## III. AGGREGATE E-READINESS ASSESSMENT

### Background

Bulgaria has had a tradition of excellence in producing information technology products. During its affiliation to COMECON the country specialized in production of mini computers, processors, peripherals (magnetic disk and tape memory devices), teleprocessing systems and devices, and personal-professional computers. Bulgarian computer exports amounted to 48 percent of the entire COMECON market in the 1970s. This market share was maintained until the early 1990's.

According to official statistics for 1989, electronics and telecommunications accounted for 25 percent of Bulgarian industrial production. A total of 130,000 people were employed in this sector, of whom 8,000 were highly qualified engineers. According to independent sources, in 1989 about 95 percent of the total production in this sphere was sold on the COMECON market, mostly to the former Soviet Union. In the late 1980s Bulgaria was the leading supplier of 5$^{th}$ generation computer systems to Soviet research institutes. Bulgaria also covered a large share of the Soviet markets for personal computers[5]. Many of the PBX systems for the COMECON region were also produced in Bulgaria.

These markets were artificially protected and Bulgaria's ICT industry suffered a serious shock with the political transformation and the transition from centrally planned to free market economy after 1990. A number of factors such as global competition, poor corporate management of local enterprises, lack of government support and funding, and disintegrating mechanisms of supply and demand within COMECON led to a dramatic decline in production capacity and severe drop in export figures. The country lost most of its markets in the former Soviet Bloc countries. This led to serious social problems and disqualification of the labour force.

Since 1997 the Bulgarian economy has been going through a period of structural adjustment. In a stabilized macroeconomic environment, characterized by a low level of inflation, an effective currency board, and hands-off approach of the state toward economic activity, ICT has been one of the most dynamic sectors of the economy.

Presently Bulgaria is still at a relatively early stage of preparedness to utilize the benefits which information and communication technologies can offer for achieving economic growth and competitiveness, for enhancing the quality of the education system, or improving the efficiency and transparency of government operations. However the government acknowledges the importance of ICT for development and demonstrated a strong political will to support active development of information technologies and high-tech end-products.

[5] From Run, R. and Utt, R. (1990) *Bulgarian Economic Growth and Transition Project*, National Chamber Foundation, Washington D.C., p. 22-1

***Network Access***

Bulgaria's telecommunication infrastructure has been fairly well developed prior 1990 and substantially improved in the last decade. In the beginning of 1990s modern technologies were introduced – initially DSL and later fiber optics laid the groundwork of the national telecommunication backbones. All were originally built by the Bulgarian Telecommunication Company (BTC). Mobile wireless technologies appeared widely about 6-7 years ago, but still most of the network access in Bulgaria is provided through the traditional telecommunication network. Foreign investors in telecommunication infrastructure entered Bulgarian market by acquiring majority control or 100 percent ownership of existing companies or establishing new joint-ventures (when dealing with the government). Still a small proportion represent portfolio investors.

At present, the majority of Bulgarians have at least technical capabilities to access the Internet and its information resources. Access is enhanced by competition among Internet Service Providers (ISPs), most of which operate locally. A broad range of services, including pre-paid access and VoIP, is offered with a more or less satisfactory quality. Instant access via dedicated lines is also present in most of the large cities and middle-sized towns. Finally, public access is essential to making the Internet available to greater numbers of individuals and companies in Bulgaria. Telecenters, Internet cafes and community information centers have a great importance in making the Internet available to those who cannot afford personal access at home, in school, at the workplace or elsewhere. Some 10-15,000 people visit these centers every day. Thus, it can be estimated that about 15 percent of all Internet usage is provided by public access points.

An important factor for the increase of Internet usage is its affordability. The prices which businesses and individual consumers pay for Internet access are in most cases determined by a combination of charges for basic telephony and ISP services. In countries like Bulgaria, where the sum of ISP and telephony charges is almost prohibitively high, a disincentive to network usage exists, and access is curtailed. In addition, the overall economic situation in the country has a serious impact on the network affordability, but also the government can influence the situation (for example, by completing the liberalization of the telecom market, since the existing monopoly of the Bulgarian Telecom Company leads to slow technological progress and keeps the price of telecommunication services high).

