with 8+1 (teacher's) networked desktops; every secondary school must have a computer classroom with either 8, 12 or 15+1 (teacher's) networked desktops; all schools must have a desktop in the library and in the administration office and one portable PC with a digital projector to be used in the classroom, all accompanied by appropriate software.

Schools are being supplied by computer equipment through common procurement. Of 1,366 primary and secondary schools, about 800 have computer classrooms. All Croatian secondary schools have at least one computer classroom. The total number of installed computers in schools is 21,000, of which 11,500 in primary schools and 9,500 in secondary schools. The average age of a computer is 3.3 years. In primary schools, 28 students share one desktop, whereas this figure drops to 18 in secondary schools. This means that Croatian secondary schools have practically reached the European average of 100 students per 5-15 computers.

Over the last two years, the Ministry of Education and Sports and Hrvatski Telekom have secured ISDN connection to the Internet to all schools in Croatia. Starting from the fifth grade, every primary school student has got her or his e-mail address and possibility to access the Internet from home. Every school can use the Internet ten hours a day free of charge. However, the equipment is still inadequate, teachers are hard to find and the modem Internet connection is relatively expensive.

There are no obstacles for schools to organise informal ICT classes for adults in co-operation with the local private sector and with the participation of teachers trained in the field. Some secondary schools have been authorised by the Ministry of Education and Sports to conduct formal computer training courses for adults.

3.13. Information and Communication Technology in Higher Education

All higher education and scientific institutions have been connected to CARNet at minimum speed of 2 Mbps. Since 2001, CARNet has been the member of GEANT, the pan-European gigabit research network with the international bandwidth of 622 Mbps. The ongoing GigaCARNet project is aiming at increasing the backbone bandwidth to 1 Gbps. For interactive distance courses, a network of teleconference classrooms has been established, and new central backup and disk servers have been purchased to meet the infrastructural requirements of the Croatian academic and research network (CARNet) and Zagreb University Computing Centre (SRCE).

The Ministry of Science and Technology has purchased 1,270 PCs, 62 network servers, 154 network printers and 87 LCD projectors for the needs of higher education and scientific institutions in 2002 and 2003. It has also financed the installation and/or renovation of LAN networks in 24 higher education institutions and 5 research institutes. The year 2003 saw the installation of LAN in 7 student hostel buildings in Osijek and Zagreb within the networking project of student hostels in Croatia whose completion is expected for the end 2004. This will give every student free access to the Internet from her or his hostel room. Authorisation and authentication system allows Internet access only to persons who have an open account in a higher education institution.

The programme to computerise higher education institutions entails setting up two information systems: Higher education management information system and Student Mess Information System whose development and maintenance have been financed by the Ministry of Science and Technology.

In addition, the Ministry has been financing CARNet referral centres (RCs) since spring 2003. The task of CARNet referral centres is to provide support to university teachers who apply ICT in class. There are seven specialised referral centres located in institutions of higher education with adequate expertise. RC for the selection of courseware tools (Faculty of Electrical Engineering and Computing in Zagreb); RC for courseware design (Faculty of Textiles and Technology in Zagreb); RC for the selection of hardware and software support for the application of IT in class (Zagreb University Computing Centre – SRCE, Zagreb); RC for submitting applications for distance learning projects (Faculty of Organisation and Information Science in Varaždin); RC for multimedia design and adjustment for the World Wide Web (Faculty of Graphic Design in Zagreb); RC for teaching methods and communication in distance learning (Faculty of Organisation and Information Science in Varaždin); RC for IT knowledge testing and self-testing (Faculty of Medicine in Zagreb). All these referral centres are still on a trial run, but after a year they are expected to provide independent and long-term service to their users.

