

# **THE ICT RESEARCH ENVIRONMENT IN MONTENEGRO**

**November 2008.**

## Table of Contents

<b>ABSTRACT .....</b>	<b>3</b>
<b>1. MONTENEGRIN ICT POLICY FRAMEWORK.....</b>	<b>4</b>
1.1. OVERALL ICT POLICY FRAMEWORK .....	4
1.2. THE ELEMENTS OF ICT RESEARCH POLICY MAKING .....	7
<b>2. OVERVIEW OF ICT RESEARCH ACTIVITIES .....</b>	<b>11</b>
2.1. ICT RESEACH PROJECTS .....	11
2.2. KEY COMPETENCIES IN ICT RESEARCH FIELDS .....	14
<b>3. KEY DRIVERS OF ICT RESEARCH.....</b>	<b>15</b>
3.1. MAIN ICT SECTOR TRENDS IN MONTENEGRO.....	15
3.2. MAIN SOCIO-ECONOMIC CHALLENGES IN MONTENEGRO .....	19
<b>APPENDIX 1 - MAIN FINDINGS AND CONCLUSIONS .....</b>	<b>21</b>

## **Abstract**

This report is developed in November 2008 in the content WBC-INCO.NET project and is orientated along the lines of the SCORE reports-document that can serve to consulting expert ICT stakeholders about the relevant ICT research priorities in each WB country in the period 2007-2013.

The report provides a brief overview of the ICT research environment in Montenegro. It includes key facts and figures concerning policy framework, current trends as well as short overview of main drivers of ICT research in Montenegro.

### **Expert team**

**PhD Bozidar Krstajic**, leading expert – Center of Information System, Podgorica

**Milica Dakovic**, ICT analyst - Institute for Strategic Studies and Prognoses, Podgorica

**Aleksandra Radulovic**, analyst – Center of Information System, Podgorica

# 1. MONTENEGRIN ICT POLICY FRAMEWORK

## 1.1. OVERALL ICT POLICY FRAMEWORK

Montenegrin economic development is, among other important policies, based on the concept of highly developed information society. Conceptual frame for future information society development is based on network of institutions and regulations which are defining this area of economic activity. The most important which is a basis for this statement is the **Strategy for information society development** of Montenegro, as the most significant document which contains main areas, goals and planned activities for information society development as well as knowledge society development in Montenegro. Reform in ICT sector started in 2000. From that period Montenegro adopted and implemented all important regulations which now present a solid base for liberalization of telecommunication sector and open market economy in this particular area. In 2001 Montenegro introduced **Telecommunication Law** which is the most important legislation in this area. This law was innovated in 2008 and adjusted to EU directives as well as changed its name into the **Electronic Communications Law**. After 2001 Montenegro adopted several legislations and important legal documents in area of ICT like: E-commerce Law; Intellectual protection Law; Central Register Law as well as Electronic documents Law. All of these regulations are prepared according to EU Directives and international legislation in area of ICT. On that way, Montenegro has created a solid framework for open market, competition in this area and future information society development. In order to achieve these goals two regulatory bodies are established: Agency for telecommunications and postal services and Agency for radio-diffusion which has positively influenced on ICT market in Montenegro. Strategy for information society development in Montenegro was adopted in 2004 and contains all important goals and planned activities that need to be implemented on the way to highly developed information society. Some of the most important goals presented in the Strategy are:

- Dynamic economic development;
- Reform, adoption of standards and democracy;
- Establishing better, more transparent public administration;
- Removing of business barriers;
- The same opportunities for individuals in area of education and access to Internet;
- Better safety for citizens and human rights issue.

