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Strengthening the Strategic Cooperation Between the EU and Western Balkan Region in the field of ICT Research

The ICT Research environment in BOSNIA and HERZEGOVINA

Information Society Technologies

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ABSTRACT

The present report was firstly developed in March 2007 in the context of the EC funded project SCORE "*Strengthening the Strategic Cooperation between the EU and Western Balkan Region in the field of ICT research*", and has supported the SCORE Consultation Document that served for consulting expert ICT stakeholders about the relevant ICT research priorities in each WB country for the period 2007 – 2013. The document was finally updated and optimised in September 2007.

The report provides a brief overview of the ICT research environment in BOSNIA AND HERZEGOVINA.

1 THE BOSNIA AND HERZEGOVINA ICT POLICY FRAMEWORK

Council of Ministers BiH adopted the Policy[1], Strategy[2] and Action Plan for Information Society Development in Bosnia and Herzegovina[3]. Strategy is covering period 2004-2010, with a focus on the "key period" between 2004-2007. Owner of the document is Council of Ministers BiH. Final document was delivered 24 September 2004. Final draft of the BiH Policy for Development of Information Society was produced 05 January 2004 and the document has been accepted by the Steering Committee 22 June 2004. The aforementioned documents had been prepared by working groups made of experts from different fields coordinated by UNDP mission in BiH.

However, although the above-mentioned documents precisely define the project which should be implemented, not much was realised up to day. This especially refers to the aforementioned "key period" (2004 - 2007) – a number of important projects were planned, but most of them did not start or do not have funding secured.

1.1 The overall ICT policy framework

Overall aim of the BiH Policy for Development of Information Society is transformation of the current underdeveloped economy and society into a middle-developed economy and society, capable of integration into European Union until the year 2010.

The information society development goals, through a wide application of information and communications technologies, as defined in the BiH ICT Policy, are as follows:

• the increase of know-how and abilities of citizens to live in an information society,

• a creation of new market environment, new business processes, know-how and adequate means of organization,

• the increase of cost-effectiveness, competition, quantity and quality of services rendered and products manufactured, as well as the application of innovation in economy, government, etc.

• the increase of investments and employment,

• a development of information and communications technologies industry (software, engineering, hardware, consultancy),

• a development of small and middle-sized companies,

• reaching of a sustainable economic development along with a protection of environment,

• the increase of standards of living of citizens,

• a harmonized development of information society, including distant (rural) areas,

• the increase of gross national product,

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[1] Policy for IS Development in BH

[2] Strategy for IS Development in BH

[3] Action Plan for Information Society Development in Bosnia and Herzegovina[0].

• reaching preconditions for European and regional integrations.

Briefly introduce the next table. E.g. the following table summarise the main sections and strategic priorities of the Policy for Development of Information Society for the period 2004-2010.

Section	Strategic Priority
ICT Infrastructure	Building of an ICT Main Road
	Broadband access network
	Access to Internet
	Network and information security
	Introduction of new information and communication technologies
	Connection with other policies
ICT Industry	Industrialization in the area of ICT
	Creation of environment suitable for development of ICT
	Support to production development
eBusiness	ICT infrastructure
	The Financial Sector infrastructure
	Infrastructure of distribution and delivery
eEducation	Connectivity to Internet and research and educational networks
	Development of platforms for different forms of electronically supported learning
	Advancement of computer facilities for teaching and academic and scientific research activities
	Educational management information systems
	ICT for Librarianship
eHealth	Health for All
	Information systems in health care
	Integrated information network development within the health sector
	Telematics
	Health system reform support in Bosnia and Herzegovina
eGovernment	Government reengineering
	Technological and development bases
	eGovernment infrastructure (modern communications infrastructure, based on optical transmission lines)
	Mutual operational capacity of eGovernment organization units
	Fundamental registers (harmonization and/or integration oF fundamental public data)
	Government will provide a secure environment for the electronic transactions of its administration
	Government joint functions

	Specialized functions of some Government sectors
	eDemocracy
	Services: C2G, G2C, G2B, B2G, G2G
	Portal and access points
Information Society Legal Infrastructure	Information society legal infrastructure development
	Information society legal basis
	Unique legal infrastructure
	Creation and connection of databases
	Secrecy of data
	Globalisation of society
	Harmonisation of regulations and legislation with EU solutions
Information society and sustainable development	Realization of environmental sustainable development
	ICT influence on the environmental sustainable development
	Synergy between information society development and sustainable development
	Monitoring of information society development effects on the environmental sustainable development

Table 1 – Overview of the Policy for Development of Information Society (2004 – 2010)

However, although the Policy is based on eight development pillars the Strategy is related to five development pillars: eLegislation, eEducation, eGovernance, ICT Infrastructure and ICT Industry.