In order to produce ICT managers and increase the number of graduates in ICT for positions in research, development and production, the National Council for Higher Education has approved teaching plans and programmes for professions information science engineer and computing engineer in three institutions of higher education: The Faculty of Electrical Engineering, Machinery and Shipbuilding in Split, Technical Faculty in Rijeka, and Rijeka Community College. However, as the Ministry of Science and Technology is confronted with the lack of higher education teachers in ICT, the National Council for Higher Education has approved IT training plans and programmes for teachers which will be carried out in four institutions of higher educations: Faculty of Philosophy, University of Rijeka, Faculty of Teaching, “J. J. Strossmayer” University in Osijek, High School for Teachers, “J. J. Strossmayer” University in Osijek (classes will be held in Slavonski Brod) and High School for Teachers in Čakovec. However, there are many young people who cannot find a job after

graduation. This is partly due to the failure of a proposal that instead of unemployment aids, funds should be allocated to the training of professions such as ICT whose job is secured immediately after graduation.

Seeking to increase the number of ICT teaching and research staff, the Ministry of Science and Technology has opened 300 new positions in science and higher education in late 2003. Most of these are university positions, but a part of them is meant for teachers and researchers in information and communications technology. New vacancies are being opened for infrastructure specialists in institutions such as Zagreb University Computing Centre (SRCE). Despite the efforts, new positions at institutions of higher education outside the nation's capital Zagreb are being filled slowly.

3.14. Interdisciplinary Acceptance of Information and Communication Technology

Zagreb University Computing Centre (SRCE), Microsoft Education Centre within SRCE and Cisco Academy run by SRCE and CARNet have been holding courses to facilitate the use of ICT to future graduates and to prepare them for lifelong learning in that area. The courses have mainly been held in Zagreb, which makes them less accommodating for other university centres. These courses are intended for students, teachers, researchers, system engineers and other members of the scientific and higher education community. The courses cover a variety of aspects of computer use, Internet use, and use of specific software tools. The courses can be basic or advanced; some are intended for end users, and some as professional training for system engineers. Microsoft courses and the Cisco Academy follow programmes authorised by the respective companies, and the students can obtain Microsoft or Cisco certificates at the end of training.

The Ministry of Science and Technology has been issuing approvals for specialist postgraduate courses and other suitable forms of lifelong learning in which experts in different areas gain interdisciplinary skills needed for innovative thinking. It has also approved the organisation of postgraduate interdisciplinary specialist courses that will encourage ICT application in production and services.

3.15. The Information and Communication Support of Science

The Ministry of Science and Technology has been procuring computer equipment and setting up local area networks for institutions of higher education and scientific institutes, and has financed the connection between the Croatian Academic and Research Network (CARNet) and GEANT, bringing its node to Zagreb in spring 2002. By connecting to GEANT, CARNet has resolved an old problem with small international bandwidth capacity.

CARNet and SRCE provide the Croatian scientific community with hardware and software resources for advanced computer and information use.

The Ministry has also financed the Scientific Information System (SZI) which facilitates the networking of scientific libraries in Croatia, particularly of sibling libraries regardless of their organisational and physical setup. The system has a uniform user interface for all libraries. SZI includes a Centre with on-line access to international databases with science literature and e-journal collections. Croatian scientific literature is available through the Croatian Scientific Bibliography (CROSBI). This database includes all scientific publications by Croatian authors since the early 1990s. It provides the basis for a follow-up and evaluation of results of scientific projects.

3.16. Science in Information and Communication Technology

The Ministry of Science and Technology has financially supported scientific projects which include junior researchers. Their number has increased several times since 1999, and now it is 2,200. A junior researcher is offered a limited duration appointment to work on a project and obtain a master's or doctoral degree.

Since the autumn 2002, the Ministry of Science and Technology has been financing a new generation of scientific projects (including ICT projects). These projects have been divided in four science fields: natural sciences (computing branch of mathematics), technical sciences (computing, telecommunications and information science), social sciences (information science) and liberal arts (information science). The Ministry is seeking to overcome the gaps between these projects through collaboration between them.