**Table 1** Basic principles and goals for future information society development

	<b>PRINCIPLE</b>	<b>GOAL</b>
1	Developing of institutional infrastructure	<ul style="list-style-type: none"> <li>- On the state level</li> <li>- On the local level</li> <li>- At the University</li> <li>- In NGO sector</li> </ul>
2	Development of telecommunication infrastructure	<ul style="list-style-type: none"> <li>- Harmonize the project to local telecommunication infrastructure</li> <li>- Public Access Points</li> <li>- Competitiveness of telecommunication sector</li> </ul>
3	Improving legislation	<ul style="list-style-type: none"> <li>- Analysis of existing legislation</li> <li>- Prepare the Law on electronic document</li> <li>- Deregulation of the Government of Montenegro and other institutions</li> <li>- Implementation of Convention on cyber crime</li> <li>- Intellectual property protections</li> <li>- Personal data protection</li> </ul>
4	Increasing level of information literacy	<ul style="list-style-type: none"> <li>- Harmonizing of education program to information society development</li> <li>- Access to Internet</li> <li>- Education related to E-government projects</li> <li>- Developing of digital languages for minorities</li> <li>- Education among the population</li> <li>- Inclusion of social excluded groups</li> </ul>
5	Stimulating development of ICT sector in Montenegro	<ul style="list-style-type: none"> <li>- Developing ICT sector as an intellectual capital</li> <li>- Developing of domestic ICT sector</li> <li>- Better fiscal policy in ICT area</li> </ul>
6	Digital gap avoiding	<ul style="list-style-type: none"> <li>- Internet access in rural areas</li> <li>- Private sector promotion</li> <li>- Respect of the local specifics</li> <li>- Better chances for excluded parts of society</li> <li>- Programs for excluded social groups</li> </ul>
7	Confidence and privacy protection	<ul style="list-style-type: none"> <li>- Implementation of the Public Key Infrastructure</li> <li>- Education about privacy protection</li> <li>- Limited access to the private data</li> </ul>
8	Increasing level of safety	<ul style="list-style-type: none"> <li>- Establishing the body responsible for this area</li> <li>- Safety policies and models</li> <li>- Action plan for technical measures of protection</li> <li>- Education in area of computer protection</li> </ul>
9	Transparency	<ul style="list-style-type: none"> <li>- Defined rules for usage of services</li> <li>- Insight into request</li> </ul>
10	Interoperability	<ul style="list-style-type: none"> <li>- Faster access to existing systems</li> <li>- Implementation of international standards</li> </ul>
11	Private Public Partnership	<ul style="list-style-type: none"> <li>- Outsourcing</li> <li>- Importance of the contract</li> </ul>
12	Benchmarking	<ul style="list-style-type: none"> <li>- Implementation of eEurope recommendations 2005</li> </ul>
13	Public interest for information society development	<ul style="list-style-type: none"> <li>- Wide number of participants</li> <li>- TV panels and programs</li> <li>- Newspaper</li> <li>- Domestic achievements in area of ICT</li> </ul>

Source: Strategy for Information Society Development, 2004.

Some of planned goals are already achieved until 2008 and some of them are still waiting to be realized. Strategy for Information Society Development in Montenegro is innovated in 2008 and currently is in status of the final phase preparation. The new version of this strategy has its new goals that need to be achieved until 2013 and which would improve existing level of information society in Montenegro.

The key elements/goals proposed in the newly innovated Strategy for information society developing are specially focused on:

- ICT infrastructure;
- E-education;
- Registers of the population;
- E-business and E-banking;
- E-government;
- Institutional and regulatory framework;
- European goals and standards;
- E-health.

Basic goals are highly oriented to strengthening of existing ICT infrastructure and access to modern technologies as well as further continuing and development of E-government services. One specific goal among the others is E-education. On that way, future investment in this area and focus on research activities in that field represents one of the key issues regarding the new Strategy implementation.

## 1.2. THE ELEMENTS OF ICT RESEARCH POLICY MAKING

The most important document that regulates area of research in Montenegro is given through **Law of science and research** (Official Gazette of Montenegro, 71/2005). Most important bodies that are in charge for science and research activities, according the Law, are: Montenegrin Academy of Science, University of Montenegro, other institutions in area of high education, research institutes and other private and public institutions. In order to achieve priorities, motivate and monitor area of the science and research Strategy on science and research is adopted. Strategy needs to be implemented during the period of eight years. It defines framework for financing the projects in area of the science and research and promote annual plan for financing of research activities. According to the Strategy for information society development in Montenegro, investment in research represents one of the basic priorities on the way to developed information society. Financing research activities in specific areas (education, health) represents important segment that can follow dynamic of information society development, as well.

Today, Montenegro is in its transition phase if we consider estimation and following of development process of information society development. Government of Montenegro recognized the importance of further development it is planned to be established **Ministry for information society development** very soon. **Republic Secretariat for Development** still presents the most important institution in charge for ICT development in Montenegro. This governmental body activity is focused on adoption and implementation of key documents in area of information society. One of the key important documents, besides the Strategy, is Methodology for monitoring and measuring of information society development which is adopted in December 2006 and which clearly defines activities and methodology for research which should trace trends in information society development in Montenegro. Signing and adoption of **eSEE Europe Agenda for the Development of the information society 2007-1012** Montenegro was started to be actively involved to follow the goals from this document. The most important goals are addressed to creation of unique SEE information space; improvement of innovation and investment in ICT research and education as well as development of inclusive information society.

