# Bridging the Digital Divide in South-Eastern Europe

**Elissaveta Gourova, Albena Antonova**

*Faculty of Mathematics and Informatics, Sofia University,*
*125, Tzarigradsko shosse Blvd. bl. 2, 1113 Sofia, Bulgaria, {elis, a_antonova} @fmi.uni-sofia.bg*

***Abstract**: The main aim of the paper is to raise some issues related to the access and usage of Information and Communication Technologies (ICT) in South-Eastern Europe. It is based on the results of a recent project and highlights the trends and the remaining challenges for ICT development in the region. A short review is made on the changes in the concept of Digital Divide with the time, and in particular on the most recent understanding about the need for facilitating access and usage of information and knowledge, and their usage for the competitiveness of the industry.*

***Keywords:** digital divide, information and communication technology, digital content*

## 1. INTRODUCTION

The Information Society (IS) development requires fast and secure technology infrastructure accessible to all, universally accessible electronic content and electronic services. At the same time, the availability of Information and Communication Technologies (ICT) skills makes it possible to further develop the new technologies or to avail itself of their opportunities. At policy level, many efforts have been made to close the gap between the technology advanced countries or regions and the less developed ones. However, a multiple divide exists between countries and regions, between large and small companies, and between people of different age and social status. The direct link between GDP and purchasing power on the one side, and ICT adoption and usage, on the other, seems to be the main reason for a continuous down spiral for people, companies and regions [Gourova et al. (2007)].

The term Digital Divide was introduced with the first concerns that an inequality might emerge as a result of the differential access to telecommunications and to the Internet. It was initially understood as an inequality of the accessibility and availability of communications infrastructure, equipment, applications and services. Subsequently, its scope was extended to include the quality of the technology and services used, the availability of knowledge and skills required to develop and use ICTs, the accessibility and availability of digital content and services, and finally, the patterns of usage of services and technologies [Nahon (2006), Haythornthwaite (2007)]. Following the trends towards knowledge society and economy, the term was recently re-conceptualized using a knowledge-based approach. Tibben (2007), for example, highlights the increased intelligence of networks and that they enable people to develop, organize, share and use knowledge. There is no one type of ICT access anymore, and ICT use is an essential 'social practice involving access to physical artefacts, content, skills and social support'. ICTs have a special function in supporting social networks, communities of practice and learning. Thus, the Digital Divide is becoming an exclusion from collective knowledge processes of the community. The new understanding of Digital Divide should focus on the value of having access to information and knowledge and the abilities to access, retrieve, interpret and use information for generating new knowledge.

Within a recent project were undertaken surveys of the trends in ICT development in FYR Macedonia, Serbia and Albania. For the purposes of this paper their results were extended with further investigation. It was taken into account the difficulty to assess the real status of all SEE countries, as there is no common base for monitoring the multifaceted digital divide in the region. At the same time, there is no unified understanding which countries belong to this region. Looking at many sources[1], the Western Balkan countries (WBC) with their neighbours Slovenia, Greece, Bulgaria and Romania form the core of the region. However, sometimes also Austria, Hungary, Italy, Moldova and Slovakia are added to this group. In this paper the wider picture will be taken.

## 2. TRENDS OF ICT DEVELOPMENT IN SEE

It is well-known that the telecom infrastructure of the SEE region was old-fashioned compared to Western Europe, and all former and present EU-accession countries have undertaken a deep reform of the sector, including new regulations, privatization and market liberalization, in order to catch-up with technology trends and provide up-to-date opportunities to their citizens and enterprises. All countries have acknowledged the importance of ICT infrastructure, and have increasingly invested in its development, which resulted in overall growth of the sector of electronic communication, and all countries (except Bulgaria) have higher than 95% digitization of the fixed network [Cullen International, 2007]. It is promising that the broadband usage has grown at very high speed in the last few years as reported by Cullen International, whereas DSL technology is the dominating technology, followed by Cable TV, which is widely used in Romania, Serbia and FYR Macedonia. Promising is that in several countries broadband connections are provided mainly by other operators, whereas the incumbent operators are dominating this market only in Albania and Croatia. Nevertheless, the broadband remains still very limited in most SEE countries (except Austria, Hungary, Slovenia), which could limit the usage of the full range of digital content and services. The level of economic development in the SEE region is dominating the ICT uptake and the differences by all countries as shown on (Figure 1).