The available bandwidth, although sufficient to serve the basic needs for connection to the Internet backbone, determines the number of users and types of online activities.

Being a relatively small market both in terms of population and purchasing power, , Bulgaria is not seen as a primary target by both international hardware and software manufacturers. On the other hand, local efforts to produce hardware and software have proven inefficient in most cases and with the development of market economy after 1990, only a small part of original software producers continue to exist. The overall situation, as well as several particular factors discussed elsewhere in this report, determine a considerable level of software piracy in Bulgaria.

The overall score on network access in Bulgaria (4.00) is higher than the average e-readiness index. This means that technology-wise Bulgaria is making significant progress which could be used to boost developments in other areas such as e-society or e-economy. Also, the three main indicators here – technology penetration, access affordability and connectivity – seem to develop coherently, providing – to the extent possible – a steady and self-supporting technological growth.

### *E-Society*

As barriers to access are being addressed, Internet is becoming more commonly used in Bulgaria. A fairly stable and homogenous core-group of Internet users emerges and is gradually expanding. This may indicate the onset of a new social culture defined by high degree of interest in, and active involvement with ICT. Yet the number of people who currently have access to PCs and the Internet is relatively small. Computer users as of October 2001 are estimated to include 940,000 adult citizens, or 14.4 percent of the population aged 15+. The number of people using the Internet resources as a share of the total population is also rather small. In relative terms, the share of Internet users amounts to 10.4 percent of the population. However, if the present tendency is preserved, this figure may grow substantially over the next few years.

Computers and Internet are typically used in the workplace and public locations (e.g. cyber cafes, computer game clubs, telecenters, etc.) Home Internet users and those accessing the Web at educational institutions represent a smaller relative share.

In terms of demographic characteristics, Internet access is available mainly to young people. Half of those having access to a PC and the Internet are aged 18 to 30, and about one-fourth fall in the 31-to-40 age group. The majority of people capable of accessing the Web live in larger cities and, above all, in the Sofia and Bourgas regions. Internet access is very limited in rural areas and small towns. According to a survey conducted in year 2000 by Vitosha Research, fewer than 3 percent of all Internet users in Bulgaria are residents of small towns. There are substantial regional disparities and a growing "digital divide" both in terms of access to ICT infrastructure and provision of Internet-related services.

The domination of the English language in the World Wide Web poses a serious obstacle to the integration of various user groups. But this situation may also present excellent opportunities to Bulgarian content providers to develop the local market. Yet the supply of online services in Bulgaria is still inadequate, as is the general penetration of these technologies in everyday life. There is still much work to be done in the area of generating locally-relevant content, presenting it in an appropriate manner, and helping people to comprehend how to use the new technologies available to them.

Currently the Internet is most commonly used for information gathering purposes, entertainment, alternative sources of world news, and personal communication. Cost, perceived low security level, availability and local economic conditions currently limit the use of Internet for electronic banking, electronic commerce, or personal activity planning. Barely 3 percent of Internet users in Bulgaria shop online, and 10

percent plan their vacations or travel using the Internet resources, as a recent survey by Vitosha Research suggests.
As a whole, the e-society index is rather low (2.29). This means that, despite some awareness of the Internet phenomenon among the Bulgarian public, there is still limited understanding of the real benefits associate with ICT, and even less direct experience.

### *E-Education*

Information about the use of ICT in Bulgaria's educational system is fragmented and often simply unavailable. The Ministry of Education keeps a record of the number of computers used in schools but it has little information about connectivity. It is also hard to make an assessment of the situation in higher education – the existing 48 colleges and universities providing training to 216,926 students have academic autonomy and no government agency collects comprehensive information on them.