**The Agency for the International Scientific, Educational, Cultural and Technical Cooperation (ZAMTES)** was established upon the decision of the Executive Board of the Parliament of the Socialist Republic of Montenegro on July 1st 1972 as an administrative organisation with the characteristics of a legal person. Ever since its establishment, the Agency successfully coordinated the cooperation between the institutions of the Republic of Montenegro and many international partners. It has been for many years the only institution appointed by the government to deal with matters of international cooperation, which was as such, and still is, known and acknowledged by foreign partners. Today, the Agency represents a modern public administration institution, similar to the ones existing and operating in developed countries, an institution which deals with a form of the so-called “operative diplomacy”, a connective tissue between several key ministries. A number of its program contents and their implementation is based on cooperation with eminent experts from different areas – prominent scientific workers for the area of international scientific–technical and educational cooperation, and the most famous Montenegrin artists for the area of international cultural cooperation.

**The Ministry of Education and Science** represents official body in charge for research activities in ICT area in Montenegro. Namely, special department for Science represents the body which is giving all necessary information related to research projects and ICT projects, as well (FP6, FP7 Program). Montenegro had (under the Program FP6) limited access for participation and was defined as ‘third country’, but today that status is changed. Namely, in 2006 Montenegro has joined to FP7 Program for research and technological development as participant with equal rights as other EU countries. Joining to FP7 Program, which represents the most important pre-accession document, Montenegro has a great chance to participate in this program. There are lots of possibilities under this program not just for the state, but for all researchers and academic institutions within Montenegro, which gives a great possibility for exchange of people and knowledge from EU countries. The Ministry of Education and Science has established a network of National Contact Points (NCP) which are in charge for defined thematic fields under FP7 Program and which can help to Montenegrin researchers and scientists to find a way how to participate in this program and how to present their projects in it. One of the key topics under FP7 Program is addressed to Information Communication Technologies. In order to help to connect Montenegrin research capacities with EU research capacities under this program it was established web portal [www.mneresearch.ac.me](http://www.mneresearch.ac.me) which

helps to researchers and research institutions in Montenegro to get all necessary information that are important for participation in ICT projects.

**University of Montenegro** as the most important academic institution was also involved in research projects related to ICT development in Montenegro. The University of Montenegro is comprised of fifteen faculties, four scientific institutes, the University library and several specialist departments. The University of Montenegro is the only public university in the country. On the other side, private high education is continually growing. Today, Montenegro has two private Universities: UDG University and Mediterranean University which can present solid basis for future ICT experts and researchers developing in Montenegro<sup>1</sup>.

Montenegro was previously a constituent republic of the former Yugoslavia and during that time was connected to Academic Research Network of Yugoslavia (AMREJ). After the establishment of the confederation of Serbia and Montenegro, each republic assumed greater responsibility for its own affairs and this led to the establishment of the **Montenegrin Research and Education Network (MREN)** in 2005. Upon independence in June 2006, MREN became the official national research and education network of Montenegro.

Through the activities of **Montenegrin Research and Education Network (MREN)** and the **Centre of Information System (CIS)** they participated in some projects under the Program FP6. Montenegrin Research and Education Network (MREN) is the name given to the collection of all networking services and facilities, which support the communication and information requirements of the education and research community in Montenegro. MREN is an initiative of the Ministry of Education and Science and does not yet have any formal legal structure. It aims to create, promote, offer, participate in and preserve the requisite bases for effective use of modern telecommunication technologies in the education and research in Montenegro. MREN activities are focused on a few basic areas:

1. The management of the national research and educational network;
2. The planning, design and implementation of technological and developmental projects with emphasis in research networking and grid areas;

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<sup>1</sup> <http://www.udg.cg.yu>; <http://www.unimediterran.net>

3. The representation of Montenegro in the field of European and World-wide research networks;
4. Providing services for academic network in Montenegro.

Its mission is the provision of high-quality international and national networking services to the Academic & Research institutions in Montenegro and to support Research and Educational activities of the public and private sector. In addition, MREN promotes and disseminates the use of ICT in the public and private sector towards a knowledge-based Information Society (e-Government, e-Learning and e-Business). The development and operation of MREN is co-financed by the European Commission through the SEEREN2 project (FP6) and the Ministry of Education and Science. On the other side, CIS represents unique information system which is covering the University and which organizational concept is based on modern development and system monitoring. It is organizational unit of the University and is established in 1996. The most important activities under the CIS are connected to connecting and managing of information system as well as designing and realization of computer networks and software solutions for the University. CIS took part in several projects under FP6 Program (SEE-GRID2 and SEEREN2).