Source: Gartner Dataquest (January 2004)

Fig. 1: Eastern Europe: IT infrastructure vs. Market potential, quoted in Kon-Popovska et al., 2007

According to the e-readiness indicators of 2008, only Austria from SEE belongs to the top 10 countries in the world, which also is pointed out as a leader in Western Europe regarding consumer and business adoption of ICTs, and its governmental pol-

[1] SEE pact, World Bank, UN, SEE Transnational cooperation program, etc.

icy and vision. Slovenia is leader of the Central and Eastern European countries in most criteria. The other EU-members from SEE take positions from 15 (Italy) to 48 (Bulgaria) in this ranking, whereas the Western Balkan countries scores are not given under the 70 countries ranked [Economist Intelligence Unit, 2008].

Eurostat data suggest that in terms of access to PCs, Internet connections and broadband connections at home, the households in Bulgaria and Romania have almost four time lower accessibility than the EU25, whereas the data for Austria are almost twice higher then those for Greece. The WBC levels of Internet access are even lower - ranging from 4% internet users per 100 inhabitants in Albania to almost 40% in Croatia, and 20% in average for the SEE region. It is promising, that the Internet users have reached very high percentage of growth in the last few years, thus trying to catch up with the most developed countries (Figure 2). However, while Internet users are growing at a high speed in SEE, there are a lot of challenges for ensuring security and thrust infrastructure [Kon-Popovska et al., 2007]. Looking at ICT adoption in enterprises, it is interesting to note that more than 90% of all enterprises in AT, IT, EL, SK and SI have Internet access, while in HU and BG they reach 75%. RO and all WBC are lagging behind most EU enterprises in ICT usage. For example, in RO more than 50% of all enterprises use Internet, in FYRM – more than 70%, and in SB – around 90%.

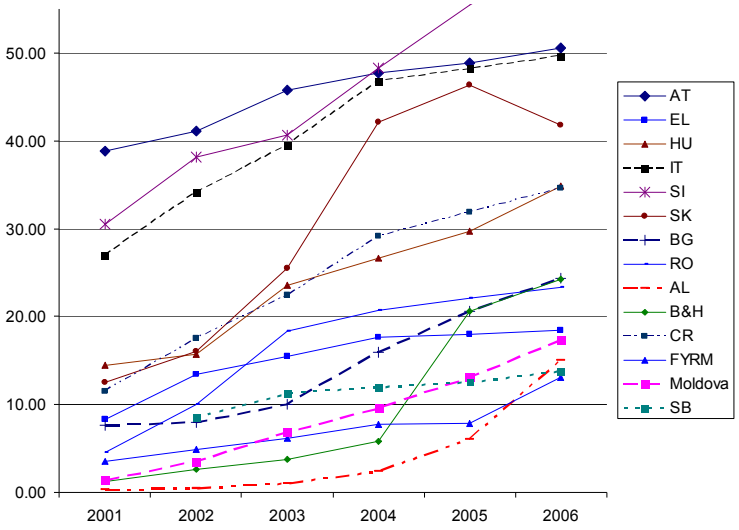


Fig. 2: Internet users per 100 inhabitants, Source: UNCTAD (2006, 2007)

Enabling conditions for ICT uptake are ICT skills. Presently, a need is emerging to extend the digital literacy concept to include not only basic ICT skills, but to focus also on retrieval skills, information seeking and sharing. Individual commitment for ICT usage, group work, and intellectual and academic support in acquiring ICT skills could contribute to higher level of knowledge generation and communication. The Eurostat data show that in 2006 37% of all Europeans had no computer skills at all, and only 22% were acquainted with a wider range of computer activities. The disadvantaged groups include people over 65, retired or unemployed, and less educated people. One very important observation is that a very high percentage of ICT skills are obtained through informal assistance by the colleagues, self-study using books, CD-ROMs or learning-by-doing. This raises the need for wider accessibility of qualitative training materials and books which could support self-learning of individuals at each level of ICT skills. Therefore, a lot of efforts are made by all governments to provide digital literacy

at an early age, thus building computer labs, training teachers and providing Internet access in schools at all levels. Unfortunately, the picture is not very rosy in most SEE – having not sufficient computers (Figure 3) and working sometimes with out-of-date equipment and dial-up connection [Ivanovic et al. 2007].