3.17.Measures for Encouraging and Benchmarking the Development of Information and Communication Technology

The Ministry of European Integration issues opinions on all new bills as to their conformity with *acquis communautaire* and analyses the conformity of the legal system of the Republic of Croatia to that of the European Union and to the legal instruments of the Council of Europe. The Ministry also studies the experiences of other countries, especially if they are candidates for the EU membership.

For ICT to develop, it is vital to observe internationally recognised intellectual property rights. The State Intellectual Property Office closely follows the activity of relevant international intellectual property organisations such as WIPO, USPTO, EPO and JPO, and occasionally holds seminars whose aim is to encourage the application of acquired knowledge in real life. The Office would appreciate a greater public response to its activities, but is also aware of limited resources on hand. The Office has set up a public web service with a searchable database of intellectual property rights and registered intellectual property in Croatia, providing an overview of registrations and protected industrial property (patents, product and service marks, industrial design) and an insight into the related trends in the world. In addition, the Office co-operates with a number of inventors' associations.

International ICT standards which are important for harmonisation with World Trade Organization and the European Union are adopted and applied through the Ministry of Justice, Public Administration and Local Self-Government. The adoption and application of ICT standards require strong professional commitment of individuals and institutions alike.

One of the permanent activities of the State Bureau of Standards and Metrology is to provide infrastructure for the adoption of international/European standards (by establishing national technical committees – gathering representatives of interested parties, studying international/European standards, achieving national consensus on the adoption of international/European standards, and applying new Croatian standards) and to encourage their implementation as new Croatian standards. So far, the Bureau has appointed technical committees for the application of IT in medicine (DZNM/TO 215, Medical information technology, established on 19 June 2000) and in geoinformation (DZNM/TO 211;

Geoinformation, established on 29 January 2003), and has initiated the procedure to introduce relevant standards. In 2001, the Ministry of Science and Technology commissioned from IDC a comparative study of ICT trends in Croatia in respect to other countries. IDC has decided to continue this study at its own expense in order to sell it to interested parties. The study provided an accurate insight in the number of Internet users, number of computers and the strength of Croatian ICT sector.

ANNEX 1 Information and Communication Technology in Culture

In order to bring ICT closer to all citizens, institutions and culture workers, the Ministry of Culture has developed "Teuta", a cultural heritage information system built on its Central Inventory of Cultural Heritage, but also including collections of documents (photo library, photo collection on CDs, map library and microfilm), Registry of Cultural Goods, War Damages to Immovable Cultural Heritage, Project Proposals for the Preservation of Cultural Monuments and a number of accompanying files necessary for such preservation service to operate.

Teuta has three objectives: the first is to give a complete view of national monuments; the second is to create a knowledge base which is necessary for the preservation of cultural heritage in the sense that it would show all available documentation about a particular monument; the third is literally to preserve cultural heritage, since digitised documentation, which is a cultural good in itself, is the most efficient way to preserve cultural heritage.

This information system conforms to the European standards (Council of Europe recommendations and directives, ISO standards) in terms of information content and structure, as well as in terms of the platform on which the system has been built. These warrant smooth connection and data exchange with other similar systems on the national, regional or international level. Moreover, the system is open for upgrade and adjustment and may prove useful in those countries which have not started to develop their own information systems or may serve as the basis for a larger, regional project to digitise cultural heritage.

In its next phase of development, Teuta will be upgraded to web technology which allows input of and access to data from many locations at the same time as well as the connection with similar systems in the country and abroad. This means that public shall have access to

information on our cultural heritage, which in turn will be protected by necessary safety measures. This will improve general awareness of the cultural heritage, strengthen the identity of the community and individual, open dialogue between cultures, and encourage interest for the entire human heritage, contributing thus to its preservation.

CultureNet.hr is a project of the Ministry of Culture realised in co-operation with the Open Society Institute Croatia whose aim is to put together all available cultural data resources (organisations, associations, institutions, projects, etc.), encourage their use and improvement, and make relevant information (such as that on potential partners) available to all culture workers. The idea of CultureNet is to improve cultural co-operation in Croatia and abroad, as well as to improve the interaction between Croatian cultural institutions, between institutions and artists, and between these two and general public. The intention of this portal is to bring together all cultural resources in Croatia, public and private, profit and non-profit, mainstream and underground.