1.2 The elements of ICT research policy making

Stimulation of research is stated in the BiH ICT Policy as one of the basic principles and commitments. "A development and application research in the field of ICT will be supported by a selective stimulation measures, notably in the form of customs and tax exemptions."[4]

In the Chapter 11.1.7. on "Scientific and Research Work" the Strategy states:

"…The state must finance basic costs of such activities, regardless of their short-term results. It is necessary to establish permanent funds for, before all, fundamental researches..."

The dissolution of the former Yugoslavia and the application of the Dayton Peace Agreement (1995) have contributed to the complexity of the governing system in BiH, which is also reflected in the distribution of competence regarding science and technology (S&T). At present there are three levels of political and administrative competence in BiH: the State, the BiH Federation (including the ten cantons of the BiH Federation) and the Republic of Srpska. The State of BiH has some limited competence to regulate S&T through the Ministry of Civil Affairs but no funds to support the R&D activities.

The complexity of the fragmented, multi-layered political and administrative organisation in Bosnia and Herzegovina, with many different national and international institutions and

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[4] Policy for IS Development in BH

bodies involved in the creation and implementation of R&D legislation, poses many difficulties in establishing a unified state-level science policy. Some of the legislation on R&D activities has been taken over from the former Yugoslavia, and as such, does not correspond to new needs, while some is based on entity laws, and some on BiH state regulations. Although a number of important laws have been adopted between 2001 and 2002, it was not until 2005 when a framework 'Law on Science' at the state-level was drafted. The 'Law on Higher Education' on the state level is also not adopted yet. In principal, the 'Law on Science' should define the general objectives of BiH's science policy and provide the legal framework in which the research system will operate. The law should also encompass the guidelines and institutional means for defining priorities and funding research activities at the state level[5].

One of the areas for intervention is to emphasize applied research as the main orientation in the RTD sector. **Since there are no research funds at the state level, there has been no operational setting of the thematic priorities**, but in the upcoming period applied research in the following areas will be prioritised: electric power industry, **information and communication industry**, food industry, woodworking and wood-pulp industry, mining and ferrous metallurgy, machine-building and metal working, chemical and petrochemical industry[6].

Unlike at the state-level, both entities (the BiH Federation and the Republic of Srpska) have ministries in charge of science (the Ministry of Education and Science in the Federation, and Ministry of Science and Technology in the Republic of Srpska) and possess financial resources (Dall 2006). The Ministry of Education and Science of the BiH Federation is responsible for education and research at the level of the Federation but each of the ten cantons within the Federation has jurisdiction regarding educational, scientific and technological policy.

As already mentioned, no funds are available for science at the state level – expenditures are periodical and minor, mainly realised through the two entities and on the cantonal level. Sarajevo Canton has adopted a science law for the organisation of research activities within its territory. It has established a research fund worth BAM 1.5 million5 to support research projects based on expert evaluation under the responsibility of the Academy of Sciences and Arts of BiH (ANUBiH).

Within the Republic of Srpska, issues of science and technology are dealt with by the Ministry of Science and Technology, which dedicated 80 % of its budget (approximately BAM 3 million 6 in 2005) to R&D activities through its support of projects. A law defining the main guidelines in research activities has been adopted as well as a basic document for the research strategy of RS, which defines the main areas to be supported and developed inside the higher education institutions, research institutes and industry[7].

Because of the above-mentioned facts (lack of strong state level competence in the field of R&D, non-existence of state level "Law on Science", non-existence of state level funds for R&D, lack of setting of thematic priorities within existing funds [entity/cantonal level] and lack of reliable statistical data) it is hard to determine the level of national R&D funding.

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[5] Science and Technology Country Report Bosnia and Herzegovina, Maruška Bračić, Elke Dall, September 2006

[6] Science and Technology Country Report Bosnia and Herzegovina, Maruška Bračić, Elke Dall, September 2006

[7] Papon, Pejovnik 2006

2   OVERVIEW OF ICT ACTIVITIES

2.1   ICT research projects

The following table of EC co-funded Framework Programme[8] ICT projects with BiH participants does not cover all ICT research investments in BiH, but in short it represents most active ICT research areas. It is difficult hard to determine reliably the level of national funding due to reasons mentioned above.