The overall penetration of ICT in Bulgarian schools is relatively low. On average Bulgarian schools have one PC for 66 students. The situation is somewhat better at the secondary school level where a mix of government support and local community efforts have brought computers to the classrooms over the past 4-5 years. In January 2001 the Ministry of Education reported that around 50 percent of the secondary schools (514 out of 1023) were equipped with at least a single computer laboratory with at least 5 networked PCs (486 or Pentium). There is no data on the number of computers used in primary and elementary schools but the situation is generally much worse.

Most Bulgarian universities and colleges also have a paucity of computer resources, although the necessary investments in hardware and connectivity are becoming more common, mostly though international programs and donor support. Experts assess the number of PCs at the universities in Bulgaria to be about 20,000. Penetration is highly uneven. For example, the American University in Bulgaria (AUBG) reports around 550 PCs for 700 students (an almost 1:1 ratio), while other universities have one computer for over 100 students. In many cases this equipment is used only in administration (e.g. in accounting) and not for education or research. With the only exception of AUBG no other university in the country currently offers its students free access to computer labs with Internet connections.

Most Bulgarian universities are connected to the Internet but this capacity is very limited and Internet resources are not integrated into the learning process. With the exception of a few technical and engineering schools, Internet is rarely used for education or research. Practically all universities have registered Internet sites.

ICT education in mid 1980s to early 1990s was well-developed in specialized schools – mathematical schools, foreign language schools and some technical secondary schools, but it covered less than 5 percent of the students.

Basic ICT education was introduced to Bulgarian secondary schools in the 1999/2000 school year. A general course on Informatics and IT is currently taught at ninth through eleventh standard grades at all schools nationwide. A more advanced

(optional) course is offered to twelfth graders. Although the state-designed curriculum provides a solid first step at introducing secondary school students to computers and IT, the courses are largely theoretical since infrastructure is still lacking or inadequate, and teachers are ill-prepared and often unaware of the latest developments in the field. Teacher access to computers is available at few or no schools. Classes at secondary school level currently do not integrate ICT meaningfully in the lesson plans.

Overall the level of integration of ICT in education outscores that measured in other categories of e-readiness but it remains unsatisfactory (4.27). The existing situation is largely the result of a sharp decline in public spending on education since 1990. There is a feeling that Bulgarian education is declining somewhat in quality and is subject to further erosion unless schools and universities are wired to the Internet in a matter of urgency and new curricula are developed that integrate ICT in the learning process and promote group work via computers, WWW research, and so on.

### *E-Economy*

There are no representative and comprehensive data on the current use of computers and Internet in Bulgarian companies. According to various surveys conducted in 2001 and expert assessments by Vitosha Research, about 30 percent of Bulgarian companies use computers in their work. However, computers are not used effectively and their penetration is very uneven. Only 7.3 percent of the workplaces are computerized and less than 20 percent of the companies have Intranets. Only 12 percent of Bulgarian companies are connected to Internet. Due to the large proportion of out-of-date technology and a still lacking awareness about the role of Internet communications as a driving force of business development, merely 3.85 percent of employees have access to the Internet and it is used primarily for e-mail communication. The financial services sector (banking and insurance) and telecommunications are the two sectors of the economy which have the greatest IT penetration.

A possible indicator for the state of ICT in Bulgaria's economy is the number of web sites of local companies. There is a tendency toward increased company presence on the Internet. As of March 11, 2002 the number of hosts in the ".bg" domain was 1860. In addition there are about 2,500 Bulgarian sites under ".com", ".net", and ".org" domains and hundreds of others (about 800 in expert estimates) which use free hosting services offered by Bulgarian portals such as www.hit.bg, www.dir.bg, www.online.bg, www.search.bg, to name but a few. The majority of company websites contain mostly static, basic information (limited to a company profile, contact information and listing of products), which is rarely being updated. Websites that are fully interactive for online customer support, or such that offer products and services online, are rather an exception.