Culturelink, a project by UNESCO, Council of Europe, Ministry of Science and Technology, and Ministry of Culture is a world network of international co-operation in cultural development and data exchange related to culture and cultural policy.

The Ministry of Culture has in many ways encouraged and financed online projects related to publishing and publications, especially to online bookstores, e-book development, and online ticket reservations for performances. It has also organised a number of conferences and seminars dedicated to the development of the information society and encouragement of ICT use in civil society.

ANNEX 2 Healthcare Services in the Information Society

The Ministry of Health has become aware of the need to make its healthcare services available online. So far we can speak of but a few information islands in the sea of national healthcare system. No standards for medical coding systems or medical documentation have been defined so far. The Ministry of Health has started an initiative to define these standards and has appointed a committee whose task is to define coding systems and medical documentation to be used in the computerisation of the entire healthcare system. The Ministry

has also initiated a number of projects whose aim is to introduce IT to primary health care, hospitals, outpatients' clinics and laboratories.

The information and communication system of primary healthcare is seen as the central system allowing access to all participants in medical treatment. Thus, the primary healthcare system will make the core of the entire healthcare system. This system will keep together all patient records. As other systems such as hospitals, laboratories, and outpatient clinics will be connected to the central system, it will have to store unique personal records of all patients. Smart Card technology will warrant the privacy and safety of data, professional use and interoperability. Thanks to the connection between all systems, patient referral and prescriptions will be completely digital. In the trial run, the primary healthcare information system has also included the infrastructure of e-signature.

The systems in preparation must support online services such as patient appointment, interactive counselling, and other healthcare services. The implementation of this system is expected to bring better control over healthcare resources and expenses and better service to the patient. In addition, all records required for the treatment will be available in one place.

ANNEX 3 An Outline of Projects by Government Bodies

Ministry of Finance

- Customs: Customs administration reform and modernisation
- Revenue: Revenue Service Information System
- Treasury: Treasury System
- IBRD loan: The construction of border-crossings (objective: integrated border control)
- IBRD loan: Trade and Transport Facilitation in Southeast Europe
- Public Debt System
- Project: Capital Investments and Institutional Reforms (City Administration of Zagreb)

Ministry of the Economy

- Computerisation of land under exploration and exploitation
- Introduction of IT in administration in accordance with the ICT development strategy

Ministry of Patriotic Defence War Veterans

- Information system

Ministry of Culture

- CultureNET, CultureLINK

- Information system
 - Cultural Heritage Information System "Teuta"
- Ministry of Defence
- Information system
 - Project: Administrative Processes and Document Management
- Ministry of Agriculture and Forestry
- Market Information System for Agriculture
 - Main Study of the Geographical Information System for the Forest Fire Management
 - Farmer registry
- Ministry of Maritime Affairs, Transport, and Communications
- Computerisation of the regional treasury and accounting office of the Ministry
 - Computerisation of inland navigation
 - Building and equipment of the control stations system
 - Building of the information system for maritime transport
 - Computerisation of the Ministry
- Ministry of Justice, Public Administration and Local Self-Government
- Computerisation of land and deeds registry
 - Computerisation of public administration and county offices
 - Computerisation of the judiciary
 - Supreme Court Decision Information System
 - Internet access for municipal and county courts in Zagreb, Osijek, Rijeka and Split
 - Digital Company Registry with commercial courts
 - Network of Judges
 - Land registry for islands
- Ministry of Education and Sports
- Computerisation of schools
 - Internet School
- Ministry of Labour and Social Welfare
- Computerisation of the Ministry
- Ministry of the Interior
- Introduction of the new identity card
 - Visualisations in real time
 - Project: Border Crossings (Schengen-CARDS)
 - Police information system
 - Project: Business Processes and Document Management
 - Implementation plan for a professional radiocommunication system TETRA
- Ministry of Foreign Affairs
- Information system
 - Network of Embassies and Consulates
- Ministry of European Integration
- Connection between Euro info points
 - Euro Kiosks
 - Harmonisation of legislation