ICT Research	International-funded Projects	Approximate level of funding (BiH partners)
eProcurement	ELLECTRA-WEB (*European electronic public procurement application framework in the Western Balkan region*)	EXIT IT Business Support Centre (30.600 EUR) Public Procurement Agency (26.400 EUR)
eCustoms	RACWEB (*Risk assessment for customs in western Balkans*)	EXIT IT Business Support Centre (35.600 EUR) Indirect Taxation Authority of BiH (40.800 EUR)
eInfrastructure	SEEGRID (South Eastern European GRid-enabled eInfrastructure Development)	Academic and Research Network BiH BIHARNET (3.682 EUR) Faculty of Electrical Engineering, University of Banja Luka Faculty of Electrical Engineering, University of Sarajevo

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[8] Framework Programmes for Research and Technological Development are high-level programmes determined by the European Commission, setting out the direction of research and technological development activities for a specific period of time (e.g. FP6 and FP6 covered 4 year periods each, FP7 covers 7 years from 2007 to 2013)

eInfrastructure	South-Eastern European GRid-enabled eInfrastructure Development 2	Faculty of Electrical Engineering, University of Banja Luka Faculty of Electrical Engineering, University of Sarajevo Faculty of Natural Sciences, University of Sarajevo Faculty of Electrical Engineering East Sarajevo
eGovernment	WE-GO (*Enhancing Western Balkan eGovernment Expertise*)	BAIT (Association for Information Technologies in BiH) (23.000 EUR) Faculty of Economy, University of Sarajevo (23.000 EUR)
ICT research awareness and training	IS2WEB (Extending Information Society Networks to the Western Balkan Region)	SUS BiH – Svjetski univerzitetski servis BiH, Sarajevo (63.300 EUR)
ICT research awareness and training	IDEALIST7FP (*Support for participants in ICT Priority by network for IST under the transition to the 7th Framework Programme*)	Faculty of Natural Sciences, University of Sarajevo (13.960 EUR)

Table 2 – Overview of key ICT research projects in BiH

2.2   Key competencies in ICT research fields

The table below gives overview of results of mapping performed within IS2WEB project in BiH (sample of 15 key research organisations). IS2WEB is an FP6 project aimed to develop the directory of promising research organisations in the field of ICT through the aforementioned mapping. Another goal of the project is to provide information, training and consultation to those organisations.

Classification of ICT research fields	Percent of research organisations active in research field (15 organisations sample)
Software, grids, security and dependability	77 %
ICTs for enterprises (business processes, work organisation etc.)	69 %
Knowledge, cognitive and learning systems	54 %
ICTs for government meeting societal challenges for governments	54 %
ICT for learning	46 %
ICTs for health	38 %

Table 3 – Competent research fields of key research organisations in BiH

3   KEY DRIVERS OF ICT RESEARCH

3.1   Main ICT sector trends in BOSNIA AND HERZEGOVINA

Key ICT market trends in BiH, according to IDC[9]:

- ICT market in BiH in 2005: $124.09 million
- Estimated compound annual growth rate (CAGR) of BiH ICT market in the period 2005 to 2010   14.0% annualy
- BiH ICT market in 2010: $240.00 million

Or, when it comes to sales in 2005[10]:

ICT sector segments	Number sold	Percentage	Annual growth

[9] IDC, MARKET ANALYSIS, Bosnia and Herzegovina IT Market, 2006 - 2010 Forecastand

[10] IDC, MARKET ANALYSIS, Bosnia and Herzegovina IT Market, 2006 - 2010 Forecastand

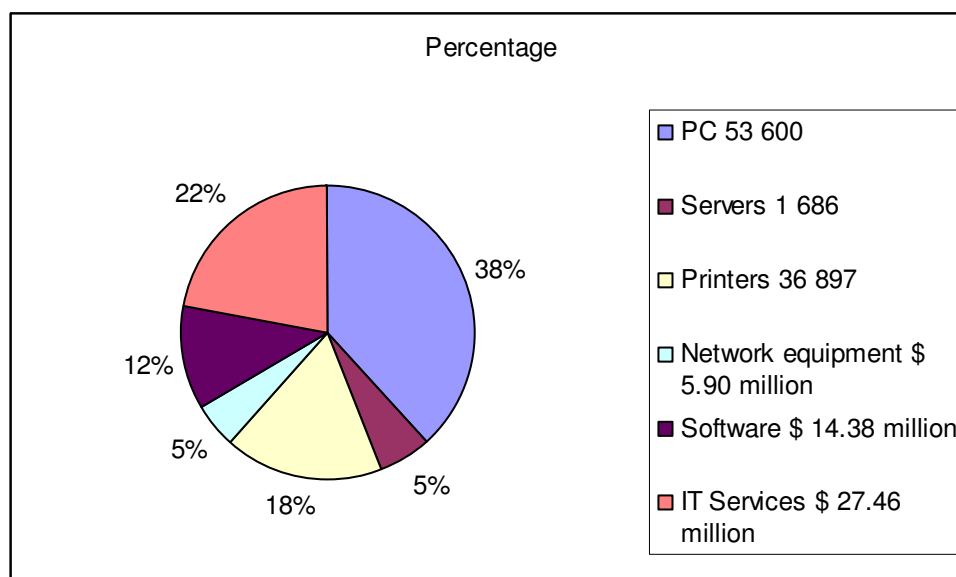|			
PC	53 600	38.40%	28.6%
Servers	1 686	5.50%	15.7%
Printers	36 897	17.65%	16.00%
Network equipment	$ 5.90 million	4.80%	22.00%
Software	$ 14.38 million	11.60%	13.7%
IT Services	$ 27.46 million	22.10%	14.4%