Montenegro has independent research institute which is following information society development through internationally recognized ICT indicators. It is the **Institute for Strategic Studies and Prognoses (ISSP)** and is the first independent economic institute in Montenegro, established in 1998 and is the leading research institute in Montenegro in area of ICT. Based on own experience and significant number of realized projects, ISSP is recognized as one of the leading economic reform promoters in the region. ISSP started in 2004 projects and surveys related to ICT research in order to promote importance of information society development in Montenegro. Lack of data and basic ICT indicators were main ideas to start projects in this area. ISSP has established successful cooperation with local IT experts as well as IT companies in Montenegro and governmental bodies in charge for this area. Making sets of ICT indicators ISSP has developed methodology that measures ICT environment in Montenegro and make it comparable with other countries from the region and EU. Each year, starting from 2004-2008, ISSP through its ICT Survey among population and enterprises in Montenegro provides basic ICT indicators and shows trends in information society development.

## 2. OVERVIEW OF ICT RESEARCH ACTIVITIES

### 2.1 ICT RESEARCH PROJECTS

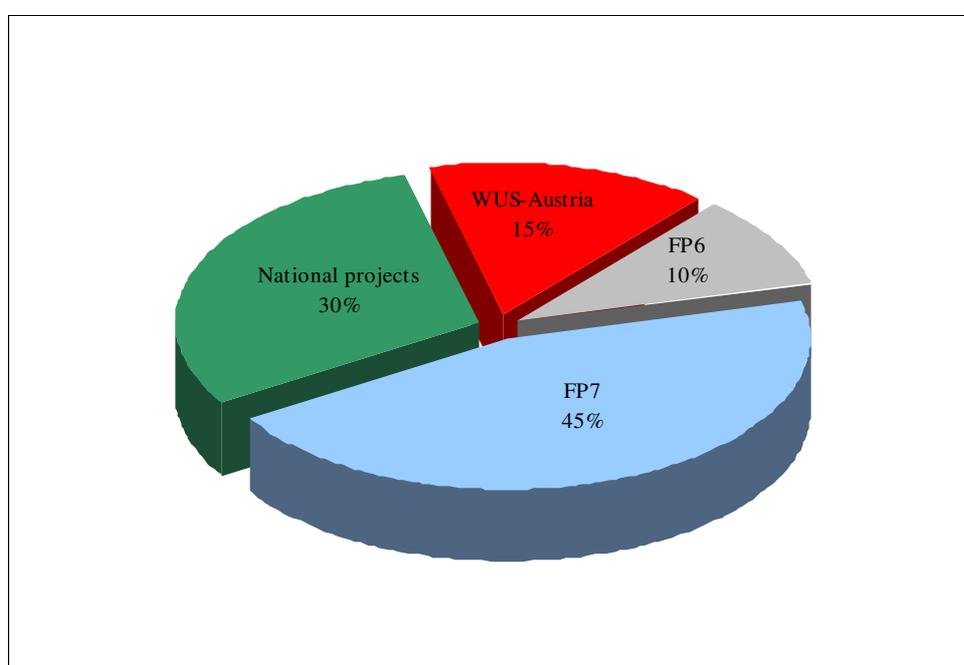
In the past, research in ICT in Montenegro has not been a main focus, but there were some projects with the focus in ICT research in national and international level. ICT research in Montenegro was present, but it was just recently, at the start of this year, that it got integrated to some extent into European research community. On 25th January 2008 the Republic of Montenegro signed Memorandum of Understanding (MoU) with the European Commission which enabled research organisations from Montenegro to participate fully in the EU's Seventh Research Framework Programme (FP7) which includes a period from 2007 to 2013. This associated status allows Montenegro to participate in all calls for proposals and compete on an equal footing with the EU Member States for research co-operation and support actions covering a large number of strategic areas, such as health, agriculture, biotechnology, **information and communication technology**, energy, nanotechnology, materials and new technologies, environment, sustainable tourism, transport and many others. Association of the Republic of Montenegro to the biggest European programme for science is opening big opportunities to Montenegrin scientists, faculties, institutes and companies for cooperation in researches and support activities which are sponsored by this fund, including scientific areas relevant for implementation legislation of EU. This is the way the Republic of Montenegro is entering the society of other countries from West Balkan which are already joined to Seventh Research Framework Programme (FP7): Serbia, Croatia, Macedonia and Albania.

On February 7<sup>th</sup> 2008, University of Montenegro signed a Memorandum of Understanding with the Austrian Development Agency and WUS Austria. A Memorandum refers to the projects in the area of higher education support lasting three years. During past several years, Montenegro was building its own research capacities. Obtained from Ministry of Education and Science, and from WUS-Austria, the summary (pie chart) of projects carried out in public research institutions and for which realization was supported by the Ministry and University of Montenegro was given below.