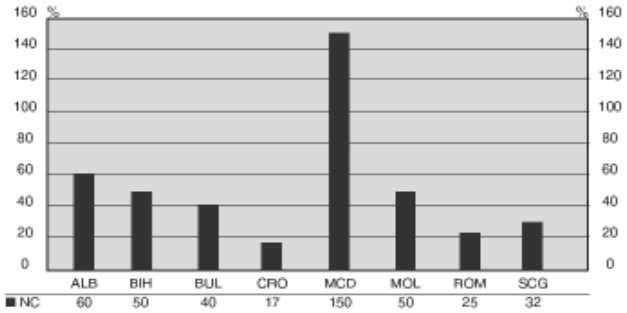


Fig. 3: Average number of students per computer in schools with computer classrooms, Source: Ivanovic et al. (2007)

Thus, in relation to ICT development, the SEE region could be divided in four tiers:

- 1st tier – Austria (AT), Italy (IT), Slovenia (SI)
- 2nd tier – Hungary (HU), Slovakia (SK)
- 3rd tier – Bulgaria (BG), Greece (EL), Romania (RO), Croacia (CR)
- 4th tier – Albania (AL), Bosnia and Herzegovina (BH), FYR Macedonia (FYRM), Montenegro (MN), Serbia (SB)

## 3. TRENDS IN DIGITAL CONTENT, SERVICES AND USAGE

The available, easy-to-use and understand digital content seems to be of utmost importance for the advance of ICTs usage. Governments are among the main producers of information and services for citizens and enterprises. They are increasingly creating web sites, and providing less expensive and more efficient services. As already mentioned above, AT is EU leader in the availability of e-government content and services on-line, followed from SEE by SI, and IT – all being above EU-average. BG is on the bottom line for EU in this respect, while EL, HU, SK and RO have below 50% provision of e-government services [Eurostat, 2008]. A lot of project are on the way for building e-government content and services for the citizens in AL, FYRM and SB [Cico et al. 2007, Kon-Popovska et al. 2007, Ivanovicz et al. 2007]. Croatia, while keeping its leadership in WBC (Figure 4), is also following a national strategy related to advancement of e-Government and catching up with its EU neighbours [Klicek et al, 2007].

While communications over the Internet and search for information are still the dominating patterns of ICT usage in SEE, it is increasing the usage of e-learning, e-government and e-banking services. For example, in Macedonia in 2007 27.2% of the population took advantage of e-Learning, of e-Government – 13.2%, and of e-Banking – 6.8%, whereas enterprises were using Internet for financial and banking services (61.8%), training (28%), market monitoring (63.3%), obtaining e-services or products (32.5%) [Kon-Popovska et al. 2007]. Furthermore, the wired companies in EL, BG and RO are more active in using the available governmental information than many other EU countries. The two-ways communication is, however, still not at the required level in Bulgarian and Romanian companies, while Greak enterprises are performing similar to the Austrian ones for obtaining and filling in forms [Reis (2005)].

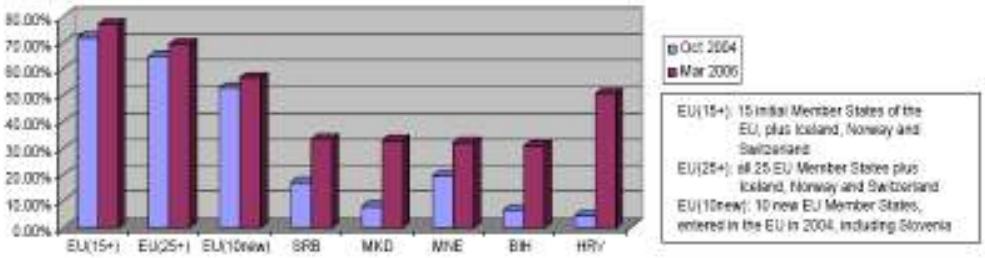

Fig. 4: eGovenment benchmark of WBC with EU countries, Source: Klicek et al. (2007)

The monitoring of e-business trends in Europe shows wide differences between sectors, according to the size of the companies, as well as the nature of e-business activities. The European e-Business W@tch suggests that the enterprises in the sectors of tourism and construction in EL, RO and BG are performing quite well. There are, however, large differences in the patterns of on-line selling or purchasing, whereas the former is dominating in RO, and the latter – in BG and FYRM [European Commission (2006), Kon-Popovska et al. 2007]. In Serbia, enterprises ordering goods or services on-line account for 17.6% [Ivanovic et al. 2007].

As digital divide contemporary is extended by new – knowledge related elements, it is important to look also to other large producers of knowledge – research institutions and universities. However, the need to pay high fees to access on-line scientific journals, studies, etc. puts several researchers in developing regions in a disadvantaged position. The same is valid also for enterprises which have fewer opportunities to access recent knowledge, inventions and technology, and apply them to gain competitive advantages. In addition, a simple search on the web shows that there is still a lot in front of digitizing public libraries and placing traditional media on-line in order to extend the diversity of digital content and information sources in SEE.