- Multi-language Translator
- Ministry of Trades, Small, and Medium-Sized Enterprises
- Small business database
 - Trades Registry of the Republic of Croatia
 - Registry of Co-operatives in the Republic of Croatia
- Ministry of Environmental Protection and Zoning
- Information system and environmental management database
 - System of Environmental Protection Documentation
 - National Environment IS (IST project)
 - Inventory of polluters
 - Design of an integral environmental protection information system
- Ministry of Health
- IBRD: Croatian Healthcare System
 - Primary healthcare information system
 - National project of hospital information system
- Ministry of Science and Technology
- Croatian Academic and Research Network (CARNet)
 - Higher education management information system
 - Computerisation of higher education and scientific institutions
 - National and University Library
 - Zagreb University Computing Centre (SRCE)
 - Technology infrastructure – ICT centres
- State Geodetic Directorate
- Restructuring and reprogramming of the national geodetic system
 - National topographic and cartographic information system
- State Directorate for Water Management
- Information system on waters
 - Design of public waters inventory

The connection of the following information systems to the Internet:

- State Institute for the Protection of the Family, Maternity, and Youth
- Meteorological and Hydrological Service
- State Intellectual Property Office
- State Bureau of Standards and Metrology
- Central Bureau of Statistics
- State Inspector's Office

ANNEX 4 Croatian Participation in International Projects and Initiatives

- EU projects and Quadrilateral Co-operation
 - Cross-border eCommerce Development in the Region
 - EU Corridor 5 project – dematerialisation of paper documents
 - Healthcare and Interoperability of Healthcare Systems

- Virtual Rijeka (within the E-MuniS project)
- Tristan-East
- Agenda eSEE (collaboration in development of the information society in South eastern Europe)

4. Plan of Further Implementation of Strategic Recommendations for Information and Communication Technology-Croatia in 21ST Century

4.1. National Council and the Parliamentary Committee for the Information Society Technology

It is necessary to establish the National Council for the Information Society Technology to be presided by the Prime Minister. The Council should define strategic guidelines toward general wellbeing of the society through the use of information and communication technology, and should co-ordinate the implementation of these guidelines.

4.2. Inexpensive, Fast and Safe Information and Communication Infrastructure

Pursuant to the new Telecommunications Act, the Minister of Maritime Affairs, Transport, and Communications should enact a number of subordinate laws, whereas the Croatian Parliament should, upon Government recommendation, appoint the Council of the Croatian Telecommunications Agency as a management body inheriting the Council for Telecommunications and the Croatian Institute for Telecommunications.

The issuance of a public invitation to bid for the implementation of a universal mobile telecommunications system (UMTS) nationwide is expected for 2004. The issuance of UMTS licences will be one of the first activities of the Croatian Telecommunications Agency.

The Ministry of Maritime Affairs, Transport, and Communications intends to increase the market of broadband services at the national level. It also intends to stimulate the development of advanced services and applications for citizens and companies alike, especially in international affairs. The intention is to introduce market competition to the only ADSL service provider in Croatia.

National Smart Card project is intended to integrate the following: ICT ID cards; e-signature cards; health insurance cards; budget user cards; public services cards.

It is necessary to secure high-capacity, high-quality voice and Internet transmission international connectivity with business centres worldwide with which we already co-operate or

intend to co-operate. Not only does this refer to countries with which we have the greatest turnover rate in terms of tourism, but also in terms of scientific data exchange.

4.3. Liberalisation of the Telecommunications Market

After the enactment of the new Telecommunications Act, market situation is to be further improved by a series of subordinate laws. Liberalisation of the market should be monitored using standard statistical indicators, which requires data collection and analysis.

In addition, it will be necessary to distinguish which telecommunications infrastructure is a private property and which has been franchised for use. Operators and service providers should be granted a franchise provided that they invest in ICT infrastructure and service development to keep up with the world trends. Special attention should be paid to research and development at home.