On March 1<sup>st</sup> 2007, University of Montenegro, Centre of Information System, Faculty of Mechanical Engineering, Faculty of Metallurgy and Technology, Faculty of Natural sciences and Mathematics, Faculty of Civil Engineering, Institute of Marine Biology, Hydrological and Meteorological Service of Montenegro, T-com, Cikom – ICT engineering, ltd and IT

Advanced Services Ltd. (ITAS) signed Memorandum of supporting and developing GRID technologies in Montenegro as well as its implementation in scientific and research purpose. SEE-GRID-2 project supported the launch of the Montenegrin Grid Initiative (MGI). Senior members of the SEEGRID-2 project supported their Montenegrin colleagues from the research community who joined their forces to form the National Grid Initiative (NGI), under the official auspices of the Montenegrin government. Montenegrin Research and Education Network (MREN) is responsible for MGI, and enables to all researchers and science workers of our institution access to GRID infrastructure. MREN also provides help for GRID services.

**Graph 1** ICT Projects in Montenegro



**Table 2** ICT Projects under FP6 Program

FP6 PROJECTS in ICT		
ACRONYM Full name	Partner from Montenegro	Duration (years)
<b>SEE-GRID 2</b> South East European GRID2	CIS <sup>2</sup> –UCG <sup>3</sup>	2
<b>SEEREN<sup>4</sup></b> South East European Research and Education Network	CIS –UCG	2

<sup>2</sup> Centre of Information System, <http://www.cis.ac.me>

<sup>3</sup> University of Montenegro, <http://www.ucg.ac.me>

<sup>4</sup> SEEREN-South East European Research and Education Network.

**Table 3** ICT projects under FP7 Program

<b>FP7 PROJECTS in ICT</b>		
<b>ACRONYM</b> Full name	<b>Partner from Montenegro</b>	<b>Duration (years)</b>
<b><u>SEE-GRID-SCI</u></b> SEE-GRID eInfrastructure for regional eScience	CIS –UCG	2
<b>WBC-INCO.NET</b> Co-ordination of Research Policies with the Western Balkan Countries	MINISTRY OF EDUCATION AND SCIENCE	4
<b>EuroRIs-Net</b> European Research Infrastructure Network of National Contact Points	MINISTRY OF EDUCATION AND SCIENCE	4
<b>IDEALIST2011</b> Trans-national cooperation among ICT NCPs	MINISTRY OF EDUCATION AND SCIENCE	3
<b>SEEERA-EI</b> South East European Research Area for eInfrastructures	MINISTRY OF EDUCATION AND SCIENCE	3
<b>SEEERA-EI</b> South East European Research Area for eInfrastructures	CIS –UCG	3
<b>WINS-ICT</b> Western Balkan Countries Inco-Net Support in the field of ICT	MINISTRY OF EDUCATION AND SCIENCE	2,5
<b><u>NET4SOCIETY</u></b> Trans-national co-operation among National Contact Points for Socio-economic sciences and the Humanities (SSH NCPs)	ZAMTES	2
<b>ICT-WEB-PROMS</b> Promoting ICT cooperation opportunities and policy dialogue with the Western Balkan Countries	UNIVERSITY OF MONTENEGRO – FACULTY OF ELECTRICAL ENGINEERING	2

**Table 4** WUS-AUSTRIA ICT Projects

<b>ICT WUS-AUSTRIA PROJECTS</b>		
<b>ACRONYM</b> Full name	<b>Partner from Montenegro</b>	<b>Duration (years)</b>
<b>eLTF</b> eLEARNING TASK FORCE	CIS –UCG	1
<b>eLP</b> eLEARNING PROJECT	CIS –UCG	2
<b>WIIC</b> WALK IN INTERNET CENTERS	CIS –UCG	1

**Table 5 ICT National Projects**

ICT NATIONAL PROJECTS		
Full name	Partner from Montenegro	Duration (years)
Design of specialized hardware for processing high no stationary one and multidimensional signals of time-variable percolation	UNIVERSITY OF MONTENEGRO (PhD Veselin N. Ivanovic)	3
General time-frequency distribution: application in multimedia systems and hardware realization	UNIVERSITY OF MONTENEGRO (PhD Srdjan Stanković)	3
Research of influence on the structure commutation device on the performance commutator packets implement on NetFPGA platform	UNIVERSITY OF MONTENEGRO (PhD Igor Radusinović)	2
Analysis performances OFDM relay i OFDM cooperative diversity systems	UNIVERSITY OF MONTENEGRO (PhD Zoran Veljović)	2
Menangement of Switched reluctance motor by FPGA chip	UNIVERSITY OF MONTENEGRO (PhD Vladan Vujičić)	2
New concept in development of WHC system	UNIVERSITY OF MONTENEGRO (PhD Radovan Stojanović)	2