According to a survey carried out by Vitosha Research in May 2001, about 186,000 people in the country hold college or university degrees in information and communication technologies and about 565,000 have attended some sort of computer training courses. About 443,000 know how to use a computer through self-training, formal training at the workplace, or have learnt such skills from friends. On this basis

it is possible to conclude that computer literacy amounts to 16.2% of the adult population in Bulgaria.

Experts assess the number of ICT specialists in the country (i.e. those involved in software development, Internet applications and design, system administration, hardware) to be anything between 4,000 and 15,000. If the definition is extended to include also telecoms engineers, teachers and IT specialists employed in public administration this figure may as well grow to 45-50,000. It is very difficult to give a precise figure for the number of ICT jobs because of the large size of the "gray" economy in this sector which reaches between 30 percent and 80 percent of the ICT market, according to various estimates and sub-sectors

On average, ICT jobs in Bulgaria are quite attractive. According to IDC data for year 2000, the average salary of ICT specialists was 220 percent the average monthly salary in the country, while programmers, system administrators and other highly qualified professionals were paid 340 percent the average monthly salary. Still the local ICT labor market cannot offer the opportunities sought by young and qualified ICT professionals. Many of them are leaving the country if offered a more challenging position abroad. According to the Bulgarian Association of Information Technologies (BAIT) about 15,000 IT professionals have left the country in the past 10-12 years. This is a real "brain-drain" since only 3 percent of these people are coming back to Bulgaria later. A number of managers have a valid concern that Bulgaria will soon have to import ICT professionals from abroad.

An important indicator of the role of ICT in the economy is the progress in e-commerce. Most electronic transaction in the country currently fall within the category of business-to-consumer (B2C), while business-to-business (B2B) share of e-commerce is only negligible. No more than 100 companies, usually small and known to tiny consumer segments, could be considered as e-retailers. The most common categories of goods and services traded on the Internet include books (45%), prepaid Internet access cards (10%), flowers and souvenirs (10-12%), music (7-8%), electronics and mobile phones (6-7%), or online payment of utility bills in Sofia (12-15%). However, these transactions are not purely electronic as the Internet is primarily used for processing orders while payment is done in a conventional manner upon delivery. Advertising is often limited to a banner on one of Bulgaria's most popular portals.

Lack of convenient payment instruments is one of the major impediments to a faster uptake of e-commerce in Bulgaria. The number of debit card holders in the country was 800,000 in mid-2001, plus about 7-10,000 credit card holders. On average the number of debit cards has grown by 50 percent in each one of the past couple of years. Some 400 to 700 credit cards are being issued by Bulgarian banks every month.

Yet only 1.4 percent of all debit card holders are registered in ePay.bg – Bulgaria's most popular system for online payments. The registration procedure is rather clumsy and people seem reluctant to provide debit- or credit-card information because they are not sure of system security. A second e-payments system – BGPay.bg – was launched in mid-2000 but reports very limited turnover figures. A new service of online payments by prepaid cards, called Net-Card, is rapidly gaining popularity. There are about 3,000 registered users of this service in just 3-4 months.

So far, Bulgarian companies have been slow to integrated e-commerce into their corporate strategies. There has not been much in the way of B2B e-commerce. Even big companies do not understand that it is important to develop online activity. What little movement there has been is towards e-business solutions aimed at lowering costs and increasing efficiencies. For the most part, these are still at relatively basic level, such as integrating sales and accounting systems. A few are also pursuing supplier integration.

Some of the main obstacles to e-commerce in Bulgaria include the low level of Internet penetration, low level of trust and perceived security problems and, until recently, the lack of a clear legal environment for electronic business. This situation is changing with the enactment in May 2001 of an electronic signatures law which recognizes digitally signed documents and contracts concluded online as having the same validity as conventional instruments. The law also stipulates requirements for providers of digital signatures, which guarantee the veracity and security of the documents transmitted by their clients.