Table 4 – ICT sales in 2005 (per ICT segment)

Figure 1 – ICT sales in 2005

The next table summarises some key information on ICT penetration within BiH society[11]:

Number of Internet users (per 1000 inhabitants)	Number of mobile users (per 1000 inhabitants)	Number of fixed lines (per 1000 inhabitants)
179 (806,400 in 2005)	354 (1.594,000 in 2005)	215 (968,900 in 2005)

Table 5 – ICT penetration statistics

The ICT industry in BiH is facing a series of limitations in doing its business. The survey showed that:

• Lack of ICT experts is recognized as a limitation by 68% of respondents.

• Lack of technical expertise is recognized as a limitation by 55% of respondents.

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[11] https://www.cia.gov/cia/publications/factbook/geos/bk.html

• Harmonization of local standards with the international ones is recognized as a limitation by 54% of respondents.

• Access to infrastructure is seen as a limitation by 53% of surveyed ICT firms.

• Access to the capital is seen as a limitation by 49% of respondents.

• Legal, regulatory and administrative procedures are seen as limitations by 47% of respondents.

3.2   Main socio-economic challenges in BOSNIA AND HERZEGOVINA

Bosnia and Herzegovina was among the poorest republics of the former SFRY. Industry is still greatly overstaffed, reflecting the legacy of the centrally-planned economy (U.S. Department of State 2005). Nevertheless, BiH's economy has made significant progress since the end of war in 1995, when the GDP had dropped to only 20 % of its pre-war levels. High donor inflows during the initial years after the war resulted in annual growth rates of about 10 % from the year 2000. As donor aid declined, the real GDP growth slowed to only 3.5 % in the year 2003 due to a severe drought. Growth in the year 2004 rose to 5.1 % and is expected to grow at rates around 6 % between 2005 and 2008. GDP has more than tripled since 1995 and had climbed to 70 % of its pre-war levels in 2005[12].

The service-sector accounts for the largest part of the economy, 62 % of the GDP, while industry accounts for 21 % and agriculture for 12 % of GDP. The ratio of exports to imports of goods and services to GDP in 2003 equalled 85 %. However, this high ratio is driven mainly by the high level of imports. The EU is Bosnia and Herzegovina's main trading partner, accounting for around 40 % of exports and 45 % of imports[13].

According to official data, unemployment rose from 43 % in 2004 to 44.6 % in 2005. Using ILO definitions, unemployment was estimated at 31 % in April 2006, but after accounting for the informal sector, unemployment is estimated to be closer to around 20 % of the working-age population, although no recent official estimate is available[14].

BiH has begun the negotiation process to join the World Trade Organisation (WTO) and has signed all the Free Trade Agreements (FTAs) proposed by the Stability Pact's Memorandum of Understanding on trade. A unified customs tariff has been applied since 1999. However, the country has generally been lagging behind in its implementation of FTAs, especially compared to its neighbouring countries. BiH benefits from the autonomous trade measures introduced by the EU in September 2000, which allow more than 95 % of all imports (including agricultural produce) to enter the EU duty-and-quota free[15].

Economic revitalisation clearly remains BiH's most immediate task. Successful accomplishment of such growth requires an environment conducive to private sector development and supportive of a market-led economy. At present, privatisation has been slow, unemployment remains high, and some restructuring of BiH's domestic debt is also necessary before economic growth is achievable'[16].

[12] USAID 2005

[13] European Commission 2006b

[14] European Commission 2006

[15] European Commission 2006b

[16] U.S. Department of State 2005