**Table 6 ISSP ICT national research projects**

ISSP NATIONAL PROJECTS		
ACRONYM Full name	Partner from Montenegro	Duration (years)
<b>ICT Survey '05</b> Research about ICT usage among households and enterprises in Montenegro	National IT companies: Cikom, TradeCom, Jugodata, Informatika Montenegro, Digit Montenegro	1
<b>ICT Survey '06</b> Research about ICT usage among households and enterprises in Montenegro	Republic Secretariat for Development, T-COM, Cikom, TradeCom, Jugodata, Informatika Montenegro	1
<b>ICT Survey '07</b> Research about ICT usage among households and enterprises in Montenegro	Cikom, TradeCom, Jugodata, Broadband Montenegro, Digit Montenegro, S&T Montenegro, SAGA, Informatika Montenegro	1

## 2.2 KEY COMPETENCIES IN ICT RESEARCH FIELDS

According to the data showed at Graph 1 ICT research fields of great interest in Montenegro's research community are: software, computer hardware and systems and telecommunication

The Table below presents the most competent research fields in Montenegro.

	Classification of ICT research fields	Number of organizations active in research field
1	Software, grids, security and dependability	6
2	ICTs for enterprises (business processes, work organization etc.)	14
3	Knowledge, cognitive and learning systems	8
4	ICTs for government	6
5	ICTs in NGO	5

### 3. KEY DRIVERS OF ICT RESEARCH

#### 3.1. MAIN ICT SECTOR TRENDS IN MONTENEGRO

Montenegrin ICT sector is showing positive trends in the period 2001-2008 and it can be concluded through the analysis of main ICT indicators like PC and Internet penetration, mobile and fixed phone penetration rates as well as IT consumption per capita which is still below the expected level but projections are showing that it would increase by 30% in average, until 2011.

**Table 7** Main ICT indicators in Montenegro

	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Main telephone lines (per 1,000 people)</b>	169.5	177.4	184	190	188	185	171	168	176
<b>Fixed phone penetration rate (%)</b>						29.7	27.5	27.1	28.4
<b>Public telephones (per 1,000 people)</b>	0.53	0.86	1.5	1.6	1.5	1.3	1.2	1.02	0.86
<b>Mobile phone users (per 1,000 people)</b>	62.3	241.4	356.2	445	420	483	543	735	1,083
<b>Mobile phone penetration rate (%)</b>			57.4	71.6	67.7	78	87.6	103.8	168.6
<b>Computers in households (%)</b>								38	47
<b>Internet subscribers (per 1,000 people)</b>			18	27	37.5	51	68	73.9	195
<b>Internet penetration rate (%)</b>			2.6	4.1	12.5	16.1	19.8	23.9	31.5

*Source: Agency for telecommunications and postal services  
Institute for Strategic Studies and Prognoses*

During the recent several years telecommunication sector shown positive trends and it was faced with the process of liberalization and market opening. Competition in this area increased number of market players (mobile phone operators) which caused price decreasing in area of mobile telephony. Based on that fact, today Montenegro has the highest mobile phone penetration rate in the region and EU. On the other side, in area of fixed telephony there's still one dominant operator, but it is faced with a new competition in this field. The similar situation is in case of the Internet providers. Even though Montenegro still has not only one but dominant Internet provider, it can be expected competition in this area, as well. Struggling with monopolies in ICT area should positively influence on prices and quality of services in those areas.

### **3.1.1 Telecommunications**

Opening of telecommunication market and its liberalization caused competition between the mobile phone operators which are now present in Montenegro. Today, Montenegro has three telecommunication operators: ProMonte GSM (100% owned by Telenor Mobile Communications AS), T-Mobile (owned by Crnogorski Telekom) and M:Tel (owned by Telekom Serbia and Dutch company 'Olagar). On the other side, Montenegro has one of the highest mobile phone penetration rates which are in the same line like other technologically developed countries from EU. But, if we analyze the purposes of mobile phone usage it is still below expected, especially related to mobile phone usage for the Internet services.