Within the next six months, the Ministry of Maritime Affairs, Transport, and Communications, private sector and other relevant ministries will jointly propose stimulating measures and the framework for the employment of Croatian experts in jobs related to national production and development.

4.4. Access and Participation of Citizens in the Information Society

Once the information technology has been introduced into public administration, it will be possible to provide services to citizens over the Internet. Public and school libraries which have been computerised will provide Internet access to those citizens who do not have their own PCs. Installation of networks and the equipment of computer classrooms in student hostels and higher education institutions will provide each student with an access to electronic educational materials, higher education information systems and public administration services. In procuring ICT products and services, it will be necessary to implement the universal principle in accordance with the initiative of eEurope "User Interfaces for All". In this respect, special attention should be paid to people with special needs.

Croatia requires an Internet law which would regulate its content and use, discourage illegal and offensive content, encourage awareness of the risks associated with Internet use and disseminate legislative aspects of communication and distribution of information over the Internet.

It is necessary to introduce customs and tax benefits that would encourage the use of ICT equipment and software in schools and at home.

4.5. Electronic Business

The Ministry of Trades, Small, and Medium-Sized Enterprises has been preparing a programme for including small entrepreneurs in technical committees with the State Bureau of Standards and Metrology and a number of proposals to encourage the activity of these committees.

It is necessary to design and adopt measures to attract capital investment in small and medium-sized Internet-based businesses, to streamline company registration, tax exemption and employment benefits for start-ups, and to boost users' confidence in e-business in co-operation with consumer associations and industry.

4.6. Electronic Government

Unlike in 2002 and 2003, CARDS programmes for 2004 announce major activities in designing and implementing e-government in central and county administration, and later in local and regional administration.

The Ministry of Justice, Public Administration and Local Self-Government in co-operation with the Croatian Information and Documentation Referral Agency (HIDRA) has worked on a special regulation that would modernise office administration in the Republic of Croatia and adjust it to the requirements of e-administration and communication in accordance with legal provisions of the EU, on the basis of EUROVOC classification.

The year 2004 will see the implementation of a CARDS project intended to put the Croatian Telecommunications Agency to work. The Agency's main objectives are to encourage true and

sustained competition on the telecommunications market and to ensure the implementation of relevant regulations. This project is expected to produce trained Agency experts, to provide assistance in drafting regulations and to provide relevant software, especially the one designed for frequency spectrum management.

The introduction of IT in the judicial branch will partly be covered by CARDS, and will include land registry and other projects. The ongoing activities around land registry will require an amount of time and funds. The latter have partly been provided through CARDS.

The Government of the Republic of Croatia is expected to complete the project Public Administration Computer and Communication Network (PACCN), a multi-service network which will include computer and voice communication and videoconferencing, and which is a *sine qua non* of e-government. This project includes the building of a judiciary VPN (connecting courts and other judicial institutions) and of a VPN connecting primary and secondary schools.

CARDS projects for 2004 also include e-government in terms of connecting central and county administration. The responsibility for the transition of the central and local government to e-administration lies with the Government Office for the Internet Infrastructure Development and depends on available hardware, software, and network resources. Priority should be given to e-procurement due to its key influence on the development and transparency of e-business administration in the public and private sector.

The development of easily accessible, top-quality information services, which includes an integrated Web portal with access to all levels of the central and local government, depends on the availability of central and local databases which are run by appropriate software. The application of this software is relatively quick and can be seen on several web-pages of the central government.

The project of citizens' digital registry which started with the healthcare information system will show the degree of interoperability between government systems (Ministry of the Interior, Ministry of Labour and Social Welfare, Ministry of Justice, Public Administration and Local Self-Government, Central Bureau of Statistics and other systems).