***e-Government***

Bulgaria has made its first steps in the field of e-Government which includes the use of ICT by central and local administrations for the services they provide in order to achieve greater efficiency and higher quality. Given the lack of official statistics on the availability of computers in central and local government, experts interviewed by Vitosha Research assess that about 18 percent of all workplaces in public administration are presently computerized. Internet connectivity is widely varied: 80-100 percent of computers in regional authorities, 70-80 percent of these in ministries and less than 20 percent of those in municipalities are currently hooked up to the Internet. On average, about 20 percent of computers in public administration have access to the Internet.

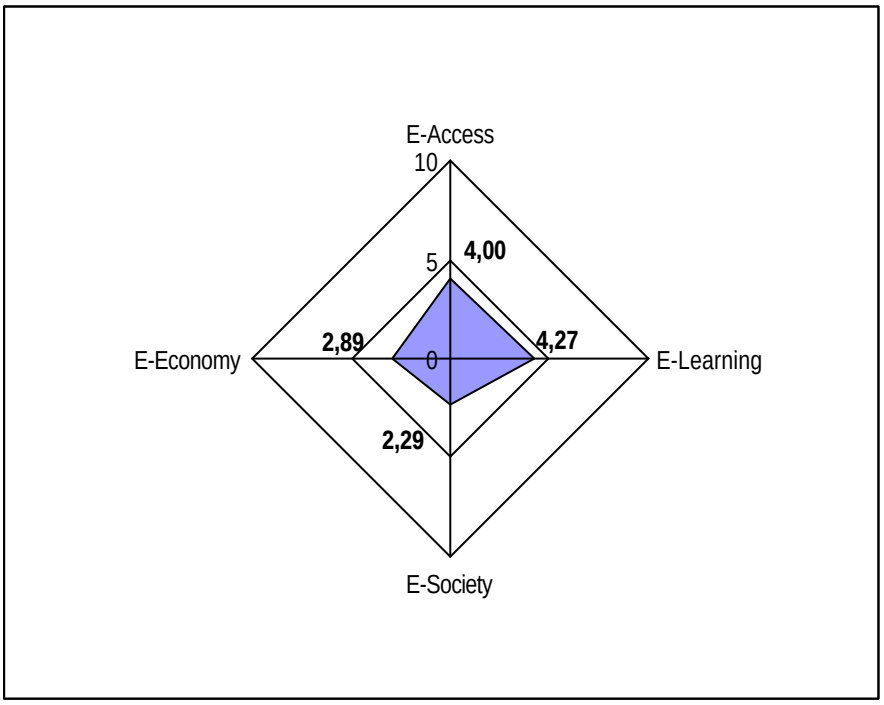
Bulgaria's public administration has made a remarkable progress in terms of its Internet presence. While in 1997 there were only two government websites, this number grew to 120 in 2001. Over 90 percent of central government agencies and public institutions have websites, as well as 4-5 regional authorities, and about 30 municipal administrations. A couple of comprehensive government websites are currently available to the public. In most cases, however, the information is static and not regularly updated. A few websites (e.g. www.taxadmin.government.bg) provide some degree of interactivity, mostly downloading of forms. The implementation in practice of the new law on electronic signatures is expected to create new possibilities for processing of forms and online payments. As thing stand now, the public administration websites are visited by a small number of people – about 4.3 percent of the population and about 6 percent of companies, according to Vitosha Research.

The overall e-economy index (2.89) is below the aggregate e-readiness score for the country and only higher than e-society. This indicates a relatively underdeveloped e-business environment in Bulgaria. Even the government seems better prepared to take on the opportunities of the new economy. Although Bulgaria is still at an early stage

of conceptualizing the benefits and uses of e-Government (3.89), the country is already making efforts to implement some pilot projects in the field.

Figure 3.1 provides an aggregate scorecard of the current state of e-readiness in Bulgaria. A more detailed analysis, including qualitative analysis, of different e-readiness variables is provided in the remaining portion of the paper.

**FIGURE 3.1. AGGREGATE E-READINESS INDEX**




Average value: 3.36