### **3.1.2 PC and Internet**

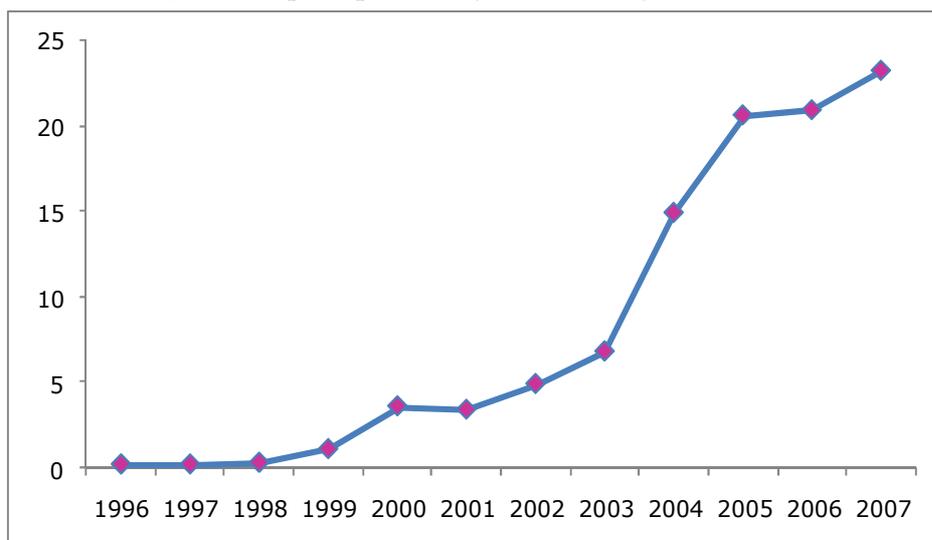
If we analyze average annual projected growth of PC shipments in Montenegro, they showed 40% growth in the period 2006-2007. Prognoses of IT market growth in the period 2007-2011 are positive and are showing that an average level of sold equipment should increase 25%, programs should increase 30% and IT services 35%. It can be concluded that Montenegrin IT market within the observed period should increase 28% in average.<sup>5</sup>

PC penetration rate as well as the Internet penetration rate represents one of the key ICT indicators which are showing level of information society development in one country. Based on that fact, number of computers in the households in Montenegro is constantly increasing as well as those households with the Internet connection. Digital divide among the regions (north, central and south) is still present.

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<sup>5</sup> Mineco, Belgrade.

**Graph 2** Computer purchasing trends among the households



Source: ISSP

For example, in 2006 38% of the households in Montenegro had computers, while that percentage increased in 2007 on 47%. On the other side, Internet penetration rate is increasing too and in 2007 was 31.5%. It is still below the EU average, but is constantly increasing on the other side<sup>6</sup>.

### 3.1.3 Software

Montenegrin vision to develop strong information society is recognized through the documents and strategies related to ICT development as well as E-government solutions that should increase level of E-sophistication and improve efficiency of current administration and decrease costs on the other side. In order to achieve these goals Government of Montenegro have signed long term contract with the Microsoft Corporation (starting from 1999 and 2005) which was interested for implementation of E-government solutions in Montenegro. By signing the contract Microsoft provided software solutions that can be used in Montenegro in the period of next three years. On that way, licensed software was implemented in all education and research institutions in order to develop modern education system in which pupils and students can improve their level of information literacy and be involved into modern information society.

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<sup>6</sup> ISSP, ICT Survey '07  
Agency for telecommunication and postal services

### 3.1.4 E-government

In May 2007 Montenegro has introduced a framework for establishing E-government solutions. Another contract with the Microsoft Corporation is signed and was addressed to improvement of information system safety within the governmental bodies. Governmental Commission for economic policy in July 24<sup>th</sup> 2007 have organized the first e-meeting which officially represents starting point for E-Government project in Montenegro. Activities related to E-government solutions are in startup phase. Future activities should address more actual projects which should implement new software solutions.

### 3.1.5 Montenegrin Education Information System/MEIS

The Ministry for Education and Science in 2004 started with implementation of ICT in education system of Montenegro. Project called **MEIS (Montenegrin Education Information System)** is focusing on computers and their establishing in Montenegrin primary and secondary schools. On the same time, it is planned education process for professors of informatics in these schools. It is planned that 94% of students and pupils in Montenegro has computers in their schools. Today, four years later, all the secondary schools in Montenegro has the Internet connection, while there are 50% primary schools covered with the Internet connection. On the other side, many schools in rural areas still do not have the Internet access. In existing structure of education system in Montenegro informatics science is present in primary and secondary schools like one mandatory topic which can help young people to get and improve their level of information literacy. Besides that, informatics is introduced as an optional topic, which can improve future specialist knowledge in area of ICT.

Nevertheless, IT education still remains a great challenge. According to the latest survey:

- 68% of citizens in Montenegro has opinion that lack of knowledge on foreign language is the main obstacle for their information literacy;
- 40% of citizens wants extra IT education;
- 35% children between 10 and 19 want extra IT education<sup>7</sup>.

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<sup>7</sup> Source: ISSP, ICT Survey '07

## 3.2. Main Socio-Economic Challenges in Montenegro

### 3.2.1 ECONOMIC TRANSITION

Transition is process of economic transformation from the state to the private ownership. It presents the transformation of the political, institutional, economic and social system. At the first place it presents change of people's way of thinking. However, in period since 1998 until the 2006, many changes in different sectors and parts of the society have happened in Montenegro.