Business process reengineering and the application of modern decision-support methods based on ICT in public administration rely mainly on the efforts of the Government Office for the Internet Infrastructure Development and on the implementation of an integrated information system in the Republic of Croatia - an issue which should partly be solved by the establishment of an organisational unit within the Ministry of Justice, Public Administration and Local Self-Government through CARDS programme and partly by improved performance of public administration.

4.7. Teleworking

In order for telework to become a Croatian reality it is necessary to make the public aware of its benefits. The Ministry of Labour and Social Welfare will encourage trade unions, employers and the Croatian Employment Institute to organise seminars whose aim is to train people in teleworking skills. These seminars will familiarise the employers and the workers with the possibilities and benefits of working at home or away from an employer's place of business.

Teleworking should be encouraged through tax benefits.

4.8. Development of Information and Communication Technology as a Production Sector

The Ministry of Trades, Small, and Medium-Sized Enterprises should prepare the ground for bringing leading international ICT companies and their development programmes to Croatia. Although such co-operation has been recorded, it has been scarce. Foreign investment in priority areas should be encouraged, provided that there are no intermediaries between Croatian and ICT companies.

The development of the information and communication sector requires that it be evaluated in terms of price, quality and functionality of all its components, and particularly of network services and applications. Individual ratings should be made public and the top-ranking institutions and companies should be awarded and compared with developed countries.

4.9. Focusing on Software and Innovation

The Ministry of Trades, Small, and Medium-Sized Enterprises should encourage programmes introducing ISO standards, especially ISO 14001, ISO 17025, and ISO TS 16949, for which few enterprises have shown interest. By adopting ISO standards, companies, businesses, cooperatives and institutions can improve their business management, boost their competitive edge on the international market and gain managements skills.

It is necessary to provide tax benefits to all ICT companies whose employees are included in lifelong learning programmes.

The Ministry of Trades, Small, and Medium-Sized Enterprises will focus on introducing uniform operational standards to entrepreneur centres and incubators within the framework of its support programme.

Financed from the budget of the Ministry of Science and Technology, the national Programme of Innovation and Technology Development (HITRA) intends to network infrastructure institutions for technological development and innovation by the end of 2003. The network will not include a research and development institute and technology park in Osijek, whose establishment is still pending.

4.10. Open Opportunities for Accelerated Growth

The Ministry of Science and Technology intends to complete university education reform by the end of 2007. This lengthy deadline reflects the inertness of the higher education system. There are grounds to believe that the new Science and Higher Education Act will increase the number and better integrate Croatian universities. The universities will have to compete to attract students and company investment, which in turn will encourage those professions that are of mutual interest to students and investors.

Along those lines, it is necessary to reduce the quotas for those professions which are in low demand on the labour market and to invest in the training of professions such as ICT whose job is secured immediately after graduation.

In three institutions of higher education outside Zagreb the school year 2004/2005 will start with teaching programmes for new professions *information science engineer* and *computing engineer*: Faculty of Electrical Engineering, Machinery and Shipbuilding in Split, Technical Faculty in Rijeka, and Rijeka Community College. These programmes have been adopted by the National Council for Higher Education and are expected to produce ICT managers and increase the number of graduates in ICT for positions in research, development and production.

ICT companies should co-ordinate their efforts toward a more aggressive marketing in Central and Eastern Europe. Their success could be measured through increase in exports.

4.11.Improvement of Production and Business Processes

In order to improve production and business processes it is necessary to follow and encourage the latest achievements in industrial information systems and to ensure that relevant Croatian institutions actively participate in the work of international consortiums whose job is to create standards in this area.

It is also necessary to introduce business process reengineering and modern decision-support methods based on information and communication technology in higher education training programmes for managers.

4.12.School for the Information Age

New teaching programmes prepared by an expert team of the Ministry of Education and Sports will be adopted by end 2003, and their gradual implementation will start with the school year 2004/2005. The Ministry of Education and Sports is about to adopt and implement the results of the project "ICT Curriculum" which has catalogued ICT teaching programmes for primary and secondary schools. It is worth noting that the adoption of this and similar projects is of strategic importance for Croatia.