## 4. CHALLENGES FOR SEE COUNTRIES

Many evidences show that ICT contribute to turnover growth via the innovations made, and have positive effects on labour- and total-factor-productivity, however, the effects vary greatly between sectors and countries. In addition, the link between ICT-investments and productivity is rather indirect, and positive effects are contingent upon additional complementary investments into innovation and human capital at the firm level [Koellinger, (2006)]. For the SEE countries an analysis of the impact of ICTs on economic growth shows that they have high potential to benefit from ICTs. The developed countries with highest 'infodensity'[2] benefit from ICTs in a smaller extend compared to countries like Greece, Slovenia and Croatia, while Bulgaria, Romania, Serbia and Turkey have the potential to catch up, if they incorporate ICTs more efficiently in the production processes [UNCTAD (2006)].

To sum up: technology infrastructure and content, users skills and motivation, knowledge capturing and access, etc. – all these issues need a proper solution in the knowledge-based society. ICT are an important factor for proper capturing, accumulating, sharing, communicating and utilizing the organizations' and individuals' knowledge resources, however, the cultural and human factors dominate the success of ICT adoption and usage, and should be not underestimated for further IS development in SEE.

[2] 'Infodensity' is representing the ICT production function of an economy, and is composed of ICT capital and labor. [UNCTAD (2006)]

Most e-readiness indicators and digital divide reports outline that the leadership and governmental activities are essential for the IS development. Public institutions have an essential role to play: first as facilitator of IS, and second as provider of high quality digital content and services to enterprises and citizens. Knowledge economy is placing high demands for building new skills and capabilities. Therefore, in order to close the existing divide from the leaders all SEE need to plan carefully their future actions.

## 5. ACKNOWLEDGEMENT

The authors should like to acknowledge the work of all partners of the project 'Bridging the digital divide in South Eastern Europe (SEE)', funded by Austria in the framework of the Research Cooperation and Networking between Austria and South Eastern Europe, and their contributions to the workshop in September 2007 within the Third Balkan Conference in Informatics - BCI'2007 which were used in this paper.

## 6. REFERENCES

[1] Cico, B., E.Mece (Kajo), N.Frasheri, S.Theodhor, B.Topciu, M.Brumbulli (2007), Bridging the digital divide in South Eastern Europe National report – Albania, *Proc. Workshop "Bridging the Digital Divide in SEE*", 2007, Sofia, p. 13-34

[2] Cullen International, (2007), Supply of services in monitoring of South East Europe – telecommunications services sector and related aspects, Nov. 2007

[3] Economist Intelligence Unit (2008), E-readiness rankings 2008

[4] European Commission (2006), A pocketbook of e-Business Indicators, EC, 2006

[5] Eurostat (2008), Europe in figures, Eurostat yearbook 2008

[6] Gourova, E., A.Antonova (2007), The Digital Divide – wider challenges for SEE, *Proc. Workshop "Bridging the Digital Divide in SEE*", 2007, Sofia, p. 163-172

[7] Haythornthwaite, C., (2007), Social Facilitators and Inhibitors to Online Fluency. *Proceedings of the 40th Hawaii International Conference on System Sciences - 2007*. http://csdl.computer.org/comp/proceedings/hicss/2007/2755/00/27550067a.pdf

[8] Ivanovic, M., Z.Budimac, Z.Komlenov, G.Rakic (2007), Bridging the digital divide in South Eastern Europe National report – Serbia, *Proc. Workshop "Bridging the Digital Divide in SEE*", 2007, Sofia, p. 112-150

[9] Klicek, B., D.P.Vukovac (2007), Information Society and eGovernment Developments in Croatia*, Informatica* 31 (2007), p. 367-372

[10] Kon-popovska M., M.Jancevski, M.Jovanov (2007), Bridging the digital divide in South Eastern Europe National report – Macedonia, *Proc. Workshop "Bridging the Digital Divide in SEE*", Sofia, p. 35-149

[11] Nahon, K.B. (2006), Gaps and bits: conceptualizing measurements for digital divides, *The Information Society*, Vol. 22, 5, Dec. 2006 , pp. 269 - 278

[12] Reis, F., (2005), e-Government 2004: internet based interaction with European businesses and citizens, Eurostat, Statistics in Focus, 35/2005

[13] Tibben, W., (2007), Re-conseptualizing the digital divide, *Proc. of the 40th Hawaii International Conference on System Sciences*, http://csdl.computer.org/comp/proceedings/hicss/2007/2755/00/27550067b.pdf

[14] UNCTAD, (2006), Information Economy Report 2006, UN, New York and Geneva, 2006

[15] UNCTAD (2007), Information Economy Report 2007-2008, New York and Geneva, 2007