*Domination of private property* - As a result of different privatization methods more than 80% of state-owned capital has been privatized, several strategic partners have been obtained and now there is no enterprise in Montenegro that does not have, in certain percentage, private owners. Less than 20 firms in Montenegro remain with Government ownership over 51%. The privatization led to the expansion of the capital market and its institutional foundation.

*Improvement of business environment* - Three main changes that mostly contributed to the development of the business environment were introduction of Euro, price liberalization and decrease of custom rates. In addition, the whole set of regulation regarding business environment were passed in the last several years. The major changes introduced by the new laws are the following:

- Introduction of VAT tax on the level of 17% instead turnover tax;
- Proportional rate prescribed by new personal income (15% in 2008 and 9% in 2010) and corporate profit tax laws (9%);
- The amount of the property tax is based on the market value of the real estate.

*Public expenditures reduction* – During the last three years Government started restrictive budget policy through the reduction of almost all expenditures categories. In the first year of its independency, Montenegro run budget surplus for the first time in its modern history. That trend continued through the 2007 and state budget until the end of September of the current year had budget surplus of about 8.4% of estimated GDP.

*Price liberalization* - Today only prices of several products are under the state control (electricity, petrol, water supply services and communal services, etc). Interest rates are also set up at the market.

*Institutional deregulation* - Establishment of independent institutions that are not under the Government control presents the institutional deregulation. In Montenegro several very important institutions are settled as independent: Central Bank, Securities Commission and all institutions of capital market.

*Deregulation of state monopolies* - The deregulation of the state monopoly is partially achieved in the telecommunication sector. In this area the main regulatory body is Agency for Telecommunications. The new Energy Law (adopted in June 2003) promotes new way of functioning of Energy Company of Montenegro, in accordance with the EU directive and anticipates establishing of independent regulatory agency for energy. Public utilities and water supply companies still operate as state owned as well as Railway Transportation Company which is mostly state owned.

All of these measures had positive impact on the macroeconomic performances of Montenegro. The last couple of year's macroeconomic data shows GDP growth, growth of industrial production and inflation rate decreased. From May 2006, Montenegro has stepped into a new phase of its economic and democratic development and returned back its independence. Montenegro jumped over the final obstacle that was in its way to improving economic and political freedom, to developing a free market, to protecting property rights. The enthusiasm of investors and entrepreneurs has to be supported by higher economic freedom and openness of Montenegro. So far, the reforms in Montenegro have been designed in light of achieving macroeconomic stability. Today, in 2008, Montenegro continues with its policy based on macroeconomic stability and increasing level of investments. Regarding ICT issue VAT is reduced from 17% to 7% for computers and computer equipment purchasing. It can be expected that this measure should create better business environment for ICT development in the future.

Future information society development of Montenegro is also depending on removing of existing obstacles related to this issue. On the other side, one positive trend is addressed to ME domain. Namely, future plans for investment in research and generally ICT are directly

connected to the revenues which Montenegro can have from ME domain. That can be sustainable resource for future research project development and better involvement of Montenegro in existing research programs. Implementation of goals until 2013 regarding information society development can be achieved which can put Montenegro one step forward to the concept of highly developed information society.

## **Appendix 1**

### **MAIN FINDINGS AND CONCLUSIONS (SWOT ANALYSIS)**

<p style="text-align: center;"><b><u>S</u>trengths</b></p> <ul style="list-style-type: none"> <li>- Education and learning in the ICT field</li> <li>- Progressively growing ICT sector</li> <li>- Government commitment towards modernizing and developing ICT sector</li> <li>- ICT infrastructure</li> <li>- ICTs for E-government and E-business</li> <li>- Stability in financing of ICT research projects (ME Domain)</li> <li>- Long-term sustainability</li> </ul>	<p style="text-align: center;"><b><u>W</u>eaknesses</b></p> <ul style="list-style-type: none"> <li>- Lack of regulation and inefficient existing legislation</li> <li>- Small number of realized research projects</li> <li>- Research infrastructure</li> <li>- Lack of information literacy</li> <li>- Digital divide between the regions</li> <li>- ICT investment per capita</li> </ul>
<p style="text-align: center;"><b><u>O</u>pportunities</b></p> <ul style="list-style-type: none"> <li>- Highly skilled ICT workforce</li> <li>- Open market and liberalization</li> <li>- IT market diversification</li> <li>- Regional competition</li> <li>- The advantage based on the small number of population</li> </ul>	<p style="text-align: center;"><b><u>T</u>hreats</b></p> <ul style="list-style-type: none"> <li>- Lack of IT specialists</li> <li>- Monopoly</li> </ul>