By 2005, the training programme in ICT for school staff which has been adopted by the Council for Computerisation of Schools of the Ministry of Education and Sports will include

over 40,000 people in primary and secondary schools, of whom over 85% will be teachers. Through the programme, the teachers will acquire (or confirm) elementary "computer literacy" and will be prepared for lifelong learning in ICT application in class.

In 2004, the Ministry of Science and Technology will introduce UNESCO Chair in ICT Training of Teachers in Higher Education. With the support of UNESCO, this could become a lifelong programme. It would include special courses for teachers in information science, and separate courses for other teachers. The application of ICT would be encouraged in all subjects, and the translation of foreign language materials would help create a pool of electronic educational materials and tools. The problem is the shortage of teaching staff and translators.

4.13. Information and Communication Technology in Higher Education

The four institutions of higher education (Faculty of Philosophy in Rijeka, Faculty of Teaching, in Osijek, High School for Teachers in Osijek with classes in Slavonski Brod, and High School for Teachers in Čakovec) whose programmes for studies in information science have been approved by the National Council for Higher Education have decided to start new ICT programmes as soon as possible and increase the number of enrolled students.

To increase the number of ICT teaching and research staff, the Ministry of Science and Technology should encourage the filling of vacancies opened by higher education institutions outside the national capital.

The Ministry of Science and Technology intends to increase the number of staff providing support in ICT application in higher education.

4.14. Interdisciplinary Acceptance of Information and Communication Technology

It is necessary to develop vocational training programmes for managers who will be able to successfully apply ICT in various business and administration processes.

4.15. The Information and Communication Support of Science

The National Information System of Libraries (NISKA) is a system under which all Croatian libraries should be computerised and networked, regardless of their profile (scientific, public or school). IBM Croatia and the National and University Library (NSK) have made an implementation project for building digital libraries. NISKA will be implemented according to the library profile, but all libraries will share common standards of interconnection. NISKA will be implemented within the framework of Scientific Information System (SZI).

Local area networks and computer equipment require continued maintenance and upgrade. This is the task of the Ministry of Science and Technology which has been procuring computer equipment for institutions of higher education and scientific institutes through the Government Office for the Internet Infrastructure Development.

4.16. Science in Information and Communication Technology

It is necessary to initiate a science project called "Research in the field of information and communication technology" to allow the pre-competitive pursuit of the further development of information and communication technology both globally and domestically, to offer a scientific foundation for the realisation of the strategy, to unify individual research projects in a common strategic concept, to unify research teams using information and communication technology, to introduce more young researchers to research and provide the foundation for the development of competitive services and products of information and communication technologies.

It is also necessary to encourage applied research aimed at the advancement of various areas of human activities and the creation of knowledge, in particular in the areas of data mining and knowledge discovery, decision-making support and the creation of models and simulations of social, economic, technical and ecological systems, as well as research on the links between ICT and employment, and the role of education in securing employment.

4.17. Measures for Encouraging and Benchmarking the Development of Information and Communication Technology

To speed up the development of information and communication technology it is essential to adopt relevant international standards. Although the technical committee for information technology has formally been appointed for a couple of years and has been reorganised in accordance to the Ordinance on the Appointment and Work of Technical Committees (NN 86/98), only after a series of negotiations with IT professionals (Croatian Information Technology Society, Ministry of Science and Technology) have Croatian standards entered a stage of preparation. The Ministry of Science and Technology and the Central Bureau of Statistics will be responsible for monitoring and measuring the progress of the information society.

By 2007, the Central Bureau of Statistics intends to harmonise its procedures, methods and most of its infrastructure (statistical registries, classifications and nomenclatures) with the EU directives based on the EUROSTAT document "Statistical Requirement Compendium". Modules 491 and 492 of the "Compendium", which refer to the use of statistics in the information society and to communication services, provide the model for an improved analysis of ICT and Internet use. This analysis, supported by the Ministry of Science and Technology, should in the long run produce a national map of ICT and Internet use.